

Carotid Baroreflex Control of Heart Rate is Enhanced during Whole-body Heat Stress

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ABSTRACT

Whole-body heat stress (WBH) reduces orthostatic tolerance. While impaired carotid baroreflex (CBR) function during WBH has been reported, study design considerations may limit interpretation of previous findings. We sought to test the hypothesis that CBR function is unaltered during WBH. CBR function was assessed in ten subjects using 5-sec trials of neck pressure (45, 30 and 15 Torr) and neck suction (-20, -40, -60 and -80 Torr) during normothermia (NT) and passive WBH (Δ core temp \sim 1 °C). Analysis of stimulus response curves (4-parameter logistic model) for CBR control of heart rate (CBR-HR) and mean arterial pressure (CBR-MAP), as well as separate 2-way ANOVA of the hypo- and hypertensive stimuli (factor 1: thermal condition, factor 2: chamber pressure) were performed. For CBR-HR, maximal gain was increased during WBH (-0.73 ± 0.37) compared to NT (-0.39 ± 0.11 , $p=0.03$). In addition, the CBR-HR responding range was increased during WBH (32 ± 15) compared to NT (18 ± 8 bpm, $p=0.03$). Separate analysis of hypertensive stimulation revealed enhanced HR responses during WBH at -40, -60 and -80 Torr (condition*chamber pressure interaction, $p=0.049$) compared to NT. For CBR-MAP, both logistic analysis and separate 2-way ANOVA revealed no differences during WBH. Therefore, despite marked orthostatic intolerance observed during WBH, CBR control of heart rate (enhanced) and arterial pressure (no change) is well-preserved.