



## Artery Research

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### **P5.13: CHANGES IN VENTRICULO-ARTERIAL COUPLING IN PATIENTS WITH HYPERTENSION AND TYPE-2-DIABETES AFTER A PERIOD OF INTENSIFIED ANTIHYPERTENSIVE TREATMENT**

T.K. Soender, L. van Bortel, T. de Backer

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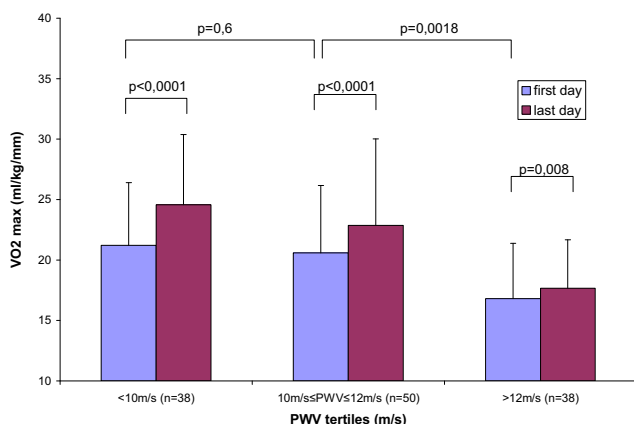
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Carotid femoral PWV, blood pressure (MAP) and heart rate (HR) were measured in a quiet room in the morning of their first and last day prior to any exercise. VO<sub>2</sub>max was also measured at entry and at the end of the rehabilitation program.

PWV was correlated with age ( $R^2=0.23$ ), MAP ( $R^2=0.10$ ) and VO<sub>2</sub>max ( $R^2=0.14$ ) on the first day of the program. There was a small significant reduction in MAP ( $92\pm 12$  to  $88\pm 10$  mmHg,  $p<0.001$ ), in PWV ( $12.1\pm 3.4$  to  $11.4\pm 3.1$  m/s,  $p=0.002$ ), an increase in VO<sub>2</sub>max ( $19.7\pm 5.5$  to  $21.8\pm 6.5$  ml/kg/mm,  $p<0.001$ ) but no change in resting HR ( $70\pm 13$  to  $67\pm 11$  bpm  $p=0.02$ ). When the cohort was separated into PWV tertiles at entry, patients with the lowest PWV exhibit the highest improvements in VO<sub>2</sub>max (see figure).

In our cohort, physical fitness improvement depends on entry arterial stiffness with highest results for patients with low PWV and poorest results for patients with high PWV.



#### P5.12

### BRACHIAL-TO-RADIAL SYSTOLIC BLOOD PRESSURE AMPLIFICATION IS SIGNIFICANTLY BLUNTED IN PATIENTS WITH TYPE 2 DIABETES; UPPER LIMB HAEMODYNAMIC'S HAVE AN INFLUENTIAL ROLE

R. E. D. Climie, D. S. Picone, M. A. Keske, J. E. Sharman  
Menzies Research Institute Tasmania, Hobart, Australia

**Objectives:** We recently found significant age-related increases in brachial-to-radial systolic blood pressure amplification (Bra-Rad-SBP<sub>amp</sub>), and this has implications for correct central SBP estimation. Patients with type 2 diabetes mellitus (T2DM) have vascular irregularities that may alter Bra-Rad-SBP<sub>amp</sub> and this study sought to determine the magnitude and mechanisms of Bra-Rad-SBP<sub>amp</sub> in these patients.

**Methods:** Twenty T2DM (64±8 years; 50% male) and 20 controls (60±8 years; 50% male) underwent simultaneous cuff auscultation and two-dimensional ultrasound imaging of the brachial and radial arteries. The 1<sup>st</sup> Korotkoff sound (denoting SBP) at each arterial site was identified from the first inflection point of Doppler flow during BP cuff deflation. Bra-Rad-SBP<sub>amp</sub> was calculated by radial minus brachial SBP. Local and systemic haemodynamics were recorded by tonometry and ultrasound.

**Results:** Radial SBP was higher than brachial SBP for both T2DM ( $136\pm 16$  vs  $127\pm 17$ ;  $p<0.001$ ) and controls ( $135\pm 12$  vs  $121\pm 11$ ;  $p<0.001$ ), and Bra-Rad-SBP<sub>amp</sub> was significantly lower in T2DM ( $9\pm 8$  mmHg vs  $14\pm 7$  mmHg,  $p=0.042$ ). Central SBP was significantly higher in both controls and T2DM when radial pressure waveforms were calibrated using radial, compared with brachial SBP ( $p<0.001$  both). The product of brachial artery flow velocity and diameter was significantly increased in T2DM ( $213\pm 108$  versus  $315\pm 144$  cm/s/mm,  $p=0.023$ ), and this was inversely correlated with Bra-Rad-SBP<sub>amp</sub> ( $r=-0.643$ ,  $p=0.003$ ) even after adjustment for age and sex ( $\beta=-0.031$ , adjusted  $R^2=0.366$ ,  $p=0.002$ ).

**Conclusions:** Patients with T2DM have higher radial SBP than brachial SBP, but compared with controls, overall Bra-Rad-SBP<sub>amp</sub> is significantly blunted. Local haemodynamics influence the magnitude of Bra-Rad-SBP<sub>amp</sub> and overall these findings have implications regarding correct estimation of central BP.

#### P5.13

### CHANGES IN VENTRICULO-ARTERIAL COUPLING IN PATIENTS WITH HYPERTENSION AND TYPE-2-DIABETES AFTER A PERIOD OF INTENSIFIED ANTIHYPERTENSIVE TREATMENT

T. K. Soender, L. van Bortel, T. de Backer  
Ghent University, Ghent, Belgium

**Objective:** To examine changes in ventriculo-arterial coupling (VAC) and left ventricular systolic function (LVF<sub>SYS</sub>) after a period of intensified antihypertensive treatment in patients with hypertension and type-2-diabetes.

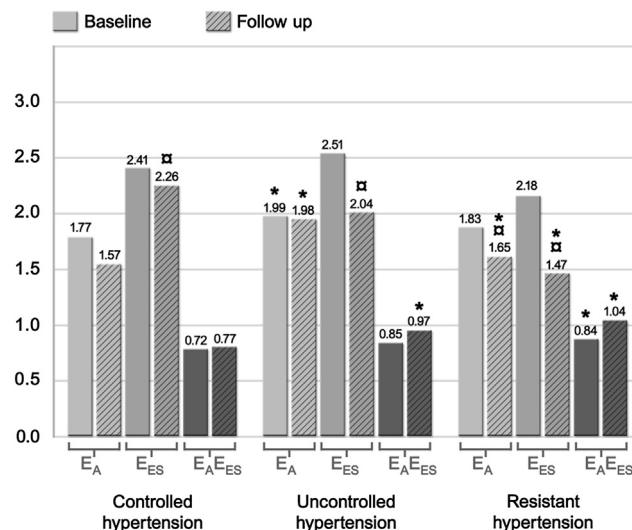
**Methods:** Patients were categorized as controlled- (CH), uncontrolled- (UH) or resistant (RH) hypertensives based on ambulatory blood pressures (BPs) and number of antihypertensive agents. Central BPs were estimated using radial applanation tonometry and a generalized transfer function. LVF<sub>SYS</sub> was evaluated using ejection fraction (EF) and S' (echocardiography). VAC was estimated as the ratio of effective arterial elastance (E<sub>A</sub>) to end-systolic elastance (E<sub>ES</sub>).

**Results:** 100 Patients were included (CH N=34, UH N=32, RH N=34). Median [interquartile ranges] follow up time was 6 [5;8] months.

At follow up patients with UH and RH had a significantly higher E<sub>A</sub> and E<sub>A</sub>/E<sub>ES</sub> compared to patients with CH. Despite a significant reduction in central BPs of 6/4 and 8/3 mmHg there was a non-significant increase in E<sub>A</sub>/E<sub>ES</sub> in patients with UH and RH respectively. E<sub>ES</sub> was significantly reduced in all hypertension groups (figure 1).

On average EF and S' was below 55% and 8 cm/s in all hypertension groups. In patients with RH EF and S' were further reduced from 48 [39;53] % to 42 [34;47] % ( $P=0.01$ ) and 7 [6;8] to 7 [5;7] cm/s ( $P=0.01$ ).

**Conclusion:** VAC and LVF<sub>SYS</sub> did not improve despite a reduction in central BPs. Instead E<sub>ES</sub> deteriorated in all hypertension groups. We speculate whether this is due to a reduction in myocardial perfusion or a gradual progression of diabetic cardiomyopathy.



#### P5.14

### HIGH INTENSITY AEROBIC EXERCISE IN PATIENTS WITH ANKYLOSING SPONDYLITIS REDUCES ARTERIAL STIFFNESS: RESULTS FROM A RANDOMIZED CONTROLLED TRIAL

I. J. Berg, A. G. Semb, S. Halvorsen, C. Fongen, T. K. Kvien, H. Dagfinrud, S. A. Provan  
Diakonhjemmet Hospital, Dep of Rheumatology, Oslo, Norway

**Objective:** Patients with ankylosing spondylitis (AS) are at increased risk of CVD. The etiological mechanism or how to reduce risk is not known. Exercise can reduce CV risk in the general population. The objective was to test whether high intensity aerobic exercise reduces central arterial stiffness.

**Methods:** A proof of concept randomized controlled pilot study. AS patients were allocated to exercise group (EG) or control group (CG). The 3 months exercise intervention consisted of aerobic high intensity training 40 minutes 3 days a week and muscular strength training 20 minutes twice a week. The control group received care as usual. Augmentation Index (AIx) and pulse