

Awareness in Vegetative State

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EYE SPY

The Study: *Cruse D, Chennu S, Chatelle C, Bekinschtein TA, Fernández-Espejo D, Pickard JD, et al. Bedside detection of awareness in the vegetative state: a cohort study. Lancet 2011; 378:2088-94.*

Patients who have been diagnosed as vegetative have been traditionally believed to be unaware of their environment as well as their own selves. The awareness of such patients however has been subject to a lot of emotional, legal, ethical and economic turmoil. In a paper [1] published by Owen et al in 2006 it was shown for the first time that a patient who seemed to be entirely vegetative was aware and able to modulate the blood oxygen-level dependent (BOLD) response to do various mental imagery tasks. The researchers used functional MRI (fMRI) for this purpose. Other studies that followed used the same principle and established the fact that within this group of apparently unaware vegetative patients lay a sub-group of "aware" or conscious patients.

Why this study was needed?

Identification of "aware" or conscious vegetative patients with residual cognitive function however was still almost impossible owing to the fact that fMRI is costly and mostly unavailable. Add to that the fact that the/a patient has to incur a considerable amount of physical stress for this investigation. Moreover even in set ups where it was available, fMRI could not be used for evaluation in most of the vegetative patients owing to motion artefacts and the presence of metal implants like plates and pins in these patients (fMRI is contraindicated for metal implants). This led to the need for developing an easier, cheaper and a more portable modality for detection of awareness. EEG was the modality chosen for this purpose by the researchers owing to the fact that novel EEG task involving motor imagery to detect command-following is a universally accepted clinical indicator of awareness (in the absence of overt behaviour).

Study design : Cohort, multicenter.

What the study found?

The study involved 16 patients in the vegetative state as per the Coma Recovery Scale-revised definition, and 12 healthy controls. Three (19%) of 16 patients could repeatedly and reliably generate appropriate EEG responses to two distinct commands, despite being entirely unresponsive behaviorally. Thus, EEG helped recognize residual conscious awareness in previously unrecognized subjects.

What is the bottom line?

EEG method can identify covert awareness in patients diagnosed to be in the vegetative state with a similar degree of accuracy to fMRI. Thus, it provides for a considerably cheaper, more portable, widely available and objective bedside technique. EEG is also less susceptible to motion artefacts. The study also showed that the clinical history of patients played no role in their ability to follow command. Hence decisions on awareness should be guided by investigations and not on history or clinical examinations. The study will definitely change the way vegetative patients are managed or cared for across the globe.

What is the way forward?

The study opens the floodgates of research for simple, reliable communication devices which will provide, "a form of external control and communication based on mappings of distinct mental states (eg: patients imagining right-hand movements to communicate yes, and toe movements to communicate no)." In the future it may also be possible to have two-way communication with some of the vegetative patients, thus allowing them to share their inner worlds, experiences, and needs.

REFERENCES:

- Owen AM, Coleman MR, Boly M, Davis MH, Laureys S, Pickard JD. Detecting awareness in the vegetative state. *Science*. 2006; 313(5792): 1402.

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