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Renal Vascular Responsiveness to Sympathetic Activation is Not Affected by Prior High Intensity Exercise

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PURPOSE: Orthostatic hypotension is common following a single bout of high intensity exercise. The renal vasculature contributes to blood pressure regulation during orthostasis. Renal vascular resistance (RVR) increases during exercise but is restored to pre-exercise levels shortly following the cessation of exercise. The responsiveness of the renal vasculature to sympathetic stimulation, such as during orthostasis, following exercise is unknown. We hypothesize that prior high intensity exercise attenuates the increase in RVR during sympathetic activation. **METHODS:** Ten healthy adults (23 ± 3 y) completed two 2 min cold pressor tests (CPT). The CPT stimulates the sympathetic nervous system. A CPT was completed before and after a Wingate Anaerobic Test that consisted of 30 s of maximal effort cycling exercise at a resistance equal to 7.5% body mass. In both instances, the CPT was administered following 10 min supine rest. Heart rate (ECG), mean arterial pressure (Penaz method, MAP), and renal blood velocity (RBV) were measured pre-CPT, at 1 min and 2 min of the CPT, and 1 min and 3 min post-CPT. RBV was measured via the coronal approach at the distal segment of the right renal artery with Doppler ultrasound. RVR was calculated as MAP/RBV. Data are presented as mean \pm SD. **RESULTS:** Pre-CPT, heart rate was elevated after exercise (60 ± 9 vs. 86 ± 13 bpm, $P < 0.01$), but MAP (85 ± 12 vs. 81 ± 15 mmHg, $P = 0.91$), RBV (34 ± 6 vs. 33 ± 7 cm/s, $P = 0.99$) and RVR (2.6 ± 0.4 vs. 2.6 ± 0.8 mmHg/cm/s, $P > 0.99$) were not different between before and after exercise. Before exercise, heart rate (at 2 min CPT: 66 ± 9 bpm, $P = 0.02$) and MAP (at 2 min CPT: 108 ± 21 mmHg, $P = 0.05$) increased during the CPT, returning to pre- levels 1 min ($P = 0.22$) and 3 min ($P = 0.60$) post-CPT, respectively. After exercise, RBV decreased during the CPT (at 2 min: 29 ± 7 cm/s, $P = 0.03$), returning to pre- levels 1 min post-CPT ($P = 0.61$). RVR increased during the CPT (at 2 min: 4.0 ± 0.7 mmHg/cm/s, $P < 0.01$), returning to pre- levels 1 min post-CPT ($P = 0.28$). Changes in heart rate, MAP, RBV, and RVR during the CPT did differ between before and after exercise (interaction: all $P \geq 0.74$). **CONCLUSION:** Increases in RVR invoked by sympathetic activation are not affected by prior high intensity exercise.