

Alcohol and the brain's vascular system

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Description of the Project

Alcohol consumption is widespread, modifiable, and can have effects on dementia risk even when consumed in low levels (Topiwala et al., 2026). This project will investigate the vascular mechanisms that may underlie the association between alcohol consumption and risk of cognitive decline and vascular dementia. Using complementary data from UK Biobank and the Whitehall II Heart and Brain Study (Protocol: Suri et al., 2021), the project will examine whether different patterns and long-term trajectories of alcohol consumption are associated with adverse vascular ageing, including greater carotid and aortic stiffness, altered arterial diameter and reduced compliance (Hobden & Reid et al., 2025). These measures will be integrated with advanced brain imaging, including measures of cerebral blood flow, cerebrovascular function, and MRI markers of cerebral small-vessel disease, to investigate potential pathways from alcohol exposure through systemic and cerebral vascular dysfunction to brain injury, cognitive decline and dementia.

The availability of repeated assessments of alcohol consumption over several decades in Whitehall II will enable investigation of the importance of cumulative exposure and changes in drinking behaviour across adulthood, while the scale and multimodal data available in UK Biobank will allow replication and extension of findings. Genetic approaches, including Mendelian randomisation and polygenic analyses, will be used where appropriate to strengthen causal inference and investigate whether genetic liability to alcohol consumption is associated with vascular and neuroimaging phenotypes.

The project will provide training across advanced neuroimaging analysis, longitudinal epidemiology and large-scale data analysis, and causal inference and genetic epidemiology.

References

- • Suri et al., 2021: DOI: 10.3389/fphys.2021.643725
- • Hobden & Reid et al., 2025: DOI <https://doi.org/10.1186/s12916-025-04105-y>
- • Topiwala et al., 2026: <https://doi.org/10.1136/bmjebm-2025-113913>