The World Brain Death Project

Brain death was defined according to the 2010 American Academy of Neurology guidelines and following 2020 The World Brain Death Project

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International efforts have been made to standardize the criteria and procedures for determining brain death to ensure consistent and accurate assessments across different countries and healthcare systems. These efforts aim to improve patient care and provide that organ donation if desired, can occur in a timely and safe manner.

Relevant international professional societies were recruited to develop recommendations regarding determination of BD/DNC. Literature searches of the Cochrane, Embase, and MEDLINE databases included January 1, 1992, through April 2020 identified pertinent articles for review. Because of the lack of high-quality data from randomized clinical trials or large observational studies, recommendations were formulated based on consensus of contributors and medical societies that represented relevant disciplines, including critical care, neurology, and neurosurgery.

Evidence synthesis: Based on review of the literature and consensus from a large multidisciplinary, international panel, minimum clinical criteria needed to determine BD/DNC in various circumstances were developed.

Recommendations: Prior to evaluating a patient for BD/DNC, the patient should have an established neurologic diagnosis that can lead to the complete and irreversible loss of all brain function, and conditions that may confound the clinical examination and diseases that may mimic BD/DNC should be excluded. Determination of BD/DNC can be done with a clinical examination that demonstrates coma, brainstem areflexia, and apnea. This is seen when (1) there is no evidence of arousal or awareness to maximal external stimulation, including noxious visual, auditory, and tactile stimulation; (2) pupils are fixed in a midsize or dilated position and are nonreactive to light; (3) corneal, oculocephalic, and oculovestibular reflexes are absent; (4) there is no facial movement to noxious stimulation; (5) the gag reflex is absent to bilateral posterior pharyngeal stimulation; (6) the cough reflex is absent to deep tracheal suctioning; (7) there is no brain-mediated motor response to noxious stimulation of the limbs; and (8) spontaneous respirations are not observed when apnea test targets reach pH <7.30 and Paco2 ≥60 mm Hg. If the clinical examination cannot be completed, ancillary testing may be considered with blood flow studies or electrophysiologic testing. Special consideration is needed for children, for persons receiving extracorporeal membrane oxygenation, and for those receiving therapeutic hypothermia, as well as for factors such as religious, societal, and cultural perspectives; legal requirements; and resource availability.

Conclusions and relevance: This report provides recommendations for the minimum clinical standards for determination of brain death/death by neurologic criteria in adults and children with clear guidance for various clinical circumstances. The recommendations have widespread international society endorsement and can serve to guide professional societies and countries in the revision or development of protocols and procedures for determination of brain death/death by neurologic criteria, leading to greater consistency within and between countries [1) 2)].

The World Brain Death Project aims in alleviating inconsistencies in clinical guidelines and practice in the determination of death by neurologic criteria. However, critics have taken issue with a number of epistemic and metaphysical assertions that critics argue are either false, ad hoc, or confused.

Lazaridis disscussed the nature of a definition of death; the plausibility of neurologic criteria as a sensible social, medical, and legal policy; and within a Rawlsian liberal framework, reasons for personal choice or accommodation among neurologic and circulatory definitions. Declaration of human death cannot rest on contested metaphysics or unmeasurable standards, instead it should be regarded as a plausible and widely accepted social construct that conforms to best available and pragmatic medical science and practice. The definition(s) and criteria should be transparent, publicly justifiable, and potentially allow for the accommodation of reasonable choice. This is an approach that situates the definition of death as a political matter. The approach anticipates that no conceptualization of death can claim universal validity, since this is a question that cannot be settled solely on biologic or scientific grounds, rather it is a matter of normative preference, socially constructed and historically contingent [3].

The concept of brain death has periodically come under criticism [4].

Confirmatory tests for the diagnosis of brain death in addition to clinical findings may shorten observation time required in some countries and may add certainty to the diagnosis under specific circumstances.

The current U.S. approach to determining death was developed in response to the emergence of technologies that made the traditional standard of cardiopulmonary death problematic. In 1968, an ad hoc committee at Harvard Medical School published an influential article arguing for extending the concept of death to patients in an “irreversible coma.“ [5]. The emerging neurologic criteria for death defined it in terms of loss of the functional activity of the brain stem and cerebral cortex. Although clinical criteria were developed in the 1960s, it took more than a decade for consensus over a rationale for the definition to emerge. In 1981, the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research provided a philosophical definition of brain death in terms of the loss of the critical functions of the organism as a whole [6].

Shortly thereafter, the National Conference of Commissioners on Uniform State Laws produced the Uniform Determination of Death Act, which has been adopted in 45 states and recognized in the rest through judicial opinion [7].

1)
Greer DM, Shemie SD, Lewis A, Torrance S, Varelas P, Goldenberg FD, Bernat JL, Souter M, Topcuoglu MA, Alexandrov AW, Baldisseri M, Bleck T, Citerio G, Dawson R, Hoppe A, Jacobe S, Manara A, Nakagawa TA, Pope TM, Silvester W, Thomson D, Al Rahma H, Badenes R, Baker AJ, Cerny V, Chang C, Chang TR, Gnedovskaya E, Han MK, Honeybul S, Jimenez E, Kuroda Y, Liu G, Mallick UK, Marquevich V, Mejia-Mantilla J, Piradov M, Quayyum S, Shrestha GS, Su YY, Timmons SD, Teitelbaum J, Videtta W, Zirpe K, Sung G. Determination of Brain Death/Death by Neurologic Criteria: The World Brain Death Project. JAMA. 2020 Sep 15;324(11):1078-1097. doi: 10.1001/jama.2020.11586. PMID: 32761206.
2)
Lewis A. How Can International Consistency in Determination of Brain Death/Death by Neurological Criteria be Improved? The World Brain Death Project. J Neurosurg Anesthesiol. 2023 Feb 3. doi: 10.1097/ANA.0000000000000902. Epub ahead of print. PMID: 36735353.
3)
Lazaridis C. Defining Death: Reasonableness and Legitimacy. J Clin Ethics. 2021

Summer;32(2):109-113. PMID: 34129526.
4)

Truog RD, Miller FG, Halpern SD. The dead-donor rule and the future of organ donation. N Engl J Med 2013;369:1287-1289
5)

A definition of irreversible coma: report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death. JAMA 1968;205:337-340
6)

President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. Defining death: a report on the medical, legal and ethical issues in the determination of death. Washington, DC: Government Printing Office, 1981.
7)

National Conference of Commissioners on Uniform State Laws. Uniform Determination of Death Act, 1981 (http://www.uniformlaws.org/shared/docs/determination%20of%20death/udda80.pdf).