Mapping interindividual variation in the aging connectome

https://neurodegenerationresearch.eu/survey/mapping-interindividual-variation-in-the-aging-connectome/

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Country

USA

Title of project or programme

Mapping interindividual variation in the aging connectome

Source of funding information

NIH (NIA)

Total sum awarded (Euro)

€ 2,845,438.53

Start date of award

01/09/2015

Total duration of award in years

2

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords

Acquired Cognitive Impairment... Aging... Alzheimer's Disease... Alzheimer's Disease including Alzheimer's Disease Related Dementias (AD/ADRD)... Basic Behavioral and Social Science... Behavioral and Social Science... Brain Disorders... Cardiovascular... Clinical Research... Clinical Research - Extramural... Dementia... Diagnostic Radiology... Mental Health... Neurodegenerative... Neurosciences... Prevention

Research Abstract

DESCRIPTION (provided by applicant): Recent decades have witnessed landmark advances in mapping neurocognitive decline in the elderly, as well as discerning its determinants. Central to this success is the emergence of magnetic resonance imaging (MRI)- based approaches to mapping human brain function and structure. These efforts have identified several protective factors. In particular, cardiovascular fitness (CF), has emerged as one of the strongest predictors of longevity, neurobiological integrity and cognitive performance in the elderly -a finding supported by cross- sectional, longitudinal and interventional studies alike. However, the origins of neurocognitive decline in mid life have received less attention in brain imaging, and likely represent missed opportunities for early intervention. The present application calls for the generation of an open science resource to comprehensively map neurobiological change throughout mid and older adulthood in a community-ascertained sample. This resource will help to discern the midlife relevance of putative determinants of neurocognitive decline previously established in the elderly (e.g., CF). Specifically, we propose to generate a community-ascertained structured multi-cohort, longitudinal sample (Ne233 after data loss) from ages 40.0-74.9 yrs that can be used to delineate aging trajectories of the brain's functional and structural architectures, and capture brain-behavior relationships. 19 age-cohorts (n=23/cohort) will be spaced two years apart, each with 4 assessments spaced 12 months apart. Per cohort, we expect to have at least 18 participants with 2 or more consecutive, usable datasets, 16 with 3 or more usable datasets, and at least 13 participants with all 4 datasets. Proposed imaging methods include resting-state functional MRI (R-fMRI), 137-direction diffusion tensor imaging, arterial spin labeling and morphometry. We will also collect a task-based fMRI assessment of executive function (flanker), allowing for direct comparisons between measures of functional connectomics with task-based cortical recruitment and psychophysiological interactions. State-of-the-art multband imaging will be used for functional and diffusion-weighted data to maximize sampling rate, as well as spatial and angular resolution, while minimizing participant burden. Comprehensive phenotyping will include dimensional cognitive, behavioral, medical, sociodemographic, and psychiatric assessments. Gold-standard CF assessments, neuroimmunologic markers and genetics will also be obtained. The impact of phenotypic variables on multimodal structure- function relationships will be examined using an innovative multi-kernel varying coefficient framework. The proposed work builds on the Nathan Kline Institute-Rockland Sample, a large cross-sectional sample of brain development, maturation and aging in ages 6.0-85.0 yrs, currently funded to recruit and assess 1000 community-ascertained participants using multiband imaging-based R-fMRI and DTI and deep phenoytyping. De-identified data will be shared quarterly on a pre-publication basis via The 1000 Functional Connectomes Project. Building upon the NKI-RS effort minimizes startup, infrastructure, recruitment and design needs.

Lay Summary

PUBLIC HEALTH RELEVANCE: Marked by progressive declines in function, aging is a complex process for the brain. Fortunately, researchers have identified factors such as cardiovascular fitness, which appear to slow aging among the elderly and can be successful targeted for active interventions to preserve function. However, we know little about how cardiovascular fitness and other factors may help prevent the aging process earlier in middle life. We propose to generate a large set of brain imaging data from middle and older adults, in which we can map the trajectory of the aging brain from as early as 40 years old, and determine if factors such as cardiovascular fitness have a protective effect there as well. If so, the work generated by this

proposal may serve as a basis for future early intervention efforts. To facilitat researchers around the world, we will all data generated with the broader scientific community on a quarterly basis.

Further information available at:

Types:
Investments > €500k

Member States:
United States of America

Diseases:
Alzheimer's disease & other dementias

Years:
2016

Database Categories:
N/A

Database Tags:
N/A