Genetic, vascular and amyloid components of cerebral blood flow in a preclinical population

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Abstract:
Aging-related cognitive decline can be accelerated by a combination of genetic factors, cardiovascular and cerebrovascular dysfunction, and amyloid-β burden. Whereas cerebral blood flow (CBF) has been studied as a potential early biomarker of cognitive decline, its normal variability in healthy elderly is less known. In this study, we investigated the contribution of genetic, vascular, and amyloid-β components of CBF in a cognitively unimpaired (CU) population of monozygotic older twins. We included 134 participants who underwent arterial spin labeling (ASL) MRI and [18F]flutemetamol amyloid-PET imaging at baseline and after a four-year follow-up. Generalized estimating equations were used to investigate the associations of amyloid burden and white matter hyperintensities with CBF. We showed that, in CU individuals, CBF: 1) has a genetic component, as within-pair similarities in CBF values were moderate and significant (ICC > 0.40); 2) is negatively associated with cerebrovascular damage; and 3) is positively associated with the interaction between cardiovascular risk scores and early amyloid-β burden, which may reflect a vascular compensatory response of CBF to early amyloid-β accumulation. These findings encourage future studies to account for multiple interactions with CBF in disease trajectory analyses.

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