Brain activation

Brain activation in response to spoken motor commands can be detected by electroencephalography (EEG) in clinically unresponsive patients. The prevalence and prognostic importance of a dissociation between commanded motor behavior and brain activation in the first few days after brain injury are not well understood.

Claassen et al., studied a prospective, consecutive series of patients in a single intensive care unit who had acute brain injury from a variety of causes and who were unresponsive to spoken commands, including some patients with the ability to localize painful stimuli or to fixate on or track visual stimuli. Machine learning was applied to EEG recordings to detect brain activation in response to commands that patients move their hands. The functional outcome at 12 months was determined with the Glasgow Outcome Scale-Extended (GOS-E; levels range from 1 to 8, with higher levels indicating better outcomes).

A total of 16 of 104 unresponsive patients (15%) had brain activation detected by EEG at a median of 4 days after injury. The condition in 8 of these 16 patients (50%) and in 23 of 88 patients (26%) without brain activation improved such that they were able to follow commands before discharge. At 12 months, 7 of 16 patients (44%) with brain activation and 12 of 84 patients (14%) without brain activation had a GOS-E level of 4 or higher, denoting the ability to function independently for 8 hours (odds ratio, 4.6; 95% confidence interval, 1.2 to 17.1).

A dissociation between the absence of behavioral responses to motor commands and the evidence of brain activation in response to these commands in EEG recordings was found in 15% of patients in a consecutive series of patients with acute brain injury. (Supported by the Dana Foundation and the James S. McDonnell Foundation.) [1)].

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1)

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