

Project Title: The heart-brain link in dementia

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Project Description:

Carrying the APOE4 gene or having poor cardiovascular health (high blood pressure, obesity, high cholesterol, smoking, diabetes) in mid-life are established risk factors for dementia. Managing vascular risk in a timely manner could help prevent a third of dementia cases, so it is important to understand how and when cardiovascular health affects the brain. We are currently investigating this with the new '**The Heart-Brain Study**', which uses novel brain magnetic resonance imaging (MRI) and cardiovascular ultrasound imaging to examine brain blood flow and cerebrovascular reactivity (CVR).

CVR is the ability of the brain's vasculature to increase blood flow during higher energy demands and is essential for maintaining stable tissue oxygenation. We have previously shown that high genetic risk for dementia is associated with low CVR in young adults (1) and high mid-life cardiovascular risk predicts low cerebral blood flow 20 years later (2). In the Heart-Brain Study, we are examining how gene-lifestyle interactions throughout adulthood influence longitudinal brain atrophy and cognitive decline.

We are assessing CVR, brain function, vascular and cognitive health in 140 older volunteers (>65 years old) from the UK Whitehall II Imaging cohort. This a well-characterised ageing cohort, with >30 years of cognitive, behavioural and mental health data, as well as baseline brain MRI scans. The Heart-Brain Study has been granted ethics approval and will run from 2019-2022.

We welcome applicants for studentships. Please contact sana.suri@psych.ox.ac.uk if you are interested.

References:

1. Suri S, Mackay CE, Kelly ME, Germuska M, Tunbridge L, Frisoni GB, Matthews PM, Ebmeier KP, Bulte DP, Filippini N. (2015). Reduced cerebrovascular reactivity in young adults carrying the APOE ε4 allele. *Alzheimers & Dementia*; S1552-5260(14)02467-4
2. Suri S, Topiwala A, Chappell MA, Okell TW, Zsoldos E, Singh-Manoux A, Kivimaki M, Mackay CE, Ebmeier KP (2019). Association of midlife cardiovascular risk profiles with cerebral perfusion at older ages: a longitudinal cohort study. *JAMA Network Open* 2 (6), e195776-e195776