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MULTI-SITE ULTRASOUND ASSESSMENT OF ARTERIAL REMODELING AND DISTENSIBILITY IN MARATHON RUNNERS

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Objective: to investigate features of arterial remodeling and distensibility in marathon runners by a multi-site, non-invasive approach.

Methods: 46 marathon runners (M) and 15 age-sex- and BMI matched sedentary (S) individuals were recruited (men 70 vs 67%, $p=0.83$; age 44 ± 7 vs 43 ± 6 years, $p=0.62$; BMI 23 ± 2 vs 23 ± 3 , $p=0.65$; brachial BP $127\pm12/76\pm9$ vs $123\pm10/74\pm8$ mmHg, $p=0.29$ and 0.30 ; HR 53 ± 14 vs 64 ± 8 bpm, $p=0.004$). The following measurements were performed: brachial blood pressure (BP – oscillometric method), carotid and femoral BP, aortic BP (applanation tonometry+transfer function), carotid-femoral pulse wave velocity (PWV), ultrasound assessment of abdominal aorta, common carotid, common femoral and brachial artery. For each arterial site mean diameter (MD) and local distensibility coefficient (DC) were assessed.

Results: M in comparison with S had increased Aortic MD (15.8 ± 2.0 vs 13.1 ± 1.1 mm, $p=0.0001$) and reduced DC (30.3 ± 15.2 vs 38.5 ± 10.5 , $p=0.05$), with similar carotid and brachial MD (7.16 ± 0.59 vs 7.04 ± 0.77 mm and 4.05 ± 0.56 vs 3.99 ± 0.82 mm, $p=ns$) and DC (38.0 ± 9.3 vs 40.2 ± 11.5 and 9.9 ± 6.6 vs 8.9 ± 5.6 , $p=ns$). Furthermore, femoral MD was increased (9.8 ± 1.0 vs 8.8 ± 1.4 , $p=0.01$), whereas DC was similar (29.0 ± 12.5 vs 33.1 ± 16.1 , $p=ns$). Carotid, femoral and aortic BP, carotid and femoral IMT, as well as carotid-femoral PWV (6.6 ± 1.5 vs 6.7 ± 0.9 m/s, $p=0.86$), were similar in M and S.

Conclusions: Marathon runners present remodeling of aorta and femoral arteries and reduced abdominal aortic distensibility. Multi-site assessment of local arterial distensibility might be more useful than assessment of regional arterial stiffness to identify specific patterns of vascular structure and function in athletes.

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PREDICTIVE VALUE OF ENDOTHEL DYSFUNCTION ASSESSED BY FLOW MEDIATED VASODILATATION AND ARTERIAL STIFFNESS PARAMETERS IN THROMBOTIC EVENTS OF PRIMARY ANTIPHOSPHOLIPID SYNDROME

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Primary antiphospholipid syndrome (APS) is characterized by recurrent arterial or venous thrombosis and/or fetal loss in the presence of antiphospholipid antibodies. The authors in a longitudinal (2005-2015) follow-up study examined how the angiological and metabolic parameters have changed during the follow up. The aim was to define if there is any association with the latter thrombotic events and the changing of examined parameters and if the parameters have any predictive values in APS specific events.

In 2005 49 primary APS patient were enrolled. In 2015 26 patient participated in the follow up measurements, but we obtained clinical history from all of the patients. Endothel function was described by flow mediated vasodilatation (FMD), stiffness parameters (augmentation index, pulse wave velocity), carotid intima-media thickness (cIMT) were examined, and metabolic parameters were also determined.

During the follow-up 28 patient suffered thromboembolic events, in 21 patients did not have any kind of thromboembolic events. In the thrombotic group the onset cIMT was significantly higher (0.73 mm vs 0.63 ; $p=0.014$) than in patients without thrombotic events. As for the other onset angiological parameters there were no significant difference between the thrombotic and non-thrombotic group. In the thrombotic group significantly more patient smoked ($p=0.015$). In the non-thrombotic group the endothel function significantly improved ($p=0.019$) while in the thrombotic group the cIMT significantly increased ($p=0.05$) during the 10 year follow-up.

The improvement of endothel function with pharmacological and non-pharmacological measures has positive clinical benefit. The abnormal stiffness parameters do not correlate with the clinical outcome.

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PULSE PRESSURE AND INTIMA MEDIA THICKNESS IN RELATION TO SERUM VITAMIN D CONCENTRATION IN A SAMPLE OF GENERAL POPULATION

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Objectives: Vitamin D regulates the renin-angiotensin-aldosterone system, inhibits proliferation of cardiomyocytes and vascular smooth muscles and has anti-inflammatory effects. We aimed to investigate the relation between serum vitamin D concentration and arterial structure and function in a sample of general population.

Methods: The study group included 303 subjects recruited from general population. Office BP was measured at 2 separate visits, 5 times at each visit. SpaceLabs90207 oscillometric monitors were programmed to measure ambulatory BP (ABP) each 15 min. daytime (6.00 – 22.00) and each 30 min. nighttime. Ultrasound examination of carotid arteries allowed to obtain the intima media thickness (IMT). Based on the ABP data, we calculated pulse pressure (PP) over 24h, daytime and nighttime. Vitamin D concentration was measured in serum. Database management and multivariate analyses were performed with SAS software (SAS Institute, Cary, NC, version 9.3).

Results: The study group included 138 men and 165 women, mean age = 47 ± 16 years, 164 subjects had hypertension. Mean serum vitamin D level was 21.1 ± 8.7 ng/ml. With adjustments applied for age, sex, body mass index, 24-hour systolic blood pressure and smoking, serum vitamin D negatively correlated with 24h PP ($\beta=-0.05\pm0.038$, $p=0.05$) and daytime PP ($\beta=-0.035\pm0.027$, $p=0.05$). We observed positive correlation between IMT and vitamin D in two subgroups: in younger population (mean age = 34.8yrs, $\beta=0.01\pm0.019$, $p=0.03$) and in male participants ($\beta=0.0012\pm0.052$, $p=0.03$).

Conclusion: In that general population, vitamin D concentration was negatively associated with 24 h and daytime pulse pressure. Higher cholecalciferol was related to intima media thickness but only in men and in young individuals.

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RELATION OF PARAMETERS OF VASCULAR STIFFNESS TO CARDIAC STRUCTURE AND FUNCTION IN PATIENTS AT RISK OF OR WITH TYPE 2 DIABETES

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Objective: To investigate the relationship between arterial function and cardiac, especially left ventricular (LV) diastolic, function, in people at risk of or with type 2 diabetes (T2DM).

Design and method: 64 patients (48% non-European) participated in the study. Cardiac indices were obtained by 2-dimensional echocardiography, aortic pulse wave velocity (PWV) and augmentation index (Alx) were measured with an Arteriograph, cardio ankle vascular index (CAVI), nominally independent of pressure, was obtained using a VaSera device.

Results: Mean age was 59 y, 83% with T2DM, 84% hypertension, 12% previous cardiovascular events. Regressions for Alx with LV mass index (mean 51.2 g/ $m^{2.7}$) and left atrium volume index (β (SE)) were 0.52 (0.16) and 1.43 (0.4), $p<0.002$. Tissue Doppler indices (TDI) of diastolic function, E' septal and E' lateral waves were inversely related with Alx (-2.94 (0.9) and -2.14 (0.8)) as they were with CAVI (left, -0.2 (0.07) and -0.27 (0.05)) (all $p<0.01$), but the E/E' ratio was not. Similarly, TDI for systolic function, S', was related with Alx (-3.7 (1.1)) and with CAVI (0.21 (0.1)) ($p<0.05$). In multiple regression models these relationships were still significant, when including age, gender, BMI, diabetic status and ethnicity, for cardiac structure and function ($p<0.05$), as with CAVI measures ($p<0.05$). There was no relationship with aortic PWV.

Conclusion: In patients at risk of or with T2DM, pressure augmentation is related to cardiac remodeling and diastolic function while a mainly