

Breakthrough Research Shows Consciousness in PVS Patient

BY Burke J. Balch, J.D.

Using advanced medical technology, researchers in Great Britain have found that a patient diagnosed to be in a so-called “persistent vegetative state” (PVS) has brain activity “indistinguishable from that of healthy volunteers.” The report appeared in the September 8, 2006, issue of *Science* magazine, a scholarly journal published by the American Association for the Advancement of Science.

“This is extremely important,” said Steven Laureys, a neurologist at the University of Liege and co-author of the study. “It’s the difference between life and death. From cases in the UK and the US, we know that end-of-life decisions are of course extremely important and this will definitely change the way we deal with these patients. When you have signs of consciousness, you cannot decide to stop hydration and nutrition.”

The authors were a group of medical researchers headed by Dr. Adrian Owen based in Cambridge, United Kingdom, and Liege, Belgium. They reported on their use of functional magnetic resonance imaging (fMRI) on a 23-year-old woman who suffered a severe traumatic brain injury as the result of a traffic accident.

After a period in a coma, the woman emerged into what was repeatedly diagnosed, in accordance with standardized assessments according to the accepted guidelines, as a PVS.

“Persistent vegetative state” is a notoriously imprecise diagnosis applied to individuals who have, typically, emerged from a coma so as to have sleep-wake cycles, but have been believed to demonstrate no conscious awareness, only reflexive activity. For decades, they have been deemed prime candidates for withdrawal of life-sustaining medical treatment, food, and fluids—as in the highly publicized case of Terri Schindler Schiavo.

Five months after the accident investigators posed an increasingly complicated series of questions to her. When she was separately told to imagine herself playing tennis, and to imagine moving from room to room in her house, different parts of her brain were activated—those that would control these different behaviors. When she was read various sentences, parts of the brain associated with speech recognition were activated. When sentences with ambiguous words were used, there was additional activity reflecting “the operation of semantic processes that are critical for speech comprehension,” according to the authors.

While she was being scanned by an fMRI, previously recorded sentences were transmitted to her through earplugs, interspersed with meaningless noises of equivalent length and amplitude. For comparison, the same sentences and noises were played for 34 healthy volunteers.

“Speech-specific activity was observed ... equivalent to that observed in healthy volunteers listening to the same stimuli,” the authors report in *Science*. “Furthermore, sentences that contained ambiguous words ... produced an additional significant response in a left inferior frontal region, similar to that observed for normal volunteers.” Meaningless noises, by contrast, did not result in such brain activity.

In later trials, the patient was instructed to imagine herself playing tennis, and thereafter to imagine moving from room to room in her house. The same was done for 12 healthy volunteers. The intent was to be sure the patient was aware—that her brain was not merely responding automatically.

The team wanted to see whether the appropriate areas of her brain would “fire up” when they spoke to the patient. They did.

“During the periods that she was asked to imagine playing tennis, significant activity was observed in the supplementary motor area. In contrast, when she was asked to imagine walking through her home, significant activity was observed in [3 other distinct areas]. Her neural responses were indistinguishable from those observed in healthy volunteers performing the same imagery tasks in the scanner.”

The researchers concluded, “[H]er decision to cooperate with the authors by imagining particular tasks when asked to do so represents a clear act of intention, which confirmed beyond any doubt that she was consciously aware of herself and her surroundings.”

They also issued a warning: “[N]egative findings in such patients cannot be used as evidence for lack of awareness, because false negative findings in functional neuroimaging studies are common, even in healthy volunteers. However, ... the presence of ... responses to command ... suggests a method by which some noncommunicative patients, including those diagnosed as vegetative ... may be able to ... communicate their thoughts to those around them by modulating their own neural activity.”

“These are startling results,” Owen said. “They confirm that, despite the diagnosis of a vegetative state, this patient retained the ability to understand spoken commands and to respond to them through her brain activity, rather than through speech and movement.”

Dr. Nicholas Schiff, a Columbia University neurologist, agreed. “It’s a spectacular result.”

“This new case is not surprising to our family,” said Robert Schindler, Terri’s father. “We are seeing a growing amount of evidence indicating that the diagnosis of ‘Persistent Vegetative State’ (PVS) is often misdiagnosed, resulting in dangerous and potentially fatal consequences for people with brain injuries, as documented in this new account of a brain-injured woman.”

He added, “The danger of this diagnosis is that it is being used as a reason to kill innocent people with disabilities, like Terri.”