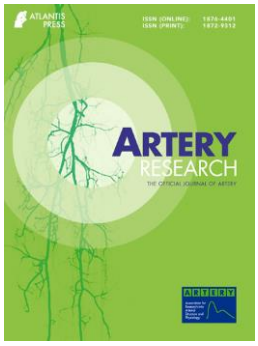

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P73: THE ASSESSMENT OF PULMONARY ARTERY STIFFNESS IN COPD USING CARDIAC MRI THE Q/A METHOD

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ASSOCIATION BETWEEN URINARY SODIUM EXCRETION, ENDOTHELIAL FUNCTION AND ARTERIAL STIFFNESS IN NON-DIABETIC HYPERTENSIVE PATIENTS

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Background: High salt intake has been associated with structural and functional vascular changes.[1]
Objective: To correlate urinary sodium excretion with endothelial function and arterial stiffness in non-diabetic hypertensive patients.
Methods: Cross-sectional study with non-diabetic hypertensive patients, both genders, aged 45–65 years, submitted to office blood pressure measurement, 24-hour urine sampling, carotid-femoral pulse wave velocity (PWV; Complior Analysis), central hemodynamic parameters by applanation tonometry (SphygmoCor) and microvascular reactivity by Laser Speckle Contrast Analysis (Pericam PSI)[2].
Results: Patients (n = 18) were divided according to the urinary sodium excretion (UrNa) median: group 1 (UrNa <165mEq/24h) and group 2 (UrNa ≥ 165mEq/24h). The mean age was 56 years, 72% were women. Although not statistically significant, group 2 presented higher systolic blood pressure (SBP, 136 ± 12 vs 144 ± 20 mmHg, p = 0.382) and diastolic blood pressure (84 ± 10 vs 87 ± 10 mmHg, p = 0.523). Serum insulin (11 ± 5 vs 20 ± 12 mcU/ml, p = 0.072), HOMA-IR (2.6 ± 1.2 vs 4.9 ± 3.0, p = 0.069), C-Reactive protein (CRP, 0.12 ± 0.35 vs 0.78 ± 0.83 mg/dL, p = 0.058) and PWV (8.8 ± 2.1 vs 10.8 ± 2.3 m/s, p = 0.093) were also higher in group 2. There were no significant differences in aortic SBP (127 ± 16 vs 132 ± 20 mmHg, p = 0.556), and in the peak of microvascular reactivity (95.5 ± 24.0 vs 83.4 ± 45.1, p = 0.505). Group 2 presented a higher proportion of patients with HOMA-IR greater than 2.7 (37.5 vs 70.0%, p = 0.047), CRP greater than 0.4 mg/dl (12.5 vs 55.6%; p = 0.064) and PWV greater than 10m/s (25 vs 80%, p = 0.020).
Conclusion: Although without significant differences in blood pressure and endothelial function, hypertensive patients with higher urinary sodium excretion showed changes suggestive of insulin resistance and arterial stiffness.

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Poster Session 1 — Imaging Technologies

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THE ASSESSMENT OF PULMONARY ARTERY STIFFNESS IN COPD USING CARDIAC MRI THE Q/A METHOD

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Background: Pulmonary artery distensibility and pulsatility has been studied in patients with COPD using cardiac MRI (CMRI) **(1)**. However, pulmonary artery pulse wave velocity (PA- PWV) using 'QA' method **(2)** in CMRI has not been studied in this population. We hypothesized that patients with COPD have a higher PA-PWV compared to healthy individuals.
Methods: This analysis includes 23 COPD and 12 healthy volunteers (current or ex-smokers free from respiratory disease). Cardiac MRI was used to measure PA-PWV using a 3.0T GE Signa HDx MRI scanner (GE Healthcare), phase-contrast cross-sectional images using steady-state free precession sequence were obtained approximately 2 cm above the pulmonary valve, under free-breathing conditions. Aortic PWV was measured using the Sphymocor device along with mean arterial pressure (MAP), heart rate, lung function (forced expiratory volume in 1sec (FEV1) and forced vital capacity (FVC) and their ratio), 6-minute-walk-distance (6MWD) oxygen saturations.
Results: Patients with COPD and the healthy individuals were similar in age, gender and BMI ($p > 0.05$). Patients with COPD had greater PA-PWV and heart rate as well as poorer lung function and oxygen saturations and 6MWD (all $p < 0.05$) (Table-1). PA-PWV did not relate to age, BMI, AoPWV, MAP, heart rate, lung function, oxygen saturations, but PAPWV was greater in males than females ($p < 0.05$).

Table 1. Data are mean ± SD.

	COPD (n = 23)	Controls (n = 12)	p-value
Age (yrs)	65.8 ± 7.3	66.8 ± 7.1	0.713
Gender (male:female)	11:12	6:6	0.903
BMI kg/m^2	25.5 ± 3.3	26.6 ± 3.4	0.351
Smoking (pack years)	39.0 ± 29.9	12.2 ± 8.6	<0.001
PA-PWV (m/s)	3.37 ± 0.6	1.41 ± 0.4	<0.001
AoPWV (m/s)	9.4 ± 2.6	8.5 ± 1.3	0.316
MAP (mmHg)	97.2 ± 9.5	90.5 ± 11.2	0.088
Resting heart rate (bpm)	68 ± 9	62 ± 7	0.034
FEV_1/FVC (L)	0.55 ± 0.14	0.75 ± 0.06	<0.001
FEV_1 % predicted	59.2 ± 17.6	105.8 ± 12.5	<0.001
6MWD (m)	388.2 ± 127.7	536.8 ± 49.9	<0.001

Conclusions: Patients with COPD have stiffer pulmonary arteries compared to healthy individuals, as measured by PA-PWV using the Q/A method. Further analysis will investigate the association between pulmonary artery stiffness and cardiac function.

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WALL SHEAR RATE AND BRACHIAL ARTERY FLOW-MEDIATED DILATORY RESPONSE BETWEEN HEALTHY YOUNG AND OLDER POPULATIONS USING MULTI-GATE SPECTRAL DOPPLER ULTRASOUND

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Background: Ageing is associated with an impaired brachial artery flow-mediated dilatation (FMD) response and a reduced wall shear rate (WSR) stimulus may contribute to this response. However, a detailed analysis of the WSR-FMD response is lacking due to inherent difficulties of WSR estimation near the arterial wall by conventional ultrasound. We have overcome this limitation by using an integrated multi-gate Doppler FMD evaluation system, and in this study, we compared the WSR-FMD relationship between a healthy young and older population.
Methods: Data from 33 young (YNG: 27.5 ± 4.9yrs) and 33 older (OLD: 64.9 ± 3.6yrs) individuals were analysed. FMD was assessed using Ultrasound Advanced Open Platform (ULA-OP). Acquired raw data were post-processed using custom-designed software to obtain WSR and diameter parameters.
Results: Peak WSR [WSRpk: 635(585–685) vs 424(374–473) s^{-1}] and absolute WSR increase [WSRΔ: 548(504–592) vs 356(313–400) s^{-1}] were greater in YNG than OLD (both $p < 0.05$). WSR area under the curve until its return to baseline value (WSRauc) was also greater in YNG than OLD [18632(16395–20868) vs 13049(10812–15285) au, $p < 0.05$]. WSRpk, WSRΔ and WSRauc were associated with both absolute and percentage diameter increases in YNG (all $p < 0.05$). However, none of the WSR parameters in OLD were associated with absolute or percentage diameter increases.
Conclusions: These results demonstrate 1) a reduced WSR stimulus during reactive hyperaemia in OLD compared with YNG, and 2) the absence of an association between WSR parameters and FMD response in OLD. These observations suggest that in older adults, diminished WSR together with WSR-independent factors are important determinants of the FMD response.