

## Blunted Arterial Blood Pressure Responses to Whole-Body Cold Stress in Individuals with Multiple Sclerosis

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### ABSTRACT

Multiple sclerosis (MS) is a neurological disease in which demyelination disrupts signal transmission and/or integration within the central nervous system. Reduced resting MSNA has been previously reported in MS patients (Keller et al., 2014). The aim of this study was to test the hypothesis that individuals with MS will have blunted sympathetic-mediated responses to a whole-body cold stress stimulus compared to healthy controls (CON). Ten subjects with relapsing-remitting MS (age, 35±7 years old; height: 163±9 cm; weight: 64±12 kg; BSA: 1.7±0.2 m<sup>2</sup>) and 4 healthy controls (31±5 years old; height: 168±6 cm; weight: 66±14 kg; BSA: 1.7±0.2 m<sup>2</sup>) participated in the study. Subjects were instrumented with a tube-lined water perfusion suit in which they were exposed to a thermoneutral (34 °C circulating water) condition for a baseline period of 10 minutes, followed by a 3-minute whole-body cold stress (5 °C circulating water) condition. Skin blood flow (laser-Doppler flowmetry), beat-to-beat arterial pressure (photoplethysmography), heart rate (ECG), and mean skin temperature were continuously measured. Cutaneous vascular conductance was calculated from the ratio of laser-Doppler flux to mean arterial pressure (CVC) and normalized to maximal responses obtained by local heating at 42 °C following cooling (%CVC<sub>max</sub>). Mean arterial pressures (MAP) were derived during the final minute of baseline and cooling. There were no differences in  $\Delta$ LDF flux (CON: -2.83±3.76; MS: -3.73±4.29, p=0.72),  $\Delta$ CVC (CON: -0.05±0.06; MS: -0.05±0.06, p=0.89), and  $\Delta$ %CVC<sub>max</sub> (CON: -2.43±3.75; MS: -0.24, p=0.12) from baseline to cooling. However, there was a significant difference in  $\Delta$ MAP between groups (CON: 12.17±9.70; MS: -0.99±7.00, p=0.01). While cutaneous vasoconstrictor responsiveness was similar between groups, these data suggest individuals with MS exhibit reduced sympathetic-mediated changes in blood pressure in response to a whole body cold stress.

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