

HOW DO IMPLANTABLE BRAIN DEVICES AFFECT THE DETERMINATION OF BRAIN DEATH?

Zaev D. Suskin, B.A.^{1,2,3}

¹ M.B.E. candidate, Class of 2018, Harvard Medical School Center for Bioethics

² M.D. candidate, Class of 2019, Georgetown University School of Medicine

³ Pellegrino Center for Clinical Bioethics

Inquiries: Zaev_suskin@hms.harvard.edu

Abstract

In the 50 years since the seminal Harvard brain death criteria were established, the Congressionally termed “Decade of the Brain” (1990’s) and “Decade of Pain Research” (2000’s) augmented immense progress in brain research, including advances in our understanding of underlying neurobiochemical processes and the development of neurotechnologies. The advent of implantable brain devices (IBDs) has furthered our ability to image/measure and manipulate/stimulate the brain. As these devices, particularly deep brain stimulation (DBS), are continuously being developed for novel purposes and various neuropsychiatric illnesses, their increased prevalence and capabilities may prove problematic for the half-century old definition of brain death. I examine how IBDs must be accounted for by this definition and how they may enhance brain death criteria. To date, I am unaware of any publications regarding this issue.

Brain death is defined as the irreversible loss of all functions of the brain. Therefore, IBDs may complicate the determination of brain death two-fold. First, already-implanted brain devices may prove diagnostically problematic following severe brain injury that would otherwise result in brain death. IBDs may continue firing after brain death has occurred, producing electrical signals of unknown functional significance and origin (i.e. “naturally” or device-produced); removal of the device may be unacceptable. Additionally, IBD-related malfunction could confound identification of a clear etiology of brain death, a necessary factor for clinical determination. Second, the therapeutic possibilities of IBDs may complicate existing notions of the irreversibility of brain death. Recent research has granted new insights into: reversible neurobiological processes occurring just prior to death, suggesting plausible room to implant devices in order to suspend this process; and the potential use of DBS to “jump-start” the brain even after brain death has been declared. As IBDs continue to advance, they may have significant technical and ethical implications for the determination of brain death.