



## Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

Journal Home Page: <https://www.atlantis-press.com/journals/artres>

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### **P5.09: LIGHT EXERCISE CENTRAL SYSTOLIC LOADING IS INCREASED IN PATIENTS WITH CYSTIC FIBROSIS RELATED DIABETES**

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**To cite this article:** J.H. Hull, L. Ansley, C.E. Bolton, J.E. Sharman, R.K. Knight, D.J. Shale, J.R. Cockcroft, R. Garrod (2009) P5.09: LIGHT EXERCISE CENTRAL SYSTOLIC LOADING IS INCREASED IN PATIENTS WITH CYSTIC FIBROSIS RELATED DIABETES, Artery Research 3:4, 175–176, DOI: <https://doi.org/10.1016/j.artres.2009.10.064>

**To link to this article:** <https://doi.org/10.1016/j.artres.2009.10.064>

Published online: 14 December 2019

and controls ( $465.78 \pm 112.36 \mu\text{m}$ ). Differences of these parameters did not reach the level of significance. In regression analysis distensibility of CCA had inverse correlation with MO ( $\beta = -0.172$ ,  $p = 0.015$ ). Other arterial wall parameters were similar between groups.

**Conclusions:** Distensibility of common carotid artery is impaired in migraine without aura.

#### P5.06

### INCREASED ARTERIAL STIFFNESS AND SYSTOLIC BLOOD PRESSURE FOLLOWING SUBCLAVIAN FLAP REPAIR FOR AORTIC COARCTATION IN INFANCY

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**Objectives:** To compare the effect of Subclavian Flap Repair (SFR) versus end-to-end anastomosis (EEA) on arterial stiffness and systolic blood pressure in young children with aortic coarctation.

**Methods:** Pulse wave velocity (PWV) was measured using a pulse volume recording technique (Vicorder, Skidmore Medical, Bristol, UK) in the right arm and leg of 21 children following CoA repair without residual narrowing (SFR  $n = 11$ , EEA  $n = 10$ ) and 18 age-matched controls. Non-invasive cardiac output was recorded to evaluate its possible contribution to elevated systolic blood pressure. Spontaneous baroreceptor reflex sensitivity (sBRS) was measured to determine if increased arterial stiffness was associated with reduced aortic baroreflex sensitivity.

**Results:** SFR patients had significantly higher right arm systolic blood pressure ( $p = 0.03$ ) and PWV ( $p = 0.02$ ) than both EEA patients and controls ( $p = 0.03$ ). This difference was not seen when comparing the EEA group to controls. No statistical difference was noted between groups in lower limb PWV. There were no significant intergroup differences in stroke index or sBRS.

**Conclusions:** Young children with SFR have higher blood pressure and stiffer upper limb arteries compared to matched children with EEA. Surgical approach may influence upper body arterial compliance and systolic blood pressure control in young children leading to implications for longer-term cardiovascular outcomes.

	SFR	EEA	Control
Age at follow-up (yrs)	$5.4 \pm 0.2$	$5.4 \pm 0.1$	$5.3 \pm 0.$
SBP (mmHg)	$108.2 \pm 3.5^{*†}$	$97.8 \pm 2.9$	$99.2 \pm 2.3$
Arm PWV (m/s)	$6.0 \pm 0.2^{*†}$	$5.2 \pm 0.2$	$5.5 \pm 0.1$
Leg PWV (m/s)	$5.9 \pm 0.4$	$5.8 \pm 0.3$	$5.5 \pm 0.2$
Stroke Index (mls/m <sup>2</sup> )	$43.3 \pm 4$	$42.1 \pm 2.3$	$46.7 \pm 2.2$
sBRS (ms/mmHg)	$11.2 \pm 1.4$	$9.4 \pm 1.0$	$9.7 \pm 0.9$

\* Indicates significance ( $p < 0.05$ ) <> SFR and EEA. † <> SFR and Controls.

#### P5.07

### LOCAL VASCULAR PROPERTIES AND AUTONOMIC NERVOUS REACTIVITY IN THE THIRD TRIMESTER OF PREGNANCY

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It is known that reproductive hormones influence both local vascular properties and autonomic nervous reactivity. The aim of our study was to measure the small artery compliance, cutaneous LD flux response to local cooling and heart rate variability in women in the third trimester of normal pregnancy (group A) and in nonpregnant women in the follicular (group Bf) and the luteal phase (group Bl) of menstrual cycle.

Experiments were performed on 19 pregnant women and in 12 age-matched non-pregnant females. A noninvasive method was used to determine finger artery compliance. Spectral analysis of RR intervals was performed using autoregression and the area under the power spectrum was evaluated using the standard frequency bands.

Our results revealed a decrease in parasympathetic and an increase in sympathetic activity during third trimester of pregnancy. The diastolic blood pressure in group A ( $60.6 \pm 2.5 \text{ mmHg}$ ) was significantly lower than in both

subgroups Bf and Bl ( $74.3 \pm 3.0$  and  $76.3 \pm 4$ ,  $p < 0.01$ ), the heart rate (HR) was increased in group A ( $82.5 \pm 1.7 \text{ bpm}$ ) compared to Bf ( $66.9 \pm 3.4 \text{ bpm}$ ) and Bl ( $69.7 \pm 3.6 \text{ bpm}$ ). In contrast there were no statistically significant differences in systolic blood pressure and finger artery compliance ( $1.35 \pm 0.26$  in A,  $1.55 \pm 0.24$  in Bf and  $1.40 \pm 0.11$  in Bl). During cooling arterial pressure and HR increased while CI decreased significant only in group A but not in subgroups Bf and Bl. LD flux decreased significantly less in group A compared to groups Bf and Bl.

Our findings suggest that reproductive hormones exert more influence on local vascular mechanisms than on central autonomic reactivity.

#### P5.08

### INDICES OF EARLY ATHEROSCLEROSIS AND ARTERIAL STIFFNESS AND CEREBRAL BLOOD FLOW VELOCITY

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**Objective:** The aim of the study was to assess the relationship between structural (IMT- intima-media thickness) and functional (PWV - pulse wave velocity, SBP - systolic blood pressure, PP - pulse pressure) parameters of the large arterial damage and the mean blood flow velocity (CBFV) in middle cerebral artery (MCA).

**Design and Methods:** CBFV in (MCA) was measured bilaterally with transcranial Doppler (TCD). The early stage of vascular atherosclerosis was estimated with sonographic measurement of carotid IMT. We assessed large arterial stiffness using carotid-to-femoral PWV, brachial PP and SBP.

**Results:** The mean (SD) age of 165 analyzed subjects was 56.1 (11.8), age range: 22-86 years. We assessed the CBFV in thirds of respective distributions of IMT, PWV, PP and SBP and found that CBFV was less with advancing thirds of PWV and IMT (all  $p < 0.02$ ) but no such relation with PP and SBP (all  $p > 0.37$ ).

The within-tertile mean values and standard deviations are shown in table.

	Mean $\pm$ SD value of characteristic		
	I	II	III
SBP (mmHg)	$116.3 \pm 5.9$	$134.3 \pm 4.8$	$159.2 \pm 13.1$
PP (mmHg)	$36.4 \pm 5.0$	$49.2 \pm 1.9$	$65.5 \pm 9.3$
PWV (m/s)	$9.8 \pm 1.2$	$12.2 \pm 0.57$	$16.2 \pm 3.0$
IMT (mm)	$0.6 \pm 0.08$	$0.9 \pm 0.06$	$1.2 \pm 0.2$

**Conclusion:** Damage of large arteries expressed by increased IMT and PWV influences negatively the blood flow velocity in middle cerebral artery.

#### P5.09

### LIGHT EXERCISE CENTRAL SYSTOLIC LOADING IS INCREASED IN PATIENTS WITH CYSTIC FIBROSIS RELATED DIABETES

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**Background:** As survival in the common autosomal recessive condition Cystic Fibrosis (CF) improves, there is focus on extra-pulmonary complications. Patients with CF have increased augmentation index (Alx) at rest which is greatest in those with diabetes (CFRD). We evaluated haemodynamic response to exercise, at an intensity similar to daily life.

**Methods:** We studied 36 (25 male) adults ( $n = 11$ , CFRD) with stable CF, mean (range) age 28.9 (16-47) yrs and 25 age/gender/BMI matched controls. Central haemodynamic parameters; BP, Alx, augmented pressure (AP) and wasted LV pressure energy ( $\Delta E_w$ ) were determined by tonometry (SphygmoCor) at rest and 8 minutes into a 10 minute period of cycle ergometry at 60% age-predicted maximal HR. Serum IL-6 was measured.

**Results:** At rest, Alx was greater in both CFRD and non-CFRD patients than controls. During exercise, CFRD patients had greater MAP, AP, and  $\Delta E_w$  ( $p < 0.05$  for all) and a trend for greater Alx, whilst in non-CFRD patients were not different to controls (Table: at 8 minutes exercise).  $\text{Log}_{10}\text{IL-6}$  was increased in patients ( $p < 0.005$ ) and related to exercise  $\Delta E_w$  ( $r = 0.27$ ,  $p < 0.05$ ).

	Controls	Non-CFRD	CFRD
MAP (mmHg)	100 (8)	102 (11)	109 (11)*
AP (mmHg)	-2.2 (4.7)	-0.4 (4.6)	2.2 (4.2)*
$\Delta E_w$ (dynes.s/cm <sup>2</sup> )	-576 (1400)	-22.9 (1360)	665 (1164)*
Alx (%)	-5.7 (11.2)	-2.0 (10.9)	3.5 (10.3)

Mean (SD). \*P < 0.05 from controls (ANOVA).

**Conclusions:** Patients with CFRD have increased central systolic loading during exercise. These changes have implications for myocardial work and oxygen demand. In contrast, the haemodynamic response in non-CFRD patients does not appear to be maladapted.

#### P5.10

##### CARDIOPULMONARY FITNESS AND ARTERIAL STIFFNESS IN HEALTHY SUBJECTS – IS THERE A DIFFERENCE BETWEEN ACUTE HAEMODYNAMIC EFFECTS OF AEROBIC VS. RESISTANCE EXERCISE?

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Although, the cardioprotective effects of aerobic exercise are proven, not much is known about resistance exercise. Arterial wave reflection measured as augmentation index (Alx), and pulse pressure (PP) amplification are independent prognosticators of CV morbidity and mortality. However, how these parameters are impacted by cardiopulmonary fitness (CPF) and acute bouts of different types of exercise is unclear.

Our aim was to investigate the relationship between CPF, arterial stiffness, and high sensitivity C-reactive protein (hs-CRP). Furthermore, we compared the acute cardiovascular effects of aerobic exercise to resistance exercise. Eighteen healthy subjects (male = 8, aged 23 ± 3) underwent a maximal exercise test, followed by measurement of Alx, blood pressure (BP), fasting glucose, lipid profile and hs-CRP. The subjects were randomised in a cross-over design to aerobic and resistance exercise and BP, Alx and PP amplification measured before and immediately after exercise. Results were analysed by JMP Version 7.1 and p < 0.05 considered significant.

VO<sub>2</sub>max was significantly and inversely related to augmentation pressure and Alx and positively with PP amplification, independent of gender and BP. Despite higher BP following aerobic exercise, there was a significant reduction

in Alx and PP amplification compared with resistance exercise which was associated with increased arterial stiffness and reduced PP amplification. Impaired CPF is associated with stiff arteries and poor PP amplification, highlighting the impaired buffering capacity of the arteries and endothelial dysfunction in unfit individuals at an early age. Furthermore, resistance exercise is associated with arterial stiffening and should therefore be prescribed with caution to those with cardiovascular disease.

#### P5.11

##### THE AUTONOMIC NERVOUS SYSTEM FUNCTIONING IN PATIENTS WITH HUNTINGTON'S DISEASE

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**Background:** Huntington's disease (HD) is an autosomal dominant neurodegenerative disorder leading to progressive death of neurons in various brain regions. In advanced stages of disease there is a classical triad of movement, behavioural, and cognitive disorders. Besides there are often symptoms suggestive of autonomic dysfunction, like excessive sweating, decrease in orthostatic tolerance, sexual dysfunction, and a disturbance in micturition. Clinical testing has revealed the hypofunction of the autonomic nervous system (ANS) in mid and advanced HD patients.

**Aim:** We intended to investigate functioning of ANS in early stages of HD.

**Methods:** We measured heart rate, systolic (SBP) and diastolic blood pressure (DBP) in 14 presymptomatic (PHD), 11 early symptomatic patients (EHD) and in 25 age and sex matched controls during rest and during simple mental arithmetic test. Heart rate variability (HRV) analyses were determined by the autoregression method. The area under the power spectrum curves over the high frequency (HF) band (0.15–0.4 Hz) and the low frequency (LF) band (0.04–0.15 Hz) was determined.

**Results:** Attenuated response to simple mental arithmetic test in PHD and EHD patients (relative heart rate in PHD and EHD patients was 10% lower than in controls; diastolic pressure was 10.6% lower in EHD than in controls; p < 0.05) was found. There was higher LF and lower HF component of HRV in PHD relative to EHD patients.

**Conclusion:** The results suggest there is an ANS dysfunction in EHD and even in PHD patients. In PHD patients there is a predominance of sympathetic over parasympathetic part of ANS.