

# A next-generation MRI brain imaging platform for dementia research: from microstructure to function

<https://www.neurodegenerationresearch.eu/survey/a-next-generation-mri-brain-imaging-platform-for-dementia-research-from-microstructure-to-function/>

## Infrastructure name

A next-generation MRI brain imaging platform for dementia research: from microstructure to function

## Institute/location

University College London

## Key contact

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## Project/infrastructure description

Magnetic resonance imaging (MRI) will be crucial in early detection, diagnosis, and treatment trials in dementia. We will establish next-generation MRI technology in the UCL 3T Dementia Research Scanner. The upgrade including multi-nuclear, parallel transmit, multi band excitation, 64 channel RF head-coil, and stronger gradients will yield the spatial resolution, diffusion sensitivity, and scan-time efficiency essential for delivery and rapid translation of MRI innovation in 7 key areas: Diffusion microstructure imaging: Neurite orientation dispersion and density imaging (NODDI), ActiveAx to map average axon diameter, and oscillating gradient spin-echo (OGSE) methods. Multi-contrast quantitative MRI: Multi-parameter mapping reflecting microstructure; in vivo histology MRI quantifying cortical microanatomy, myelin, iron and amyloid plaque distribution. Advanced tractography and tractometry: Probing tracts important in dementia, but too small to investigate reliably to date, and structural connectivity as a whole, illuminating network changes and offering connectivity-based biomarkers. Clinical Functional MRI: Functional connectivity metrics may be sensitive markers of neural network dysfunction prior to irreversible structural brain damage. Arterial spin labelling (ASL) perfusion mapping: ASL has begun to impact in dementia research and perfusion may be key in the multi-parametric MRI signature differentiating neurodegenerative diseases. Sodium Imaging: Provides indices sensitive to inflammation and neuroaxonal loss. The role of neuroinflammation

in dementia, long recognised is still poorly understood. Ultra-Fast Prospective Motion Correction (PMC): Optical tracking PMC completely compensates for head motion, a major limitation in clinical high resolution imaging. The work aligns completely with the UKDP priorities of establishing cohorts and methods to expedite trials of interventions effective before widespread, irreversible neuronal damage occurs.

**Date funding committed**

01/04/2015

**Date infrastructure operational**

**Total capital cost (Euros)**

€ 1,650,102

**Does the 'Total Capital Cost' include other associated costs?**

**Current infrastructure status**

**Is this entry applicable to another section of this questionnaire?**

**Further information available at:**

Alzheimer, Dementia, Diffusion, Magnetic resonance imaging, Neuroimaging, Spectroscopy, Tractography

**Types:**

Capital Infrastructure

**Member States:**

United Kingdom

**Diseases:**

N/A

**Years:**

2016

**Database Categories:**

N/A

**Database Tags:**

N/A