Abstract: P3714

Cerebral blood flow and cognitive functioning in the heart-brain axis

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Background: Recent studies suggest that cardiovascular disease and dementia are closely related, which led to the concept of a ‘heart-brain axis’. Dysfunction in any component of the heart-brain axis could be a risk factor for the development of brain damage and consequently to the development of cognitive impairment. In the Heart-Brain study, we focus on vascular cognitive impairment (VCI), symptomatic carotid occlusive disease (COD) and heart failure (HF) as three extreme phenotypes of haemodynamic dysfunction in different components of the heart-brain axis (i.e. heart – carotids – brain). We compared values of cerebral blood flow (CBF), measured with arterial spin labeling (ASL) between patients with HF, COD and VCI and investigated the association between CBF and cognitive functioning.

Methods: We included 442 participants (129 VCI; 75 COD; 124 HF; and 114 controls) from the Heart-Brain Study (67±9yrs; 38%; MMSE 28±2). We used 3T pseudo-continuous ASL to estimate whole-brain and regional partial volume-corrected CBF. Using a standardized neuropsychological assessment, we measured global cognitive functioning and four cognitive domains. Compound z-scores were constructed for each cognitive domain. We investigated associations using linear regression analyses, adjusted for age, sex, education, center and diagnosis. Subsequently, we stratified for diagnosis.

Results: Whole-brain and regional CBF values were lowest in patients with COD, followed by VCI and HF, compared to controls. Global cognitive functioning was lowest in patients with VCI, followed by COD and HF, compared to controls. Overall, we found hardly any association between whole-brain or regional CBF values and cognitive functioning (standardized beta [stab]=0.00-0.10, p>0.05). Subsequent stratification for diagnosis showed no association between whole-brain or regional CBF and cognitive functioning in any participant group.
Conclusions: Our results suggest that reduced CBF is not the major explanatory factor underlying impaired cognitive functioning in patients with disorders along the heart-brain axis. The predisposition of cognitive impairment in these patients is likely to be driven by other (haemodynamic) mechanisms than CBF.