



Letter to the Editor

Theoretical considerations on Koubeissi et al.



To the Editor

Consciousness and its components have been tickling the imagination of scientists for a long time [1].

Therefore, when Fernandez-Espejo and Owen discussed awareness in their *perspective article* published in 2013 in *Nature Reviews Neuroscience* [2], even the most visionary mind could not foresee upcoming events in terms of consciousness. In less than a year, the prospect of using functional neuroimaging developments (and neuro-morphology in general) in order to detect consciousness had translated into a materialistic realm by the discovery of Koubeissi et al. [3]. Although they did conclude modestly on the therapeutic potential for deep-brain stimulation implications in epilepsy by advising further studies in other patients, popular media were not shy about proclaiming this to be an epochal discovery of the on-off consciousness switch. Careful clinical examination enhanced by new knowledge could result in reclassification of the state of consciousness in some of the “minimally conscious” patients.

Therefore, a mostly immeasurable and speculative feature as consciousness, through the interpretation of this report, becomes readily locatable and quantifiable, and modern medicine is hardly slightly closer to communicating with some patients whose state of consciousness is nonresponsive. Despite the encouragement that could arise with a known location of consciousness, communication with the family is repeatedly emphasized (and should, not in the slightest, be devalued), although we are a bit more impressed with medicolegal consequences of covertly aware patients possibly getting by meticulous checkups.

It is more than a simple division between “vegetative” and “minimally conscious.” In terms of impaired consciousness in human beings, a spectrum of conditions is, in addition, bolstered with a recent report of Koubeissi et al. The modern concept of consciousness seems to be light-years away from Harvard criteria for equating brain death with human death and later, the Uniform Determination of the Death Act [4]. Even though the needs of the range are clearly definable, conditions that stand in between also need to be recognized for clinical convenience. We are wondering whether this Koubeissi et al.'s report sheds a new light on the declaration of death guidelines and whether they should be reconsidered. Would a change in concept of declaring death diminish organ-donating statistics? At the very least, are the organs being explanted from clinically unresponsive but aware donors [4]?

Secondly, we have assumed that the detected location of awareness could throw a new light on the definition of a “minimally conscious state.” With the known location of the anatomical substrate of consciousness, a simple microscopic examination after death can show radiographically invisible changes of the “switch.” Namely, different pathological processes, irrespective of its nature, can depress the conscious level with one of the following mechanisms: diffuse hemispheric damage, brainstem damage, or bilateral thalamic damage.

Since the latter is extremely rare and similar to brainstem damage and does not topographically correspond to the findings of Koubeissi et al., we are inclined to document changes in the claustrum. These can result from either ischemia or metabolic changes [5,6] that would be microscopically visible on postmortem neurons similar to the changes described in the paper of Pulsinelli et al. [6,7].

Unfortunately, far-reaching repercussions of Koubeissi et al.'s report are most likely to fail despite the identification of a small, unilateral area where electrical stimulation reproducibly disrupted consciousness. Koubeissi et al.'s finding merely suggested that the claustrum/insula complex might be a conductor for the “orchestra” of consciousness and integral to combining different ways of brain activity. Koubeissi et al. prudently reasoned that the possibility of afterdischarges from unstimulated areas could not be ruled out thoroughly, paying no attention to the features currently used in treatment. Since the current was rather high, theoretically, hyperpolarization might last long enough for other neural correlates of consciousness to take over [8,9].

Conflict of interest

The authors declare that they have no conflicts of interest. Since we are submitting a letter, IRB's approval was not necessary.

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