Advanced MR Imaging of Brain Structure and Function in Health and Disease

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Title of project or programme

Title of PI Advanced MR Imaging of Brain Structure and Function in Health and Disease

Principal Investigators of project/programme grant

Title	Forname	Surname	Institution	Country
Professor	Irene	Tracey	University of Oxford	UK

Address of institution of lead PI

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- United Kingdom

Source of funding information

Medical Research Council

Total sum awarded (Euro)

4969688.22

Start date of award

01-03-2008

Total duration of award in months

60

The project/programme is most relevant to

- Neurodegenerative disease in general

Keywords
Research abstract in English

The Oxford Centre for Functional Magnetic Resonance Imaging of the Brain (FMRIB) is a world-class, multidisciplinary, integrative MR imaging laboratory. Our translational neuroscience research in pain, plasticity in disease, cognition and in vivo neuroanatomy, combined with excellence in MR physics and image analysis, creates a unique environment for scientists and clinicians from Oxford, the UK

and overseas. Advances in ultra-high-field imaging provide a timely and hitherto unrealised opportunity to move neuroimaging away from the primary domain of the research environment towards genuine translational approaches that can be applied to the individual subject or patient. We aim to place FMRIB at the leading edge of this next wave of development by providing an advanced high field 7 Tesla imaging system and the necessary infrastructure as a platform from which we gain the benefits of improved signal-to-noise, contrast and resolution, thereby making this opportunity a reality. Our programme for 7T includes novel MR physics developments in radiofrequency coil designs, B0-inhomogeneity and physiological noise correction methods, magnetic resonance spectroscopy, quantitative FMRI and high resolution structural imaging. All these MR physics developments require simultaneous advances in our image analysis techniques, a synergy that will continue and strengthen with this initiative. This two-pronged approach will deliver statistically meaningful readouts of both structure and function on an individual subject basis. In the pain programme, the increased spatial resolution and contrast at 7T will directly benefit our human brainstem pain research, providing valuable new information to guide surgical procedures for the treatment of chronic pain. Harnessing image analysis tools to study single event, single subject and single session imaging data, obtainable due to the increased SNR at 7T, will substantially advance the development of the pain centre at Oxford and our drug development research. The plasticity-in-disease, cognition and vision programmes of research all gain equally strong benefits from working at 7T, most notably from examining the individual brain from a structural and functional perspective. Securing key infrastructure posts as part of this bid is critical for the operational running of the entire FMRIB Centre. These people will have a critical role in exploiting the proposed 7T scanner and training the next generation of neuroimagers and systems neuroscientists in these advanced technologies. A focussed and timely capital investment in this high impact programme not only provides excellent value for money but potential benefits for human health as well as securing FMRIB's world-class capabilities for the next 10-15 years.

Lay summary
In which category does this research fall?

- Clinical research