

Capillary dysfunction in Alzheimer's disease correlates with cognitive decline

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Aim: We hypothesized that capillary dysfunction exists in Alzheimer's disease (AD) and this can be determined by a relative increase in capillary transit time heterogeneity (CTH) in cortical gray matter compared to age-matched controls.

Methods: We used dynamic susceptibility contrast (DSC) magnetic resonance imaging (MRI) and surface based statistics to measure capillary flow patterns in 19 patients with clinically suspected possible or probable AD and 19 controls. Capillary dysfunction was evaluated as the flow-normalized CTH, which is the transit time coefficient of variation, designated relative transit time heterogeneity (RTH). Differences between patients and controls were evaluated over the entire cortex using mass-univariate linear regression with age and gender as co-variates.

Results: Capillary dysfunction as measured by RTH was significantly higher bilaterally in the frontal lobe, the temporal pole, and posterior cingulate gyrus in patients. In addition we found widespread negative correlations between RTH and mini-mental state examination (MMSE) scores in all major lobes except the occipital lobe (figure).

Conclusions: The widespread negative correlation between RTH and MMSE is consistent with the capillary dysfunction hypothesis of AD. High capillary transit time heterogeneity is hypothesized to limit the oxygen availability to the tissue.

