F6. Longitudinal Mid-Life Stroke Risk Predicts Brain Structure in the Aging Whitehall II Cohort

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Background: Multi-measure cardiovascular and stroke risk scores predict gray matter volume reduction and white matter changes. We aimed to establish whether: 1) there is an association between Framingham stroke risk (FSRS) in mid-life across five phases (P) and reduced structural brain integrity beyond the effects of chronological or biological age, and 2) the predicted effects on brain structure reduction in older age are the same 5 (P9), 10 (P7), 15 (P5) and 22 (P3) years before as at the time of scan (P11).

Methods: We analysed T1 and dMRI scans from 566 Whitehall II participants (age 69.9±5.2yrs, Male.450). Negative correlation between FSRS and gray matter density (GMD) and fractional anisotropy (FA) at each phase was assessed using FSL-VBM and TBSS. Correlations with FSRS at P11 including P3eP9 as regressors were also run (multiple comparisons corrected, significance level TFCE $p<.05$).

Results: Each FSRS predicted widespread GMD and FA reduction. Smaller GMD was present in right medial temporal lobe (MTL) and gyrus after removing confounders. FSRS at P11, controlling for P9 didn't predict GMD reduction. Controlling for FSRS at P3-P7 predicted GMD reduction in MTL.
FSRS at P11 controlling for P3-P9 predicted widespread FA reduction.

Conclusions: FSRS predicts reduced brain integrity 22yrs before the scan, beyond chronological and biological age. Additional GMD reduction is predicted in later life compared to 10-22yrs before the scan in the hippocampus, due to its plasticity, but not in posterior/cortical areas. FA associations are significantly different in four phases compared to in later life. They become more widespread the earlier the FSRS is.

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