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Summary of research

Key words: Air Pollution; Pulmonary Function; Respiratory Symptoms

Application lay Summary:

1a: Cerebral small vessel disease (SVD) causes a fifth of strokes and up to 45% of dementias. The cause is unknown; there are no effective treatments. High blood pressure in mid to late life is a major risk factor but explains little of the disease variance. Recent studies suggest that factors like birth weight, childhood intelligence, socioeconomic factors, education, all influence the risk of SVD in later life. We aim to see how much early life factors predict risk of SVD, stroke and dementia in later life. This may influence future health policies to prevent stroke and dementia.

1b: Identifying determinants of healthy aging, and reducing the burden of stroke and dementia, are UK Biobank stated aims.

Understanding mechanisms of common diseases, like stroke, dementia and small vessels disease, are also Biobank aims.

For SVD, animal models, biopsy and post-mortem material are lacking and in any case of limited relevance.

Epidemiology, genetics and neuroimaging methods, all in use in UK Biobank, are crucial to understanding the disease mechanisms, to develop treatments.

Very large, population-relevant datasets, as in UK Biobank, are needed to identify potential factors that influence disease over the lifecourse while avoiding confounding and reverse causation.

1c: We first request demographic, medical, educational, cognitive, birth, socioeconomic data and brain vascular disease events (stroke, TIA, dementia including vascular dementia). We will test associations between early life factors, midlife vascular risk factors and stroke or dementia.

Later, we would like to access neuroimaging data to assess brain vascular damage, including visible SVD features (structural imaging) and sub-visible changes (diffusion tensor data) in normal appearing tissues. We will assess the variance in brain integrity and vascular disease burden that is explained by early life factors and later risk factors.

Genetic analysis (DNA, mRNA) will be the eventual final step.

1d: Full cohort for the first stage.

Neuroimaging from the enhancement pilot for the second stage.

Subjects with neuroimaging for the eventual third genetic analysis phase.