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Cerebral Blood Velocity Increases during Face Cooling in Symptomatic Concussed Athletes

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PURPOSE: Test the hypothesis that symptomatic concussed athletes (CA) have a blunted increase in cerebral blood velocity during face cooling (FC) compared to healthy controls (HC). **METHODS:** Four CA (age: 20±2y) and five HC (age: 22±2y) completed 5 min resting baseline followed by 3 minutes of FC where a plastic bag filled with ice water (~0°C) was placed on the forehead, eyes, and cheeks. Mean arterial pressure (MAP; photoplethysmography), middle cerebral artery blood velocity (MCAv; transcranial Doppler), and end-tidal partial pressure of CO₂ (PETCO₂; capnography) were recorded. Cerebral vascular resistance (CVR) was calculated as MAP/MCAv. Values are reported as a change from baseline to the third minute of FC. **RESULTS:** MAP (CA: 91±9 vs. HC: 91±9mmHg; P=0.46), MCAv (CA: 73.4±16.9 vs. HC: 66.3±14.3cm/s; P=0.26), PETCO₂ (CA: 44±2 vs. HC: 46±2mmHg; P=0.09), and CVR (CA: 1.30±0.42 vs. HC: 1.43±0.34mmHg/cm/s; P=0.32) were not different at baseline. The change in MAP (CA: 19±7 vs. HC: 14±6mmHg; P=0.15) was not different between groups. The change in MCAv was different between CA (4.9±5.8cm/s) and HC (-5.0±5.7cm/s; P=0.02). The change in PETCO₂ (CA: -1±1 vs. HC: -3±3mmHg; P=0.19) and CVR (CA: 0.20±0.19 vs. HC: 0.37±0.24mmHg/cm/s; P=0.14) were not different between groups. **CONCLUSION:** HC experienced a reduction in MCAv during FC that might be attributed to the combined effects of the increase in CVR and reduction in PETCO₂. CA experienced an increase in MCAv vs. HC that might be due to an attenuated rise in CVR. These preliminary data indicate cerebrovascular dysfunction in symptomatic CA. Further research is warranted to determine the underlying cause of the increase in MCAv in CA during FC.

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