OCEAN: One-stop-shop microstructure-sensitive perfusion/diffusion MRI: Application to vascular cognitive impairment

https://neurodegenerationresearch.eu/survey/ocean-one-stop-shop-microstructure-sensitive-perfusiondiffusion-mri-application-to-vascular-cognitive-impairment/

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Country

United Kingdom

Title of project or programme

OCEAN: One-stop-shop microstructure-sensitive perfusion/diffusion MRI: Application to vascular cognitive impairment

Source of funding information

EPSRC

Total sum awarded (Euro)

€ 1,765,797

Start date of award

31/03/2015

Total duration of award in years

3.0

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords
Research Abstract
The term “dementia” is used to describe a syndrome that results, initially, in cognitive function impairment and in many cases, a descending staircase of psychological dysfunction, leading

eventually to death.
It is a major socio-economic challenge with care costs approaching 1% of global GDP. Several conditions that lead to serious loss of cognitive ability are grouped under this syndrome, including Alzheimer's disease (AD), Vascular Dementia (VaD), Frontotemporal Dementia, etc. A high publicity announcement was made in 2012, by the Prime Minister, emphasising the high priority that should be given to dementia-related research and that funding will more than double in the immediate future, to partially remedy the fact that the overwhelming impact of the syndrome has been over-looked (Guardian, 26/3/12). On Dec 2013, the G8 Summit hosted in London brought together G8 ministers, researchers, pharmaceutical companies, and charities to develop co-ordinated global action on dementia.

Dementia has marked adverse effects on the quality of life of tens of millions of people (both patients and carers) and exerts tremendous pressure on healthcare systems, especially when clear trends towards an ageing population, changing environmental influences and contemporary lifestyle choices are considered. Ca. 35M people suffer from dementia worldwide, a figure to quadruple by 2050. Europe and North America share a disproportionally high burden: the effects of ageing are particularly stark for these regions, exacerbating the healthcare provision implications.

The Clinical Relevance: Vascular Cognitive Impairment (VCI). VCI defines alterations in cognition attributable to cerebrovascular causes, ranging from subtle or fixed deficits to full-blown dementia. VCI is a wide and accepted term referring to the "syndrome with evidence of clinical stroke or subclinical vascular brain injury and cognitive impairment affecting at least one cognitive domain", with resulting VaD being its most severe form. VaD is responsible for at least 20% of dementias, second only to AD, with a prevalence doubling every 5. 3 years. Several trials examined cholinesterase inhibitors for the treatment of vascular dementia, but the benefits are very modest, except in the individuals with a combination of AD and VaD. Vascular changes result in white matter (WM) damage (leukoaraiosis), which profoundly affect the fidelity of the information transfer underlying brain function and cognitive health8.

Cerebral Magnetic Resonance Imaging (MRI) of Diffusion and Perfusion. MRI is a medical imaging technique affording non-invasive investigation of anatomy and tissue function, which is particularly suited to studying cognitive disorders due to its sensitivity and reliability. Our main interest is to characterise vascular and non-vascular tissues using quantitative diffusion and perfusion MR. Our overall aim is to characterise and quantify early differential alterations in brain blood transport and subsequent microstructural tissue damage using one-stop-shop perfusion/diffusion MR GSI incorporating novel MR signal models and optimal MR sequence design based on new human brain histomorphometric data in health and disease.

Lay Summary
Further information available at:

Types:
Investments > €500k

Member States:
United Kingdom

Diseases:
Alzheimer's disease & other dementias

Years:
2016

Database Categories:
N/A

Database Tags:
N/A