

Racial Differences in Cerebral Hemodynamics during Aerobic Exercise

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ABSTRACT

Young healthy non-Hispanic Black (BL) adults have an attenuated increase in blood flow to working skeletal muscle during exercise compared to non-Hispanic white (WH) adults. Cerebral blood flow also increases during exercise; however, previous work has mainly included WH adults. There are no studies investigating potential differences in cerebral vascular responses to exercise in BL adults. **PURPOSE:** To compare middle cerebral artery velocity (MCAv) and cerebral vascular conductance index (CVCi) during exercise in BL adults to WH adults. We tested the hypothesis that BL adults have a blunted increase in MCAvmean and CVCi response during light and moderate intensity exercise compared to WH adults. **METHODS:** 12 young healthy adults, 6 BL (21 ± 4 years) and 6 WH (25 ± 5 years) were studied. Heart rate (ECG), brachial artery blood pressure (SunTech Tango), End tidal carbon dioxide (ETCO₂; Capnograph) and MCAvmean (transcranial Doppler) were measured at rest and during semi-recumbent cycling at light (25 Watts) and moderate intensity exercise. Moderate intensity exercise was defined as 60% heart rate reserve (HRR: $\{HR_{max} - HR_{rest} \times 60\% \} + HR_{rest}$), which is American College of Sports Medicine recommended level of physical activity intensity for adults. CVC_i was calculated as MCAvmean/mean arterial pressure and used as an index of vasodilation. **RESULTS:** At rest, there were no differences in MCAvmean (BL: 65.3 ± 11.5 cm/s vs. WH: 70.3 ± 11.1 cm/s; P = 0.46), ETCO₂ (BL: 48 ± 11 mmHg vs. WH: 46 ± 3 mmHg; P = 0.75) and CVCi (BL: 0.74 ± 0.16 cm.s⁻¹ /mmHg vs. WH: 0.75 ± 0.14 cm.s⁻¹ /mmHg; P = 0.88) between groups. Increases in MCAvmean, ETCO₂ and CVCi from rest were not different between groups (all P > 0.05) during light intensity exercise. In addition, during 60%HRR exercise BL adults also had similar increases in MCAvmean (BL: 84.1 ± 13 cm/s vs. WH: 88.7 ± 22.4 cm/s; P = 0.67), ETCO₂ (BL: 48 ± 7 mmHg vs. WH: 52 ± 8 mmHg; P = 0.30) and CVCi (BL: 0.73 ± 0.17 cm.s⁻¹ /mmHg vs. WH: 0.80 ± 0.18 cm.s⁻¹ /mmHg; P = 0.50) compared to WH adults. **CONCLUSION:** These preliminary data suggest that the increase in cerebral blood velocity and CVCi changes during light and moderate intensity exercise are comparable between young BL and WH adults.