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Hot Head-Out Water Immersion Acutely Impairs Cerebral Autoregulation in Healthy Participants

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Recurring hot head-out water immersion enhances peripheral vascular function and cerebral blood flow during non-immersion conditions. However, it is not known if an acute bout of hot head out water immersion (HOWI) improves cerebral autoregulation versus thermoneutral HOWI. **PURPOSE:** We tested the hypothesis that dynamic cerebral autoregulation is greater during and following an acute bout of hot (HOT) vs. thermoneutral (TN) HOWI. **METHODS:** Seven healthy participants (age: 23±2 y, 2 females) completed two randomized trials consisting of 30 min HOT (39°C) or TN (35°C) HOWI. Beat-to-beat blood pressure (MAP), middle cerebral artery blood velocity (MCAv), and end-tidal partial pressure of CO_2 ($PETCO_2$) were recorded continuously. After 5 min of resting baseline, participants breathed through a respiratory impedance device for 5 min to assess cerebral autoregulation using Fourier transformation. Cerebral autoregulation testing was completed pre, 25 min into immersion (during), and immediately post HOWI. **RESULTS:** MAP, MCAv, $PETCO_2$, gain, and phase were not different between HOT and TN at pre ($P>0.14$for all). MAP was different between HOT and TN during (77±6 vs 91±9 mmHg; $P<0.01$) and post (81±9 vs 92±12 mmHg; $P=0.03$). MCAv was not different between HOT and TN during (63±8 vs 65±11 cm/s; $P=0.28$) or post (58±10 vs 62±11 cm/s; $P=0.22$). $PETCO_2$ was different between HOT and TN during (42±2 vs 44±4 mmHg; $P=0.04$) but was not different at post (39±3 vs 40±4 mmHg; $P=0.13$). Gain was different between HOT and TN during (1.0±0.2 vs 0.9±0.2 cm/s/mmHg; $P=0.04$) but was not different post (1.0±0.2 vs 0.9±0.2 cm/s/mmHg; $P=0.15$). Gain increased from pre in HOT during ($P=0.03$) but was not elevated post ($P=0.15$). Gain was not different from pre in TN during ($P=0.95$) or post ($P=0.95$). Phase was not different between HOT and TN during (12±7 vs 12±5°; $P=0.48$) or post (8±12 vs 11±7°; $P=0.30$). Phase was not different from pre in HOT or TN during (HOT: $P=0.79$ or TN: $P=0.70$) or post (HOT: $P=0.70$ or TN: $P=0.74$). **CONCLUSION:** These preliminary data indicate that the ability of the cerebral vasculature to buffer changes in blood pressure during hot HOWI is impaired compared to non-immersion conditions and thermoneutral HOWI in healthy participants.

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