Cognitive Fitness in Ageing (COFITAGE): A Multimodal and Longitudinal Neuroimaging Dataset

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Abstract

Brain ageing involves interrelated changes across molecular, neuroinflammatory, structural, sleep, and cognitive domains. The 50–70-year range is a critical transition period where subtle alterations may precede measurable cognitive decline and neurodegenerative disease onset. To enable systematic investigation of these early changes and their progression, we provide an open-access, BIDS-compliant dataset from a multidisciplinary longitudinal study of 101 community-dwelling adults (50–69 years) with baseline and 2-year follow-up assessments.

Participants underwent magnetic resonance imaging (MRI) using a 3T protocol that included high-resolution structural imaging (T1- and T2-weighted), quantitative multi-parametric acquisitions with B1 mapping, and multi-shell diffusion-weighted imaging. Moreover, positron emission tomography (PET) imaging was performed using [18F]Flutemetamol or [18F]Florbetapir (amyloid-β tracers) in all participants, with a subset also undergoing [18F]THK-5351 PET (tau-related/neuroinflammation). The dataset was complemented by extensive phenotypic data, including sleep and neuropsychological assessments, and by genotype data through genome-wide analysis. 66 participants underwent a 2-year cognitive follow-up, enabling longitudinal analyses of cognitive trajectories. Data acquisition and curation were performed using standardized procedures, with systematic quality control to support reliable cross-sectional and longitudinal analyses.

All data are organized in a BIDS-compliant format and released openly on eBRAINS. This dataset supports multimodal analyses, allowing the identification of interpretable brain ageing patterns. It enables the comparison of different models to derive (semi)quantitative MRI parameters, the discovery of early cognitive decline biomarkers, and the monitoring or prediction of brain ageing progression. In addition, it addresses the underrepresentation of 50–69-year-olds in public datasets.