

Investigating the Relationship between Peripheral Microvascular and Cerebral Vascular Vasodilator Function in College-Aged Individuals

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ABSTRACT

Peripheral vascular dysfunction is predictive of numerous conditions including hypertension, type II diabetes, and coronary heart disease. Likewise, impaired cerebral vascular function is linked to neurocognitive conditions including Alzheimer's disease and related dementias, cognitive dysfunction, and stroke. Previous research has reported no relationship between peripheral and extracranial macrovascular function within individuals. However, to our knowledge, no studies have examined the relationship between peripheral microvascular and cerebral vascular function within individuals.

PURPOSE: To test the hypothesis that peripheral microvascular and cerebral vascular function would not be similar within young healthy individuals. **METHODS:** Data was collected in 59 participants (45 female; age: 22±5 yr; BMI: 24±4 kg m⁻²). Peripheral macro- and microvascular function were assessed as brachial artery flow-mediated dilation (FMD) and peak blood velocity during post-occlusive reactive hyperemia (V_{mean Peak}), respectively. Briefly, brachial artery diameter and blood velocity were continuously measured (Doppler ultrasound) throughout a 2 min baseline, 5 min suprasystolic forearm cuff occlusion, and 3 min recovery. Cerebral vascular function was assessed as the % increase in middle cerebral artery (MCA) vascular conductance (CVCi = MCA blood velocity/mean arterial pressure) during hypercapnia (Δ end-tidal CO₂ = 11±2 mmHg) induced by breathing 6% CO₂ (N=39) or rebreathing expired air (N=20).

RESULTS: Peripheral macrovascular function assessed as FMD was 6.9±3.9%, peripheral microvascular function assessed as V_{mean Peak} was 77±19 cm s⁻¹, and cerebral vascular function assessed as %CVCi during hypercapnia was 29±11%. There was no significant correlation between FMD and %CVCi (r=0.15, P=0.26) or V_{mean Peak} and %CVCi (r=-0.04, P=0.77). **CONCLUSION:** These preliminary data suggest that, in young, healthy individuals, there is not a significant relationship between peripheral macro- or microvascular function and cerebral vascular function. Future research should determine if relationships emerge with advancing age or conditions that are associated with overt vascular dysfunction.