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Extra- and Intra- Renal Vascular Responses to Sympathetic Activation are Not Modified Following Cooling Recovery

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Elevated renal vascular resistance (RVR) during heat stress may provoke localized ischemia, especially when exposed to multiple sympathetic stressors. Whole-body cooling reduces risks associated with heat stress. However, this cooling raises RVR and could therefore exacerbate increases in RVR caused by prior heat stress, particularly during sympathetic activation. **PURPOSE:** To test hypotheses that increases in both extra- and intra- RVR to the cold pressor test (a sympathoexcitatory stimulus, CPT) are exacerbated by whole-body cooling following heat stress. **METHODS:** Nineteen healthy adults (22 ± 2 y) underwent passive heat stress sufficient to raise core temperature 1.2°C above normothermic baseline (NT), after which they underwent passive cooling recovery (CR) to within 0.2°C of NT. Participants completed a 2 min CPT at NT and at the end of CR. Changes in body weight provided an indication of dehydration. Heart rate (HR), mean arterial pressure (MAP), and renal blood velocity (RBV) were measured pre-CPT (Pre) and at the end of the CPT (End). RBV was measured using the coronal approach with Doppler ultrasound at the distal segment of the right renal artery (Extra-, $n=11$) or in the same segmental artery within participants in the right kidney (Intra-, $n=8$). RVR was calculated as MAP/RBV . Data are presented as mean \pm SD. **RESULTS:** The change in body weight was $-1.2 \pm 0.5\%$. In Extra- at Pre, MAP was elevated in CR compared to NT (95 ± 9 vs. 85 ± 7 mmHg, $P<0.01$) with no differences in HR (58 ± 7 vs 56 ± 9 bpm, $P=0.24$). MAP and HR in Intra- at Pre did not differ from Extra- ($P\geq 0.72$). In Extra- at Pre, RBV (33 ± 4 vs 36 ± 5 cm/s, $P=0.01$) and RVR (0.35 ± 0.06 vs 0.43 ± 0.08 mmHg/cm/s, $P<0.01$) were lower in CR compared to NT. RBV was lower and RVR was higher in Intra- compared to Extra- ($P\leq 0.02$) at Pre. At End, increases in HR (12 ± 9 vs 14 ± 7 bpm, $P=0.50$) and MAP (24 ± 16 vs 24 ± 16 mmHg, $P>0.99$) were not different between CR and NT in Extra-. Changes in RBV (-3 ± 5 vs -2 ± 7 cm/s, $P=0.59$) and increases in RVR (1.24 ± 0.97 vs 0.95 ± 0.99 mmHg/cm/s, $P=0.29$) did not differ between CR and NT in Extra- at End. There were no differences in the HR, MAP, RBV, or RVR response to CPT in Intra- compared to Extra- ($P\geq 0.10$). **CONCLUSION:** Whole-body cooling following passive heat stress does not affect the extra- or intra- renal vascular responses to sympathetic activation.