TACSM Abstract

The Relationship between Cerebral Pulsatility Index and Indices of Cerebral Vascular Autoregulation

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ABSTRACT

Reduced cerebral vascular function/health is a precursor to various cerebral vascular diseases and neurocognitive conditions including stroke, cognitive decline, and Alzheimer's disease and related dementias. Cerebral vascular pulsatility index (PI) is a measure of cerebral vascular stiffness and is positively correlated with many of the aforementioned conditions. In addition, cerebral autoregulation, the ability to maintain cerebral blood flow relatively constant in the face of changes in arterial blood pressure, is also impaired in many of the aforementioned conditions. However, to the best of our knowledge the relationship between these two commonly assessed parameters of cerebral vascular function/health remains unknown. **PURPOSE**: Therefore, this study tested the hypothesis that elevated cerebral pulsatility index (i.e. stiffer cerebral vasculature) is associated with attenuated cerebral autoregulation as indexed by transfer function gain. **METHODS**: 145 Individuals (Male: 84; age: 24±6 yr; BMI: 24.8±4.1 kg/m^2) participated in this study. Continuous measures of beat-to-beat blood pressure and middle cerebral artery blood velocity (MCAV) were obtained during a minimum of 6-min quiet supine rest. Pulsatility index (measure of cerebrovascular stiffness) was calculated as MCAVsystolic – MCAVdiastolic / MCAVmean. Cerebral autoregulation was calculated as transfer function gain between spontaneous beat-to-beat changes in mean blood pressure and MCAVmean. **RESULTS**: Cerebral vascular stiffness (PI) was 0.8±0.4 au. Transfer function gain in the very low frequency was (0.8±0.4 cm·s^{-1}·mmHg^{-1}), low frequency (1.1±0.5 cm·s^{-1}·mmHg^{-1}), and high frequency (1.4±0.6 cm·s^{-1}·mmHg^{-1}). There was not a significant relationship between cerebral vascular stiffness and transfer function gain in any of the assessed frequencies (VLF: r=0.002, *P*=0.55; LF: r=0.124, *P*=0.14; HF: r=0.096, *P*=0.25). **CONCLUSION**: These preliminary data indicate that there is not a significant correlation between cerebral vascular stiffness indexed as pulsatility index and indices of cerebral autoregulation (transfer function gain).