

**Title:** Cardiovascular and Autonomic Responses to Acute Exposure to Mild Hypercapnic Conditions: A pilot study

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**Introduction:** Prolonged sitting (PS), defined as sitting for 2+ hours at a time, has been identified as an independent risk factor for cardiovascular disease (CVD). We previously reported that an acute bout of PS can attenuate macrovascular function in healthy young adults. Additionally, we reported that PS in mild hypercapnic environments (elevated CO<sub>2</sub> concentrations) can further exacerbate these impairments in healthy young adults, and these impairments can be partially prevented by intermittent bouts of passive and active leg movements. However, the effects of prolonged sitting with a mild hypercapnic environment in the elderly population have not been studied. Therefore, the purpose of this study was to examine the impact of prolonged sitting with a mild-hypercapnic condition on macrovascular endothelial function in the popliteal and brachial arteries of healthy elderly adults. Additionally, we have further examined the effects of passive and active movements to negate the negative effects of prolonged sitting in elderly adults.

**Hypothesis:** We hypothesized that 1) PS will attenuate local and systemic macrovascular endothelial function, 2) passive and active leg movements will preserve macrovascular endothelial function.

**Methods:** Healthy elderly adults (n=1, 1 male, 71) participated in three experimental visits consisting of 2.5h of prolonged sitting in a mild-hypercapnic condition (CO<sub>2</sub> = 1500ppm): control (CON, no movement), passive (PASS, passive leg movement), and active (ACT, active leg movement). Popliteal and brachial artery endothelial function was measured using flow-mediated dilation (FMD). All measurements were taken pre- and post-sitting.

**Results:** Popliteal FMD was reduced in the CON condition compared to both the PASS and ACT ( $\Delta$  -3.54 vs  $\Delta$  -2.621 vs  $\Delta$  0.267, respectively). Brachial FMD was attenuated in the CON condition compared to both the PASS and ACT ( $\Delta$  -3.197 vs  $\Delta$  -1.863 vs  $\Delta$  0.75, respectively).

**Conclusion:** This preliminary data shows that uninterrupted prolonged sitting induces impairments in both local and systemic macrovascular endothelial function. Additionally, intermittent bouts of passive and active movements can partially preserve macrovascular function during PS.