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# Brain Death: History, Updated Guidelines And Unanswered Questions

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## Citation

G Matis, O Chrysou, D Silva, T Birblis. *Brain Death: History, Updated Guidelines And Unanswered Questions*. The Internet Journal of Neurosurgery. 2012 Volume 8 Number 1.

## Abstract

In 1959, Mollaret & Goulon, two French neurophysiologists, added a new figure of what they called “coma dépassé” (“overcoma”) to the known phenomenology of the coma. In addition to the classical coma, which was characterized by the loss of relational life functions (consciousness, mobility, sensibility, reflexes), the medical literature of the time also distinguished an alert coma (incomplete loss of relational functions), and a carus coma (the preservation of vegetative life functions was seriously threatened) [1].

In 1968, the Harvard Ad Hoc Committee on Brain Death published a report describing the characteristics of a permanently nonfunctioning brain, a condition it referred to as “irreversible coma,” now known as brain death. It included:

In 1976, the Conference of Medical Royal Colleges of the United Kingdom described the following criteria:

In 1980, the President’s Commission for the Study of Ethical Problems in Medicine determined brain death as follows: “an individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards” [4].

In 1995, the Quality Standards Subcommittee of the American Academy of Neurology published a report on the practice parameters for determining brain death in adults. It concluded that “the three cardinal findings in brain death are coma or unresponsiveness, absence of brainstem reflexes, and apnea” [5].

In 1999, the Canadian Neurocritical Care Group published its own guidelines for the diagnosis of brain death.

According to them, no testing of oculocephalic reflex was needed, the core temperature could be as low as 32.2°C during the apnea test, and the interval between exams as short as 2 hours [6].

So, many guidelines were issued in the past. But did we achieve a global consensus in diagnostic criteria? According to Wijdicks [7] no! The author reviewed the guidelines of 80 countries. Legal standards on organ transplantation were found in 55 of 80 countries and practice guidelines for brain death for adults in 88%. He concluded that “uniform agreement on the neurologic exam with exception of the apnea test; but other major differences found in the procedures for diagnosing brain death in adults, and standardization should be considered” [7].

In 2010, 15 years after its first report, the Quality Standards Subcommittee of the American Academy of Neurology issued an evidence-based guideline update [8]. This new report addressed 5 questions:

One year later, 2011, the Society of Critical Care Medicine, Section on Critical Care and Section on Neurology of the American Academy of Pediatrics, and the Child Neurology Society issued an update of the 1987 Task Force recommendations concerning the guidelines for the determination of brain death in infants and children [9]. The recommendations provided are the following:

And which areas should future research concentrate on? For adults, the safety of the apnea test (along with alternative methods of apnea testing) should be assessed. An audit of adequate documentation, and a study of the competence of examiners is also necessary. Details of the neurologic examination may be subjected to an expert panel review, possibly including international organizations [8].

For children, studies comparing traditional ancillary studies to newer methods to assess cerebral blood flow and neurophysiologic function should be pursued. Hypothermia may alter the natural progression of brain death and its impact should be reviewed. Cooperation with national medical societies to achieve a uniform approach to declaring death that can be incorporated in all hospital policies should be a new goal. Finally, additional studies are required to determine if a single neurologic examination is sufficient for neonates, infants, and children to determine brain death as currently recommended for adults >18 years of age [9].

OK. Now we have our new updated guidelines. But does really brain death mean that the patient is dead? This must be clarified because it is the declaration of death that permits organ donation/transplantation... Truog & Robinson (2003) among other researchers put into question the so far accepted belief that brain death corresponds to the biological and philosophical understanding of death [10]. For example, many patients diagnosed as brain dead retain function of the posterior pituitary. Additionally, sticking to the current belief would mean that patients in a permanent vegetative state should also be considered dead. Going one step further, the authors proposed that “individuals who desire to donate their organs and who are either neurologically devastated or imminently dying should be allowed to donate their organs, without first being declared dead” [10].

To end with, guidelines are useful for a uniform declaration of brain death not only in the adult but also in the pediatric patients. Yet, the right question to ask is “is the patient brain dead” or “is the patient dead”? There are no easy answers. A consensus involving physicians, patients and community is

imperative and urgently needed. By no means can the answer be separated from the way that our society deals with these matters of life (organ transplantation) and death. Physicians are only responsible for ensuring respect to patients and nonmaleficence. They are surely “not morally responsible for the patient’s death” [10] nor could they replace the public opinion.

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