

WU researchers breakthrough with minimally conscious state patients

1 March 2012

(Medical Xpress) -- Researchers from Western University have utilized their own game-changing technology - previously developed for use with patients in a vegetative state - to assess a more prevalent group of brain-injured patients, those in the minimally conscious state (MCS). Their findings were released today in *Neurology*, the medical journal of the American Academy of Neurology.

The study, led by Adrian Owen, Canada Excellence Research Chair in Cognitive Neuroscience and Imaging, and Damian Cruse of Western's [Brain](#) and Mind Institute, is a follow-up to the team's groundbreaking Lancet publication from November 2011 that used electroencephalography (EEG) to show that some vegetative state patients were able to reliably follow commands, even though this ability was entirely undetectable from their external behaviour.

In the new paper, titled "The relationship between aetiology and covert cognition in the minimally-conscious state," the MCS patients showed some inconsistent but reproducible external signs of awareness, such as being able to follow their eyes in a mirror. Cruse says, however, that currently very little is known about their 'internal' state of awareness that may be hidden from their external behaviour.

"Using our EEG approach, we found that 22 per cent of 23 MCS patients were able to complete a complex task which required them to imagine particular types of movement," says Cruse, a Post-Doctoral Fellow at the Brain and Mind Institute and the lead writer of the paper. "This tells us that these patients have a much higher level of cognitive ability than what you could detect from their behaviour."

Cruse adds that the cause of the brain injury was a determining factor in finding these cognitive

abilities as 33 per cent of traumatically injured patients (e.g. traffic accident, fall) returned positive EEG results compared to zero per cent of non-traumatically injured patients (e.g. heart attack, stroke).

The research team, in collaboration with Steven Laureys at the University of Liège, Belgium, asked patients approximately 100 times each to imagine moving his or her right-hand and toes. By making recordings of the patients' EEG, a measure of the electrical activity of the brain, the team showed that 22 per cent of the MCS patients were able to produce patterns of brain activity that were indistinguishable from a healthy individual following the same commands.

"There are a large number of patients in the MCS worldwide, and our approach highlights the importance of using EEG and other forms of brain imaging when assessing the mental capabilities of [patients](#) following brain injury," says Cruse "It reinforces our understanding that the externally observable abilities of a patient are not necessarily a true reflection of their internal state."

Provided by University of Western Ontario

APA citation: WU researchers breakthrough with minimally conscious state patients (2012, March 1) retrieved 2 September 2022 from <https://medicalxpress.com/news/2012-03-wu-breakthrough-minimally-conscious-state.html>

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