

Cerebral Oxygen Extraction and Blood Flow in Community-based Older Adults: Associations with White Matter Hyperintensity and Neurocognitive Function



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Key Message: High oxygen extraction combined with low cerebral blood flow, reflecting “misery perfusion,” is associated with greater WMH burden and poorer cognition, while preserved perfusion may buffer cognitive decline.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS
- Cerebral oxygen extraction fraction (OEF) and cerebral blood flow (CBF) are key hemodynamic markers. - Their combined patterns may reflect compensatory or maladaptive mechanisms related to cerebral small vessel disease and cognitive decline. - These relationships may be nonlinear, especially in community-dwelling older adults. - To examine the associations of OEF, CBF, and combined OEF-CBF patterns with white matter hyperintensity (WMH) burden and cognitive performance.	- This cross-sectional study included 296 participants from the Heritage Study in China. OEF was measured using TRUST MRI, and CBF was measured using phase-contrast MRI. - WMH volume was segmented from T2-FLAIR images and log-transformed. - Cognitive function was assessed across multiple domains and summarized as a global composite z-score. - Participants were categorized into four groups based on median OEF and CBF values. Generalized linear models and response surface analyses were used to assess associations with WMH and cognition.	The diagram illustrates four cerebral oxygen extraction (OEF) and cerebral blood flow (CBF) patterns and their associated outcomes: Efficient Perfusion (Low OEF + High CBF): Lower white matter hyperintensities (WMH) volume and better cognition. Normal Metabolism (High OEF + High CBF): Normal WMH volume and normal cognition. Metabolic Downstream (Low OEF + Low CBF): Higher WMH volume but preserved cognition. Misery Perfusion (High OEF + Low CBF): Higher WMH and worse cognition.	- OEF may serve as a sensitive marker of cognitive vulnerability in community-dwelling older adults. - CBF appears to be the main hemodynamic determinant of WMH burden. - Combined OEF-CBF patterns may help identify individuals at higher risk of small vessel disease and cognitive decline. - The high-OEF/low-CBF “misery perfusion” pattern showed the most adverse profile and may be useful for early risk stratification. Contact: yanyifan@zju.edu.cn ALZHEIMER'S ASSOCIATION AAIC 26