

## Publication

## Altered cerebrovascular reactivity velocity in mild cognitive impairment and Alzheimer's disease

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Interindividual variation in neurovascular reserve and its relationship with cognitive performance is not well understood in imaging in neurodegeneration. We assessed the neurovascular reserve in amnesic mild cognitive impairment (aMCI) and Alzheimer's dementia (AD). Twenty-eight healthy controls (HC), 15 aMCI, and 20 AD patients underwent blood oxygen level-dependent imaging for 9 minutes, breathing alternatively air and 7% carbon dioxide mixture. The data were parcellated into 88 anatomic regions, and carbon dioxide regressors accounting for different washin and washout velocities were fitted to regional average blood oxygen level-dependent signals. Velocity of cerebrovascular reactivity (CVR) was analyzed and correlated with cognitive scores. aMCI and AD patients had significantly slower response than HC (mean time to reach 90% of peak: HC 33 seconds, aMCI and AD 59 seconds). CVR velocity correlated with Mini Mental State Examination in 35 of 88 brain regions ( $p = 0.019$ , corrected for multiple comparisons), including 10 regions of the default-mode network, an effect modulated by age. This easily applicable protocol yielded a practical assessment of CVR in cognitive decline.

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