Aging-related changes in brain activation and deactivation during cognition: novel insights into the physiology of the human mind from simultaneous PET-fMRI imaging

Fact Sheet

Project Information

SIMULTAN

Grant agreement ID: 716065

Project website

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10.3030/716065

Project closed

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8 December 2016

Start date
1 June 2017

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31 December 2022

Funded under
EXCELLENT SCIENCE - European Research Council (ERC)

Total cost
€ 1 499 544,00

EU contribution
€ 1 499 544,00

Coordinated by
MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV
Germany

Objective

There is no doubt that functional magnetic resonance imaging (fMRI) has led to a breakthrough in our ability to measure how the complexities of the mind are rooted in

biology. However, deactivation of certain brain areas during cognitive control and increased activation of prefrontal areas in aging are two examples of consistently found patterns of fMRI activation that have had a large impact on the study of the human mind, but that prompt major questions of interpretation. The physiological basis of the fMRI signal reflects interplay between hemodynamics and metabolic demands that vary across the brain, as well as between different tasks and individuals, and cannot be resolved by fMRI alone. To be able to use non-invasive imaging to distinguish a normally aging brain from one that is in the pre-clinical stages of disease, it is important to understand the neurobiological basis of these functional brain changes. Positron emission tomography (PET) is a molecular imaging method that is able to monitor brain glucose metabolism, which stems primarily from synaptic activity and is invariant to changes in blood flow. Studies that have made use of the complementary information gained from fMRI and PET to investigate human brain function have had to rely on sequential scans, and correlation of the signals from both modalities between individuals. The investigation of within-person switches between different mental states with complementary modalities is only made possible by the recent development of a hybrid PET-MR system, which, for the first time, allows simultaneous assessment of fMRI signal, blood flow and PET glucose metabolism during cognitive task performance. The proposal is structured in three work packages that include PET-fMRI scans in 30 healthy younger and 40 older adults. The analyses are designed to disentangle the hemodynamic and metabolic contributions to fMRI deactivations and prefrontal over-activation in aging during cognitive task performance.

Fields of science (EuroSciVoc)

medical and health sciences > basic medicine > **physiology**

engineering and technology > medical engineering > diagnostic imaging > **magnetic resonance imaging**

Keywords

Functional magnetic resonance imaging

positron emission tomography

human brain networks

Programme(s)

H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) MAIN PROGRAMME

Topic(s)

ERC-2016-STG - ERC Starting Grant

Call for proposal

ERC-2016-STG

See other projects for this call

Funding Scheme

ERC-STG - Starting Grant

Host institution

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

Net EU contribution

€ 376 201,50

Total cost

€ 376 201,50

Address

HOFGARTENSTRASSE 8
80539 Munchen
Germany

Region

Bayern > Oberbayern > München, Kreisfreie Stadt

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (2)

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

Germany

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Total cost

€ 376 201,50

UMEA UNIVERSITET

Sweden

Net EU contribution

€ 1 123 342,50

Address

UNIVERSITETOMRADET
901 87 Umea

Region

Norra Sverige > Övre Norrland > Västerbottens län

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes

HORIZON collaboration network

Total cost

€ 1 123 342,50

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