

Rapid Onset Pressor Response during Isometric Exercise in Postmenopausal Hypertensive Women

Colodner, KT, Greaney, JL, Wenner, MM, and Farquhar WB. University of Delaware, Newark, DE.

colodner@udel.edu, jgreaney@udel.edu, mwenner@udel.edu, wbf@udel.edu

After menopause, women are at a greater risk for developing hypertension. During acute isometric exercise, increases in mean arterial blood pressure (MAP) are exaggerated in hypertensive (HTN) adults. These exaggerated responses are evident at the onset of exercise and are likely partially the result of sympathetically-mediated increases in total peripheral resistance (TPR). Examining hemodynamic responses at exercise onset is important because many activities of daily living involve an isometric component that is short-lived and sub-maximal. **Purpose:** Focusing on the immediate hemodynamic responses to isometric handgrip exercise, we tested the hypothesis that postmenopausal HTN women would have a more rapid increase in MAP, muscle sympathetic nerve activity (MSNA), and TPR compared to normotensive (NTN) women. **Methods:** We assessed beat-by-beat MAP (Finometer), MSNA (peroneal microneurography), TPR (ModelFlow-derived), and cardiac output (Q; ModelFlow-derived) in NTN (n=21; 60±1 yr) and HTN (n=9; 65±2 yr) postmenopausal women at baseline and during the first 30 seconds of static handgrip at 40% maximal voluntary contraction (MVC). **Results:** MAP increased more in HTN compared to NTN women ($\Delta 15.0 \pm 4.4$ mmHg HTN vs. $\Delta 4.0 \pm 1.2$ mmHg NTN; $p < 0.01$). Similarly, MSNA ($\Delta 13.7 \pm 2.0$ bursts/min HTN v. $\Delta 0.4 \pm 1.7$ bursts/min NTN; $p < 0.01$) and TPR ($\Delta 160.5 \pm 122.6$ dyn·s/cm⁵ HTN v. $\Delta -39.3 \pm 37.8$ dyn·s/cm⁵ NTN; $p = 0.05$) increased more in the HTN women. Increases in Q were not different between groups ($\Delta 0.2 \pm 0.2$ L/min HTN v. $\Delta 0.5 \pm 0.1$ L/min NTN; $p = \text{NS}$). **Conclusion:** As expected, postmenopausal NTN women had minimal hemodynamic responses during the first 30 sec of isometric exercise. In contrast, postmenopausal HTN women demonstrate a rapid onset pressor response during isometric handgrip exercise that is partially mediated by MSNA-induced increases in TPR. These preliminary data suggest potential abnormalities in neurocirculatory control during the onset of exercise in HTN postmenopausal women.

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