



Neurocritical  
Care Society

# BRAIN DEATH

**Frequently Asked  
Questions**  
for Healthcare  
Professionals

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## Brain Death FAQ's Healthcare Professionals

1. **Q: There can often be a significant time lag between when brain death occurs physiologically and when brain death is determined. The longer this gap is, the less stable the patient can become, the more anxious the family can become, and the less viable the organs can become if the patient does become a donor. How does one approach this time lag?**

A: There needs to be a culture shift so that people understand that brain death declaration must be made expeditiously. It also requires champions at individual hospitals to change the culture and advocate for the need for proactive physiological management. Another important step would be to institute a Devastating Brain Injury Protocol with the help of leaders in the institution. The NCS came out with new guidelines devoted to management of patients with devastating brain injuries in 2015. (Souter MJ, Blissett PA, Blosser S, Bonomo J, Greer D, Jichici D, Mahanes D, Marcolini EG, Miller C, Sangha K, Yeager S. Recommendations for the Critical Care Management of Devastating Brain Injury: Prognostication, Psychosocial, and Ethical Management: A Position Statement for Healthcare Professionals from the Neurocritical Care Society. *Neurocrit Care*. 2015;23(1):166-71.)

2. **Q: What is the appropriate blood pressure for brain death testing in adults and children?**

A: In adults, the blood pressure must be systolic > 100 mm Hg for clinical and apnea testing. Care must be taken to attend to the mean arterial pressure (MAP). If a patient has significant valvular disease or distributive shock, they may have an appropriate systolic blood pressure, but the low diastolic blood pressure may impair perfusion (for example, a patient with aortic valve insufficiency may have a blood pressure of 100/10 (MAP=40), which is not sufficient to perfuse the brain). During the apnea test, the systolic blood pressure must not drop below 90 mm Hg, or the apnea test must be aborted. In children, the appropriate blood pressure is normative for patient's age.

3. **Q: The terms "Confirmatory" and "Ancillary" testing are used, but are confusing. Can you explain the difference?**

A: The term ancillary test is more appropriate in reference to BD declaration. Determination of death is always a diagnosis made by the physician, and therefore requires physician judgment. There is no test that can confirm brain death, but rather, tests that support the diagnosis. The tests that are done should be considered additional data to help the clinician make a diagnosis, as opposed to a confirmation of death. Ancillary tests just give additional data for the physician to use when making a diagnosis. Ancillary testing is the more appropriate term to use.

4. **Q: How do you explain brain death to a family who has no understanding of medical terminology or of brain death?**

A: The concept of brain death must be explained in terms that are simple and geared toward the level of education of the family/loved ones. It should be explained to the family that death can be diagnosed when the heart and lungs stop functioning, as well as when the brain stops functioning. Therefore, brain death equals death, both medically and legally. Furthermore, it should be explained

that brain death means the complete and irreversible loss of function of the entire brain, including the most rudimentary functions, such as initiating a breath.

5. **Q: Are there any requirements that the physician ordering the apnea test be present at the bedside during the entire test?**

A: There is some variation between institutions, but most feel that the physician should be present throughout the apnea test to ensure that it is done correctly and that the patient meets criteria for apnea and thus brain death. Remember, the variable that is being tested in the apnea test is whether the patient takes a breath, NOT the rise of the pCO<sub>2</sub>. The pCO<sub>2</sub> just ensures that the stimulus for the patient to take a breath is strong enough. This requirement that the declaring physician be present is not often stipulated in hospital protocols; however it is intuitive that they should be there to assess whether a breath has been taken. This is a medical-legal diagnosis of significant importance and the physician should be present.

6. **Q: Why do we still use a cannula placed at the level of the carina for O<sub>2</sub> delivery when we have so many sophisticated ventilators for delivering the 100% O<sub>2</sub>?**

A: The O<sub>2</sub> can be delivered by a variety of means. One of the concerns about leaving a ventilator attached during an apnea test is that if someone bumps the ventilator, the patient or the bed, the ventilator might register the movement as a breath. This would result in ambiguity as to whether the patient initiated the breath or not, and the test may need to be repeated without this confounder. On modern ventilators, there is a setting for an apnea back up rate that is very difficult to override. If there is no air is going in, the flow-sensed ventilators will create a sufficient draw back from the peep valve in order to register a breath. With a cannula, you can control the amount of flow better than with the other methods available.

7. **Q: How long does one have to wait after therapeutic hypothermia is utilized and the patient is rewarmed before initiating brain death testing?**

A: This question is currently being discussed in neurocritical care circles. Currently, the temperature has to be a minimum of 36° C. There are some metabolic disturbances that can occur even in mild to moderate hypothermia and should be identified. However, sedatives and paralytics are often utilized during therapeutic hypothermia, and their clearance can be delayed by the hypothermia itself, or by concomitant liver or kidney injury, particularly with cardiac arrest. A potential short cut that is being discussed, or order to avoid having to wait long periods after complete rewarming, is to perform a CT scan, and if it shows a floridly hypodense brain with swelling and congestion, then it is quite likely that the patient has suffered a severe injury and has neuroimaging that is completely compatible with brain death. Changes such as these are not reversible, as opposed to diffusion-weighted changes on MRI, which may be. If the CT does show widespread severe injury, this should be followed by an accepted flow study (conventional angiography, SPECT, TCD) to ensure that the patient does not have cerebral flow. It is important to emphasize that this approach has not yet been validated.

8. **Q: Some have questioned that an SBP greater than 100 mm Hg is inappropriately high as a minimum blood pressure, and that a BP of over 90 mm Hg should be adequate.**

A: When developing the guidelines, a line had to be drawn somewhere regarding the BP. If a patient has a known baseline of 90 mm Hg, it may seem counterintuitive to have to raise the pressure simply to perform brain death testing. However, it is important to have a standard, and a minimum of 100 mm Hg is not unreasonable. It is also important to recall that the pediatric brain death guidelines are different, and blood pressures are standardized by the norms for different ages.

9. **Q: What is your experience in patients on ECMO when declaring brain death as technically, the flow studies may not show the decreased flow?**

A: Although not used frequently, there are two situations when ECMO is used; one is when it is used just for oxygenation without cardiac support, and another when it supports both cardiac function and oxygenation. If ECMO is only for O<sub>2</sub> support, there are two possibilities. One is that you can decrease the flow in order to allow the CO<sub>2</sub> to rise, and if the patient has no confounding factors and no confounding medication effect, you have a clear explanation of the mechanism of death, the presence of coma, and the physical exam otherwise supports brain death, then you can attempt an apnea test by this means. The CO<sub>2</sub> on ECMO rises to a point (60 mm Hg) and then reaches a plateau. If it does not reach 60 mm Hg or higher, or if one cannot perform an apnea test because the oxygenation is so severely compromised that you cannot lower the flow of the ECMO, then you can have an exam showing the absence of all brain stem reflexes. If you cannot do the apnea test, then an ancillary test must be used. In those situations in which ECMO is for oxygenation purposes, any of the ancillary tests that have been discussed can be used. Flow studies are the most appropriate.

10. **Q: How does one handle brain death determination when pentobarbital has been given and the level is unknown?**

A: Even if there are high levels of pentobarbital, your metabolic rate does not go to zero. Blood flow studies should still be reliable. However, the clinical exam and the EEG cannot be trusted in that situation and should not be used to declare death.

11. **Q: How does one handle the issue of introducing the family to the organ procurement organization (OPO) representative, but not bring up organ donation themselves?**

A: One of the best approaches is to discuss the situation with the OPO representatives prior to initiating the conversation with the family, and determine how best to bring them in. It is an awkward transition, and there is not a "one size fits all" solution. The physician often feels conflicted in these situations, as they have commonly established a relationship with the family, and yet they may be perceived as having a conflict of interest if organ donation is brought up, specifically by the physician. Sometimes the family will bring up organ donation, or simply ask, "What's next?" We recommend that the physician explain that his/her job is to make the medical and legal determination of death, and that there are others who will be speaking to them separately to discuss potential next steps. Some physicians feel more comfortable having donation conversations with families, or being present when the OPO representative has the discussion; however, this is the exception and not the rule.

Often, physicians feel awkward discussing organ donation, even when asked directly by families. Remember, studies show that families have a better experience when a specially trained person REQUESTS ORGAN DONATION. This does NOT mean that the physician cannot discuss organ donation. One approach when the family asks “What is next?” is to lay out all the options: “The now deceased person may be disconnected from the machines, or, if it is consistent with their wishes, organ donation may be a possibility. There is a representative of our organ donation organization who can answer your questions about what is involved in the second option.”

**12. Q: How does one handle difficult interactions with OPO staff concerning possible organ donation?**

A: These situations are commonly emotionally charged and stressful, and not uncommonly, there can be tensions between the treating team and the OPO staff. It is important to take a step back, reassemble, and clarify the stage and the process for the individual patient. Sometimes, it can be helpful to involve the ICU Director, the Director for the local OPO, and even the ethics committee at your hospital.

**13. Q: What do we do if we’re concerned about variability of brain death determination in our hospital?**

A: Brain death determination is a medical legal diagnosis with strict criteria. The AAN Practice Parameters from 2010 are very specific and detailed, and provide a useful checklist for ensuring proper determination of brain death. One option is to contact your hospital administrator to discuss your concerns, and advocate for the implementation of standardized practice in concordance with the AAN Practice parameters.

**14. Q: What do we do if the patient is a registered donor, but the family declines donation?**

A: This is a difficult situation that is arising more and more commonly. We strongly advocate working with families in these situations to understand their reluctance, in the face of their loved one’s declared wishes. In most states, the designation of ‘organ donor’ is seen as an anatomical gift akin to a last will. Just as a family cannot say that they are going to reallocate a loved-ones assets against the will of the deceased, there is an obligation to respect the person’s wishes. The difference between organ donation and a will is that a will can be contested for years in the courts but organ donation occurs in a more time-constrained manner that doesn’t lend itself to protracted court battles. We do not advocate forcing the issue and proceeding to organ donation without coming to resolution with the family, but we also do not advocate relenting to the families wishes as a convenience if there is clear evidence that the deceased meant to will his/her organs to others.

**15. Q: If the clinician suspects that the patient is brain dead, but they’re still in the Emergency Department, how should they proceed?**

A: It is very difficult to determine brain death in the ED, and even if it can be done, the possibility of having effective organ donation discussions is quite limited. Furthermore, it can be challenging trying to manage a consented patient toward organ donation, given the highly involved process. We strongly advocate for patients to be brought to an ICU to do the brain death determination and subsequent discussions and care.

16. **Q: Who is competent to determine brain death?**

A: Different hospitals and states have different rules about this, and although we feel that an attending physician should be determining brain death, it does not necessarily have to be a neurologist or neurosurgeon. It is more important that the physician has demonstrated competence and experience in brain death determination, and many intensivists are competent to do so. At present, there is no formal credentialing process, although there are some in development.

17. **Q: What is an appropriate amount of time to allow the family to come to terms with the diagnosis of brain death? And how long should they be given to make a decision about organ donation?**

A: There are no hard and fast rules about these issues, but common sense would dictate that families be given several hours to accept the concept that their loved one has died via neurological criteria, particularly if there is additional family coming in. However, hospitals are under no obligation to ventilate a corpse, and there is no withdrawal of “life support” in this situation, as the patient is medically and legally dead. It is simply removing artificial organ support. In terms of how long to wait for a decision regarding organ donation, it needs to be emphasized to the family that the longer they wait, the less viable the organs will be for the recipients, should they eventually decide on donation.