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study was carried out on 60 Wistar albino rats classified into two groups, male and female rats. Both groups were divided into three subgroups according to applied oil. The first subgroup was control group, without treatment. The second and third subgroups included animals treated with FSO or EPO in a dose of 300mg/kg/day and 10mg/kg/day per os, respectively. After 6 weeks of treatment, the animals were sacrificed. Following pro-oxidative markers were measured spectrophotometrically from plasma samples: nitrites (NO₂-), superoxide anion radical (O₂-), hydrogen peroxide (H₂O₂), index of lipid peroxidation (TBARS). Parameters of antioxidant protection were measured from erythrocyte lysate: superoxide dismutase (SOD), catalase (CAT), and reduced glutathione (GSH). No significant gender specific differences in pro-oxidant markers were noticed in between EPO and FSO groups (p>0.05). Both EPO and FSO significantly increased SOD and GSH compared to CTRL in both genders (p<0.05), while FSO improved CAT values only in males, and EPO only in females. Chronic administration of EPO and FSO omega 3 and 6 rich plant oils improved antioxidant defense system with slight gender specific differences in CAT. It's effect on pro-oxidants didn't seem to be protective.

W.1B.6 – The Effects of Statins on Cardiac Function and Oxidative Status in Rats with Sepsis – *Andela Milojević Šamanović, Maja Nikolić, Vladimir Živković, Željko Mijailović, Aleksandar Jevtić, Marijana Anđić, Nevena Draginić, Maja Savić, Sergey Bolevich and Vladimir Jakovljević*

Abstract:

Introduction: Sepsis is a life-threatening condition characterized by organ dysfunction evoked by an abnormal host response to an infectious process. Statins, a class of lipid-lowering agents, possess immunomodulatory effects. Having in mind the potential benefit of treatment with statins in sepsis, we aimed to investigate the effects of statins on cardiac function and cardiac oxidative stress (OS) in the experimental sepsis rat model.

Methodology: Thirty Wistar Albino rats (males, 8-weeks old, BW 200 ± 20g) were randomly divided into 2 groups: Control group (C) n=6 and animals with induced sepsis (SEPSIS) n=24. After induced sepsis, all animals from the SEPSIS group were randomly divided into 4 subgroups: animals with induced sepsis without treatment

(S), animals with induced sepsis treated with a single dose of Atorvastatin (S+A), Simvastatin (S+S*), and Rosuvastatin (S+R). After 72h from sepsis induction, all animals were sacrificed and hearts were isolated and perfused according to the Langendorff technique gradually increasing coronary perfusion pressures 40-120 cmH₂O. In coronary venous effluent were determined the biomarkers of cardiac OS. All data were analyzed by one-way Anova and Kruskal-Wallis tests (p < 0.05).

Results: There were no changes in cardiodynamic parameters in septic rats without treatment, as well in those treated with statins, except for coronary flow, where its values were statistically increased in the sepsis group compared to all

other groups. Also, sepsis was associated with disturbed cardiac OS and most of the applied therapeutic protocols of statins have mitigated the release of hydrogen peroxide and lipid peroxidation index, while in the case of superoxide anion radical, only atorvastatin at CPP 120 cmH₂O had such a positive effect.

Conclusions: The rat's hearts in septic conditions were exposed to elevated OS which was not related to its functional changes. Additionally, statin therapy has achieved positive effects in terms of reduced release of pro-oxidants that could cause oxidative damage to the rat heart.

Session W.2A: 12:00-13:45

Biomechanics

Chair: Momčilo Prodanović

W.2A.1 – Automatic Curvature Analysis for Finely Interpolated Spinal Curves – *Mihai Neghină, Radu Emanuil Petruse, Saša Ćuković, Călin Schiau and Nenad Filipović*

Abstract:

Assessment of the spinal disorders is a notoriously difficult problem, even in controlled environments where the patients are instructed to stand upright. The method presented here considers the analysis of the mathematical curvature of the scaled and interpolated spinal line, in both the sagittal and frontal planes. Although the number of assumptions for spine normality is kept to a (reasonable) minimum, we demonstrate good detection of sharp or otherwise

unnatural local bending in adolescent spinal alignments.

W.2A.2 – Machine Learning-Based Image Processing in Support of Discus Hernia Diagnosis – *Tijana Šušteršič, Vesna Ranković, Vojin Kovačević, Vladimir Milovanović, Lukas Rasulić and Nenad Filipović*

Abstract:

Diagnosing lumbar discus hernia is a challenging task, due to disc and vertebral variations in size, shape, quantity, and appearance. Medical history and physical examination, electrodiagnostic tests, and MRIs are all used by doctors to set a definitive diagnosis. A majority of the state-of-the-art methods are semi-automatic and require extra corrections to the solution or are extremely sensitive to changes in parameters. Based on literature review, there is a solid basis for implementation of machine learning-based methods for disc herniation detection in MRI images. An automated segmentation method of vertebrae and discs is proposed in this study as a first step towards a decision support system for disc hernia identification. Dataset consisted of 104 images in sagittal and 99 images in axial views. Optimized convolutional neural network U-net has demonstrated very high accuracy in segmentation. Additional result represents the calculated distance from the disc's center to the disc's edge points in axial images across 360°, which results in clearly different number of peaks for the healthy and diseased discs. Fully automated computer diagnostic system helps speed up the process of setting up adequate diagnosis and reducing human mistakes.

W.2A.3 – Comparison of Mechanical Response of Knee Joint with Healthy and Damaged Femoral Cartilage – *Aleksandra Vulović, Giuseppe Filardo and Nenad Filipović*

Abstract:

During everyday activities cartilage experiences high loads, stresses, deformations, and contact forces. Sometimes those activities can lead to permanent damage, such as focal lesions. Focal cartilage lesions have been associated with the progressive degeneration of the surrounding cartilage tissue. This paper aims to compare the mechanical response of the knee joint and femoral cartilage using finite element models during the

stance phase of the gait cycle. Our model, developed from MRI scans, has been used to compare the mechanical response of the knee joint with healthy and damaged femoral cartilage. The location of the lesion was above the anterior section of the lateral meniscus. Comparison of the obtained results has shown that having a lesion in the previously mentioned location leads to 80% higher peak Von Mises stress values.

W.2A.4 – Detecting Attention in Hilbert-transformed EEG Brain Signals from Simple-reaction and Choice-reaction Cognitive Tasks – *Patrycja Dziańok, Marcin Kołodziej and Ewa Kublik*

Abstract:

The aim of this study was to investigate supervised machine learning approaches for detecting attentive brain states in the electroencephalogram (EEG) signal. EEG was recorded during methodologically similar tasks with different attentional loads: choice-reaction task (CRT) and simple-reaction task (SRT). This approach minimalizes the influence of other cognitive processes or motor preparation on classification results and thus shows the real discrimination of attentive states. We applied a Hilbert transformation to single trial EEG data to extract selected signal features and then compared the effectiveness of three classifiers: Extra Trees (ET), Support vector machines (SVM) and logistic regression; as well as two methods of feature selection: an ANOVA-based method and Sequential backward floating selection (SBFS). ET and SVM classifiers and logistic regression yielded similar classification results. Classification accuracy was up to 100% for individual subjects and 89% was the average classification accuracy for all subjects after SBFS with the use of ET and logistic regression. ET achieved the highest precision (91%) and specificity (91%), whereas highest sensitivity (89%) was observed for LR.

W.2A.5 – SVM-based Real-Time Classification of Prosthetic Fingers using Myo Armband-acquired Electromyography Data – *Muhammad Akmal, Muhammad Farrukh Qureshi, Faisal Amin, Muhammad Zia Ur Rehman and Imran Khan Niazi*

Abstract: