P8.13: THE ROLE OF HYALURONAN IN AORTIC STIFFENING IN PATIENTS WITH RHEUMATOID ARTHRITIS

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CAROTID ARTERY WAVE INTENSITY ANALYSIS IN HEALTHY HUMANS DURING EXERCISE
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Background: The study of wave reflections in the carotid artery may reveal the vasoactive response of the cerebral circulation to exercise, which is not yet fully characterised. Therefore, we aim to examine the effect of exercise on wave intensity parameters measured in the carotid artery of healthy humans, using non-invasive wave intensity analysis.

Methods: Ultrasonic measurements of right common carotid diameter and flow velocity were obtained from 8 healthy male athletes (27 ± 4 y). Two measurements were taken at rest, followed by measurements during 5-min incremental stages of cycling at 0%, 20%, 40%, 60% and 70% of the subjects’ peak workload, then eight measurements during post-exercise recovery. Wave speed (c) and the intensity peaks and energies of Forward (FEW) and Backward (BEW) waves were determined and compared between the three stages. The reflection index (RI) is calculated as RI = BCW/FCW.

Results: All parameters increased, following the increase of workload. At end of recovery, all parameters returned to rest values. During exercise, c increased by 200%. The intensity of FCW, BCW and FEW increased by 600%, 1100% and 400% during exercise; likewise the energy increased by 450%, 500% and 800%, respectively. Also, RI increased during exercise by 170%.

Conclusions: RI results indicate that cerebral resistance increases with increased workload. Also, the increase in FEW magnitude suggests that an increase in exercise workload is associated with a greater cardiac muscle speed of deceleration in late systole.

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Growing evidence shows that patients with rheumatoid arthritis (RA) have up to twice the risk of developing cardiovascular disease (CVD) compared to those without RA. Generally, these RA patients have higher levels of inflammation in their bodies, and this inflammation is thought to be the link between RA and CVD, but the mechanism is poorly understood. One possibility is that through the overproduction of hyaluronic an (HA) in the extracellular matrix, which is associated with stiffening of the arterial wall in animal models, results of this study show that RA patients had higher serum HA (54.8 ± 67.5 vs. 17.5 ± 17.6 ng/mL, p < 0.0001) and aortic pulse wave velocity (aPWV) compared to non-RA controls. In regression analysis HA was independently associated with aPWV. Eight weeks of anti-inflammatory anti-TNF-α therapy lead to a significant reduction of aPWV (8.99 ± 1.51 vs 78.6 ± 1.58 m/s). Together, these data suggest that while HA is associated with arterial stiffening in RA patients and may be reduced by anti-inflammatory treatment, HA itself may not have a direct influence on the mechanical properties of the arterial wall.

P8.14 ELASTIC MODULUS OF HUMAN AORTAS AS A MEASURE OF STIFFNESS
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Background: Although arterial stiffness is of clinical interest, data on the elastic modulus of the human aortic wall are scarce. The aim of this work is to directly measure the elastic modulus of human aorta ex vivo.

Methods: Using a standard tensiometer, we measured the elastic modulus (E) of human aortic rings (n = 205). Wall thickness and diameter were measured, and the pulse wave velocity (PWV) for each aorta was calculated using Moens-Korteweg equations. The results were analysed based on age, gender and aortic site, then compared with data obtained in living subjects using MRI (n = 160).

Results: At 100mmHg pressure, E of aortic rings increased with age, with a composite increase in PWV: under 30 years = 3.73 ± 0.49; 30-39 years = 3.32 ± 0.58; 40-49 years = 3.32 ± 0.49; 50-59 years = 3.55 ± 1.00; 60-69 years = 4.05 ± 1.21; 70-79 years = 4.52 ± 1.26; 80-89 years = 5.93 ± 0.12 m/s. There was no significant difference in either E or PWV between genders. There was also no significant difference in E or PWV based on aortic site, likely due to under-representation of most sites. PWV measured in vivo using MRI was higher at each age: under 30 years = 3.96 ± 0.21; 30-39 years = 4.47 ± 0.61; 40-49 years = 4.85 ± 0.75; 50-59 years = 5.97 ± 1.14; 60-69 years = 6.64 ± 1.16; 70-79 years = 9.40 ± 2.42 m/s. The difference between in vivo and ex vivo measurements increased with age.

Conclusions: PWV calculated from ex vivo E measurements reflect established physiological patterns, suggesting that direct elastic modulus measurement is an acceptable method for analysing stiffness in aortic tissue.

P8.15 THE RELATION BETWEEN ARTERIAL STIFFNESS-RELATED, AND STEADY BLOOD PRESSURE COMPONENTS AND LEFT ATRIAL VOLUME IN THE CONTEXT OF LEFT VENTRICULAR MASS INDEX
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Objective: To check of relation between blood pressure (BP) and arterial stiffness parameters and estimates of left atrial volume to verify whether it is the arterial stiffness-related BP parameters or mean arterial pressure (MAP) that could be responsible for increase in risk of atrial fibrillation.

Methods: Group of Cracow suburban area inhabitants (n = 205, 66% women) was examined for: 24h(SBP24h, DBP24h, MAP24h, P24h), central(cSBP, cDBP, cMAP, cPP), BP components as factors related to left atrial volume, in particular the elastic modulus of the human aortic wall are scarce. The aim of this work is to directly measure the elastic modulus of human aortic wall ex vivo. The study of wave reflections in the carotid artery may reveal the vasoactive response of the cerebral circulation to exercise, which is not yet fully characterised. Therefore, we aim to examine the effect of exercise on wave intensity parameters measured in the carotid artery of healthy humans, using non-invasive wave intensity analysis. Ultrasonic measurements of right common carotid diameter and flow velocity were obtained from 8 healthy male athletes (27 ± 4 y). Two measurements were taken at rest, followed by measurements during 5-min incremental stages of cycling at 0%, 20%, 40%, 60% and 70% of the subjects’ peak workload, then eight measurements during post-exercise recovery. Wave speed (c) and the intensity peaks and energies of Forward (FEW) and Backward (BEW) waves were determined and compared between the three stages. The reflection index (RI) is calculated as RI = BCW/FCW.

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Conclusions: RI results indicate that cerebral resistance increases with increased workload. Also, the increase in FEW magnitude suggests that an increase in exercise workload is associated with a greater cardiac muscle speed of deceleration in late systole.

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P8.16 WHITE MATTER LESIONS ARE ASSOCIATED WITH A SIGNIFICANT DECREASE IN THE METABOLISM OF THE BRAIN GREY-MATTER FROM OLDER HYPERACTIVE PATIENTS
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White matter lesions, described as leukoaraiosis, are frequently documented in older hypertensive patients, but their consequence on brain metabolism remains debated. This study aimed at characterizing the changes in brain metabolism, assessed by [18F]-fluorodeoxyglucose Positron Emission Tomography (FDG-PET) imaging in relation to the severity of leukoaraiosis in older hypertensive patients.