

### **MRI imaging leads pioneering neurological research**

#### **MAGNETOM Trio widens neurological understanding and opens the door for enhanced care of vegetative state patients**

The MRC Cognition and Brain Sciences Unit (CBU) in Cambridge is an internationally renowned centre for research in the field of cognitive neurosciences. Its ground breaking studies into the brain function of vegetative state patients has provided invaluable insight into diagnosis pathways and the consequent care of the 'locked-in' patient.

On a day to day basis the CBU uses a MAGNETOM Trio MRI scanner from Siemens to research the brain activity in language, memory, emotion and attention. The 3 Tesla system shows microscopic detail of the human brain, allowing exceptional image clarity of neurological functions. This means that researchers can study very accurately the brain's response to a variety of stimuli.

"The MAGNETOM Trio enables us to study in great depth the brain functionality of volunteers," said Martin Monti, Researcher at the CBU. "Ongoing studies at the CBU will help to increase understanding of the brain, leading to developments in the clinical side of neuroscience. In the long term it will contribute to early diagnosis and create a better understanding of neuropathologies, helping to improve outcomes, care management and quality of life."

The CBU is renowned for its clinical studies of vegetative state patients conducted in collaboration with colleagues at the Wolfson Brain Imaging Centre at Addenbrooke's Hospital which houses an identical MAGNETOM Trio MRI scanner from Siemens. Led by Dr. Adrian Owen, the team recently looked into the brain activity during vegetative state, a condition where patients who emerge from a coma appear to be awake, but show no signs of conscious awareness\*. Traditionally, diagnosis for vegetative state is based on patient reaction to external stimuli i.e. noise or smell, but approximately

40% of patients are misdiagnosed as vegetative when in fact they may retain some degree of conscious awareness.

Using functional MRI (fMRI), a neuroimaging technique to study activity in the brain, researchers were able to test the neural responses of patients diagnosed as vegetative. The findings suggested that residual cognitive capabilities were apparent in some cases and these allowed such patients to communicate their thoughts simply by modulating brain activity. When asked to process and respond to specific commands, the scanned images of apparent vegetative state patient's brains were indistinguishable from those of a healthy volunteer. The clinical studies took place at the Wolfson Brain Imaging Centre where patients with brain injuries are examined for evidence of preserved cognitive function.

"Thanks to the advances in MRI technology and extensive research, we have gained invaluable insight into the nature of vegetative state patients," said Adrian Owen, neuroscientist and Assistant Director of the CBU. "Our studies in healthy volunteers have been 100% accurate when looking for responses to 'yes' and 'no' questions, which has enormous implications for the way conditions such as the vegetative state are assessed. Understanding these patients is vital for accurate diagnosis as well as for providing information to friends and relatives. Accurate neural maps open the door to a new type of communication, meaning researchers can reach even greater depths of understanding into this condition."

The MAGNETOM Trio is a fully integrated 3T system, providing top speed and image quality using Tim™ (Total imaging matrix) technology. It provides high quality functional images over a large anatomical plane. The patient-friendly system is designed to rapidly complete MRI scans, offering advanced image quality with the patient's comfort in mind.

"The pace of MRI innovation is assisting not only clinical establishments but also research institutions in understanding the way the brain works. MRI yields detailed images of reactions and neurological functions in patients and healthy subjects. This provides physicians and scientists with evidence of reactions that can go towards developing swifter diagnosis and improved care programmes," said Julie Shepherd, MR Product Manager at Siemens Healthcare.

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**Notes to editors:**

\*Detecting Awareness in the Vegetative State, Science, 313, 1402, 2006, Owen, Coleman, Boly, Davis, Laureys & Pickard.

## **About Siemens Healthcare**

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**Picture caption:** Adrian Owen, neuroscientist & Assistant Director of the CBU and Graham Walker, Siemens Regional Sales Manager with the MAGNETOM Trio.



**Picture caption:** The MAGNETOM Trio at the MRC Cognition & Brain Sciences Unit. (Left to right): Graham Walker, Siemens Regional Sales Manager, Helen Lloyd, Superintendent Radiographer, Patrick Revell, Siemens MR Collaboration Manager and Adrian Owen, neuroscientist & Assistant Director of the CBU.

