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PERIPHERAL BLOOD FLOW REGULATION IN RESPONSE TO SYMPATHETIC STIMULATION IN INDIVIDUALS WITH DOWN SYNDROME

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Background: Individuals with Down syndrome (DS) experience autonomic dysfunction, with reduced sympathetic and parasympathetic control. This results in alterations in resting heart rate and blood pressure and attenuated responses to sympathetic stimuli. It is unknown to what extent this impacts the regulation of peripheral blood flow in response to sympathetic stimuli, which is an important prerequisite to exercise and perform work.

Purpose: To investigate differences in peripheral blood flow regulation in response to lower body negative pressure (LBNP) between individuals with and without DS. Methods: Participants (n = 10 males with DS and n = 11 male controls, mean age 23.7 years ± 3.2) underwent 5 min of LBNP stimulations (−20 mmHg), after resting supine for 10 min. One minute steady state blood pressure and blood flow at baseline, LBNP, and 5 min recovery were obtained for analysis. Mean flow velocity and arterial diameters were recorded with ultrasonography; forerarm blood flow (FBF), shear rate and forearm vascular conductance (FVC) were calculated using brachial blood pressure measured right before ultrasound recordings. Results: Participants with DS responded differently (consistent with reduced brachial blood pressure measured right before ultrasound recordings). Rates: Participants with DS responded differently (consistent with reduced vasoconstrictive control) to the LBNP stimulus (significant Condition x Group interaction: p = 0.003). FBF (p = 0.008), shear rate (p = 0.004) and FVC (p = 0.017), compared to participants without DS (see table).

Conclusion: Young males with DS exhibit reduced peripheral blood flow regulation of blood flow in response to LBNP compared to controls, indicating a blunted sympathetic control of blood flow. Further research is necessary to explore the impact of these findings on exercise and work capacity.

Baseline LBNP Recovery DS Control DS Control DS Control MAP 90 ± 12 10.85 ± 12.47 ± 11.92 ± 11.85 ± 10 Diameter (cm) 0.36 ± 0.05 0.43 ± 0.05 0.37 ± 0.03 0.43 ± 0.04 0.37 ± 0.03 0.42 ± 0.06 Mean velocity (cm/sec) 13 ± 7 21 ± 10 15 ± 7.17 ± 5.16 ± 9.16 ± 8.1 FBF (ml/min) 91 ± 64 176 ± 80 104 ± 67 146 ± 47 114 ± 91 138 ± 74 Shear Rate (sec-1) 20 ± 12 13 ± 8 ± 16 23 ± 12 29 ± 8 ± 25 ± 17 ± 28 ± 14 FVC (ml/min/100 mmHg) 101 ± 67 203 ± 95 124 ± 84 171 ± 63 125 ± 101 162 ± 81.

References