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### **P72: AORTIC PULSE WAVE VELOCITY IN PATIENTS WITH COPD: 5-YEAR DATA FROM THE ARCADE STUDY**

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**Background:** Ankylosing spondylitis (AS) is an inflammatory autoimmune disease. AS is a prototype form of spondyloarthropathies (SpA). The precise ethology of AS has not been fully understood. But Inflammation has a critical role in the pathogenesis of the disease. Extra skeletal organs may also be affected by this disease and is also associated with an increase of cardiovascular risk. The effect of large arteries appears by a stiffness that can be an element of disease monitoring.

**Objective:** The objective of this study was to evaluate the finger-toe Pulse Wave Velocity (ftPWV) in patients with AS.

**Methods:** Finger-toe pulse wave velocity (ft-PWV) was measured by pOpmetre<sup>®</sup> allowed to explore arterial stiffness.

**Results:** Demographic and clinical characteristics are presented in Table 1. Twenty-two patients with AS and 24 controls were included in our study, subjects with AS exhibited greater pSBP ( $p < 0.001$ ), pDBP ( $p < 0.001$ ), pPP ( $p < 0.001$ ) and MBP ( $p < .001$ ) compared to controls. Moreover, in the AS group we observed a higher ftPWV with a mean difference of 1.63 ( $p < 0.006$ , 95% CI of .50 to 2.7). No significant difference was observed in pPP.

**Conclusions:** Individuals with ankylosing spondylitis showed increased ftPWV, central and peripheral blood pressure, this contributes to explain the higher risk of cardiovascular disease in this pathology. pOpmetre<sup>®</sup> is a no operator depended, simple and practical device, highlighted an increase in arterial stiffness in patients with AS by measuring the ft-PWV. It could play a role in this disease monitoring and in prediction of cardiovascular complications.

	AS	Controls	p
Age (years)	42.4±11.1	40±9.9	.45
Males/Females	5/15	6/17	.56
BMI	25.5±3.9	27.1±3.5	.16
sSBP (mmHg)	116.4±14	102.3±7	<.01
pSBP (mmHg)	127.6±13	113.8±8	<.01
pDBP (mmHg)	78.3±7	67.7±8	<.01
MBP (mmHg)	68.0±8	65.1±4	<.01
pPP (mmHg)	47±7	46.8±9.3	.84
ftPWV	7.8±2.3	6.1±1	<.006

Table 1. Demographic and clinical characteristics of patients with ankylosing spondylitis and controls.

**P71**  
**TROPONIN INCREASE AND SUBENDOCARDIAL OXYGEN SUPPLY AND DEMAND IMBALANCE IN CARDIAC AMYLOIDOSIS**

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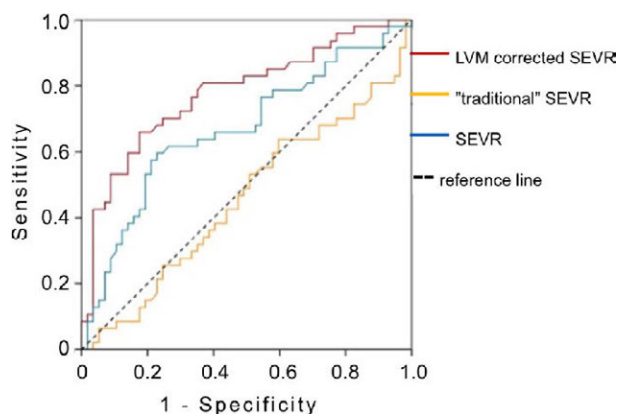
**Background:** The increase in troponin is a cardiac amyloidosis (CA) peculiarity. The most acclaimed hypothesis is direct toxicity of amyloid fibrils on cardiomyocytes, but a subendocardial ischemia due to discrepancy between oxygen supply and demand has not been investigated yet.

**Methods:** 129 outpatients attending the Pavia Amyloid Center were enrolled, 66 of them were affected by CA. Aortic stiffness was assessed measuring carotid-femoral pulse wave velocity (PWV). The subendocardial viability ratio (SEVR) was used to quantify the relationship between subendocardial oxygen supply and demand. Echocardiogram data were used to quantify left ventricular diastolic pressure and left ventricular mass index (LVMI).

**Results:** Troponin was higher in CA ( $p < 0.0001$ ); there was an inverse correlation between troponin and SEVR ( $p = 0.0002$ ). Troponin was strongly correlated with LVMI ( $p = 0.0003$ ). Both the increase in TnI and the reduction of SEVR were related to low values of ejection fraction. The ROC curves showed that SEVR had a greater sensitivity and specificity (AUC = 0.778) than EF% and PWV in identifying pathological troponin values.

**Conclusions:** There is a close relationship in CA between troponin values and the reduction in the SEVR. Ischemic suffering, with undamaged coronary arteries, may be a cause of cardiac myocytes damage in amyloidosis. LVMI

increases with disease progression. On the other hand, amorphous amyloid mass modifies the microcirculation. These two phenomena may seriously affect myocardial perfusion. Moreover, amyloid alters the macrostructural organization of myofibrils, thus heart may need an increased energy-metabolic supply. SEVR assessment may improve the identification of subclinical myocardial damage in cardiac amyloidosis.



**P72**  
**AORTIC PULSE WAVE VELOCITY IN PATIENTS WITH COPD: 5-YEAR DATA FROM THE ARCADE STUDY**

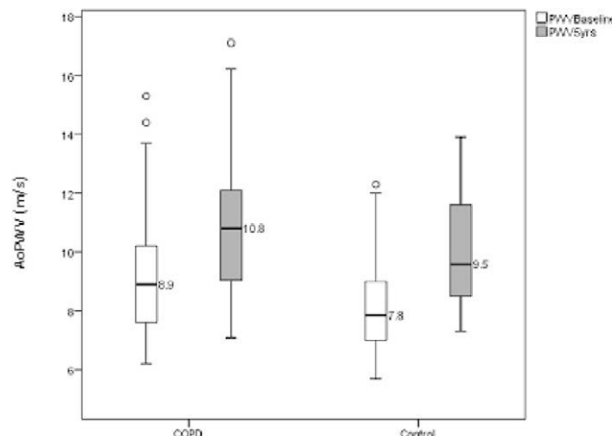
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**Background:** Cardiovascular (CV) disease is a major cause of morbidity and mortality in COPD 1. Aortic pulse wave velocity (AoPWV), an independent predictor of CV risk, is elevated in COPD 2, however, there have been no longitudinal studies of AoPWV in COPD. The Assessment of Risk in Chronic Airways Disease Evaluation (ARCADE) aims to study CV risk factors longitudinally, in COPD. We hypothesised that patients with COPD would have increased AoPWV over 5 years compared to controls.

**Methods:** Thus far, 26 patients with COPD and 26 controls subjects have completed the assessments at baseline and after 5 years. Assessments included: AoPWV (SphygmoCor device), blood pressure (BP), heart rate, BMI and lung function (spirometry).

**Results:** At baseline, patients and controls were similar in age, gender, BP, heart rate and BMI but patients had a trend of greater PWV ( $p < 0.055$ ). After 5 years both COPD and comparators had increased AoPWV ( $p < 0.05$ ). There was no change BP in COPD, but BP increased in controls ( $p < 0.05$ ), while lung function declined in patients with COPD ( $p < 0.05$ ) but not controls. The rate of change of AoPWV was similar in patients and controls after adjustment for changes in BP (Figure 1) ( $p > 0.05$ ).

**Conclusions:** Although the increase in AoPWV over 5 years was similar in COPD and controls, AoPWV was greater in patients with COPD than controls at baseline and after 5 years which may suggest earlier stiffening in COPD. Further longitudinal assessments will inform the understanding of the development of arterial stiffness and may indicate possible therapeutic targets.



## References

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2. Sabit et al. 2007 AJRCCM 175:1259–1265.

## P73

#### AORTIC BUT NOT PERIPHERAL PULSE WAVE VELOCITY IS IMPROVED AFTER HEART RATE TARGETED AEROBIC PHYSICAL TRAINING IN METABOLIC SYNDROME SUBJECTS

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**Objective:** To evaluate the response of aortic and peripheral arterial stiffness parameters to heart rate (HR) targeted exercise training in metabolic syndrome (MS) subjects.

**Methods:** This cohort study included 170 individuals with MS (mean age  $53.3 \pm 6.9$  years, 55% women). The subjects were recruited using a 1:1 random sampling method and divided into intervention aerobic physical training (aPT) and control groups. Intervention group subjects participated in a 2-month duration HR targeted aPT programme. Subjects in both groups were investigated at baseline and after 2 months. Arterial stiffness parameters, such as aortic carotid–femoral pulse wave velocity (cfPWV), peripheral carotid-radial pulse wave velocity (crPWV) and aortic augmentation index, mean blood pressure in the aorta (MBP) were evaluated.

**Results:** After 2 months of aPT aortic stiffness decreased indicated by the reduction of cfPWV by 0.54 m/s (6.33 %, p0.05). Using a regression tree method the highest improvement of arterial wall after aPT was achieved when initial cfPWV was  $>10.1$  m/s ( $-2.31 \pm 1.15$  m/s) and cut-off value for positive effect was 8.6 m/s.

**Conclusions:** After 2 months of aPT arterial stiffness improved only in reduction of cfPWV and MBP. Therefore, it would be reasonable to measure cfPWV rather than crPWV in order to evaluate the aPT effect on arterial wall function in MS patients.

## P74

#### SLEEP QUALITY IS ASSOCIATED WITH CEREBROVASCULAR FUNCTION IN INDIVIDUALS WITH MULTIPLE SCLEROSIS

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**Introduction:** Individuals with multiple sclerosis (MS) exhibit impaired cerebrovascular function and have poor sleep quality. In the general population, poor sleep contributes to cerebrovascular dysfunction and is related to cardiovascular disease (CVD). Improving sleep quality may have beneficial effects in preventing CVD; however, the relationship between sleep quality and cerebrovascular function in MS has not been examined.

**Purpose:** To examine the effect of sleep quality on cerebrovascular function in individuals with MS.

**Methods:** Sixteen individuals with MS had sleep quality assessed with the Pittsburgh Sleep Quality Index. Individuals were categorized as having poor sleep quality (n = 6, score  $>5$ ) or good sleep quality (n = 10, score  $\leq 5$ ). Cerebrovascular function was assessed via transcranial Doppler ultrasound with the following hemodynamic outcomes: mean middle cerebral artery velocity (mMCAv), pulsatility index (PI), and resistance index (RI). An automated blood pressure cuff was used to measure baseline blood pressure (systolic, diastolic, mean (SBP, DBP, MAP)) and heart rate in a seated position. End-tidal CO<sub>2</sub> (EtCO<sub>2</sub>) was measured by gas capnography.

**Results:** Those with poor sleep quality had greater PI and RI, and lower mMCAv compared to those with good sleep quality (p $<0.05$ , table 1). No group differences were seen for weight, height, BMI, CO<sub>2</sub>, or hemodynamic variables.

**Conclusion:** Our results suggest that individuals with MS with poor sleep quality have worsened indicators of cerebrovascular function. Therefore, sleep quality may be related to the elevated CVD risk in individual with MS, and it should be assessed in future studies evaluating cerebrovascular function in MS, including intervention studies.

## Poster Session I – Pathophysiology

## P75

#### DIFFERENTIAL ELASTIN DEGRADATION AND MICROMECHANICAL PROPERTIES IN ASCENDING AORTIC ANEURYSM GROUPS: STATISTICAL MODELLING

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**Background:** Elastin microstructure is an important factor in aortic aneurysms. However, it is unclear whether elastin microstructure varies in different ascending aneurysm aetiologies, and how this relates to micromechanical behaviour. Objective to combine in vitro experimentation and statistical modelling to distinguish between ascending aortic aneurysm groups; bicuspid aortic valve with associated aneurysm (BAV) and idiopathic degenerative aneurysm (DA). The role of micromechanical and biochemical properties as risk factors was explored.

**Methods:** Aortic biopsies were taken from patients undergoing BAV or DA aneurysmal repair (n = 30). Oscillatory nanoindentation was applied to the medial layer [1]. The same tissues were chemically or enzymatically digested and measured for collagen, elastin and glycosaminoglycan (GAG) levels using hydroxyproline, fastin elastin kit and 1-9 dimethylmethylene blue respectively. Elastic fibre numbers and length were measured from Verhoeff-Van Gieson stained images. All measured data and patient clinical characteristics were analysed using least absolute shrinkage and selection operator (LASSO) regression.

**Results:** Micromechanical properties of BAV tissue was found to be significantly higher than DA tissue (p < 0.001). Similarly, this significant trend was also noted for GAG (p = 0.004) and collagen levels (p = 0.02). Although elastin levels were not significant, an increase in the number of long fibres was observed in BAV tissue (p = 0.02).

**Conclusions:** LASSO regression showed that micromechanical and elastin properties were unique predictors for BAV, whereas age, gender, collagen and preoperative aortic diameter were unique for DA. Our statistical approach is the first to show that ascending aortic aneurysm groups can be distinguished using novel in vitro measurements.

## References

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## P76

#### CAROTID THERMAL HETEROGENEITY AND DYSLIPIDEMIA: THE HEAT IS ON

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**Background:** Microwave Radiometry (MWR) is a new validated method, which allows evaluation of thermal heterogeneity of carotid arteries and is associated with inflammation. Purpose: The aim of this pilot study was to determine if thermal heterogeneity in the carotid arteries is associated with aortic elastic properties in patients with dyslipidemia and whether treatment for dyslipidemia affects thermal heterogeneity.

**Method:** Twenty-nine patients with dyslipidemia (mean age  $42 \pm 13$  years, range 22–75, 19 men) without known cardiovascular disease, underwent assessment of carotid thermal heterogeneity (temperature difference- $\Delta T$ ) using MWR. Mean common carotid intima-media thickness (CIMT) was also assessed. Twenty-one patients were treated for 6 months with statin or/and ezetimibe and thermal heterogeneity was assessed after treatment.

**Results:** There was a positive correlation between  $\Delta T$  and CIMT (r = 0.474, p = 0.009). In multivariate regression analysis, after adjustment for potential confounders such as age, sex, mean blood pressure and body-mass index, CIMT showed a positive correlation with  $\Delta T$  in carotid arteries (Adjusted R<sup>2</sup> = 0.258, p = 0.048). Thermal heterogeneity after 6 months