

Temperature and brain death determination: need for updated criteria

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As noted by Greer and colleagues,¹ the birth of the brain death concept dates back to the 1959 report by Mollaret and Goulon on 23 comatose patients.² Since that time, new and better criteria for the determination of brain death have developed, as well new technologies that assess brain function, including the use PET imaging to confirm the clinical diagnosis for brain death.³ Although other new ancillary tests have developed that also include CT Angiography, there remains considerable variability in the clinical protocol checklists at individual medical centers on how the final diagnosis of brain death is achieved. Significant discrepancies were present among 38 medical centers studied by Greer and colleagues¹ for brain death guideline performance, preclinical testing, clinical examination, apnea testing, and ancillary tests.

Although variability can be partly accounted for the fact that some clinical exam tests for brain death require subjective evaluation and individual physician judgment, an absolute measurement that showed surprising variability amongst the centers studied was the minimum core temperature for brain death determination. As shown by Greer and colleagues,¹ almost 75% of all centers placed the minimum temperature at about 32°C. Since even mild therapeutic hypothermia clinical protocols have a target core temperature of 33°C for the production of a medically induced comatose state,⁴ it seems paradoxical that brain death protocols would find one degree lower at 32°C to be an acceptable minimum to conduct a clinical exam for brain viability. Furthermore, the minimum temperature for apnea testing was set at 36.5°C by 70% of all 38 US medical cen-

ters sampled.⁴ Chin and colleagues⁵ studied this variability amongst 36 physicians in Singapore, and noted that a cumulative total of 79% of all physicians set a lower limit of 35°C as a required precondition for brain death determination - only 6% of the group found a temperature below 34°C as acceptable minimum temperatures. Therefore, the proposed new guidelines by Wijdicks and colleagues⁶ with regards to temperature are very reasonable: warming blankets should be used to achieve a normal or near normal body temperature at being above 36°C.

As these updated guidelines are relatively new, US hospitals and State Departments of Health should correspondingly update their criteria for brain death to include this minimum temperature criteria as being 36°C. For example, multiple hospitals within the State of New York are still following the December 2005 Guidelines for Determining Brain Death from the NY State Dept. of Health, which has a checklist that requires core body temperature to be 32°C or above (89.6°F). This level may be considered by others to be too low to conduct a valid brain death exam, and all hospitals should rapidly update and revise their criteria according to Wijdicks and colleagues.⁶

For an excellent review on the diagnosis of brain death, the interested reader is directed to the review of Machado⁷ appearing in this journal; the author reviews all aspects of brain death and cites nine different references where the minimum temperature for brain death exams appear to have been at least 32.2°C. Given the new data listed above, it is clearly time for a reconsideration of the how we approach the exam for diagnosis of brain death - normal or near normal temperatures of 36°C and above are very reasonable starting points.

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