

Signs and Criteria of Brain Death and Organ Donation

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When a human being dies, he stops breathing and his heart does no longer beat. The cardiac arrest has been for a long time the measure to decide if a person is really dead. But in 1952, the heart-lung machine was invented. Thanks to it, human beings whose neuronal control centers failed can be kept alive. This saved a lot of lives and made organ transplants possible. We explain why the brain death diagnosis and the clearance for the removal of organs are still difficult medical decisions.



Definition of Brain Death

Irreversible cessation of all brain and brain stem functions, regardless of cause.

For medicines, it is valid to understand the difference **between a deep coma and brain death**. A deep coma also includes the failure of basic reflexes. Pain stimulus is no longer perceived, the aspiration has to be performed artificially.

Nevertheless, a coma can be about disruptions of one or more brain centers: Some areas can be irretrievable “dead” while other areas are mentally lively. Brain death, or rather **general brain death**, is a **coma with a complete failure** of the functions of:

- **Cerebrum**

- **Cerebellum**

If all three components failed, it can be considered that a patient is not consciously or is unconsciously alive.

Particular nerve cells or smaller areas of the brain can be according to this definition still active. But these cannot bring back the central nervous entity of a functioning brain.

Etiology of Brain Death

1. Severe head injury
2. Hypertensive intracerebral hemorrhage
3. Ischemia of brain
4. Aneurysmal subarachnoid hemorrhage
5. There are some drugs which can change neurological, neuromuscular function and EEG like neuroparalytic and anesthetic drugs

Examination and Diagnosis of Brain Death

To identify undeniably the **diagnosis** of brain death, the **examination of two experienced deaths** is required. These are not allowed to be part of the process of the organ transplantation in order to decide impartially.

Signs of brain death

1. Pupils of the patient do not respond to light
2. There is no response like blinking of eyes on touching the surface of the eyeball of the patient
3. On touching the inner part of the throat near the uvula there is no gagging
4. The patient needs to be put on the ventilator
5. Skin remains warm when we touch it
6. On injecting atropine 1 to 2 mg intravenously it will not increase the heartbeat not more than 6 beats per minute. This is due to the non-stimulation of the vagus nerve

Approach to brain death

Requirements:

1. Severe brain damage
2. Exclusion of other causes (for example intoxication, hypothermia)

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Proof of symptoms:

1. Coma
2. Brain stem areflexia (for example pupil reflexes)
3. Failure of spontaneous breathing

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Proof of irreversibility:

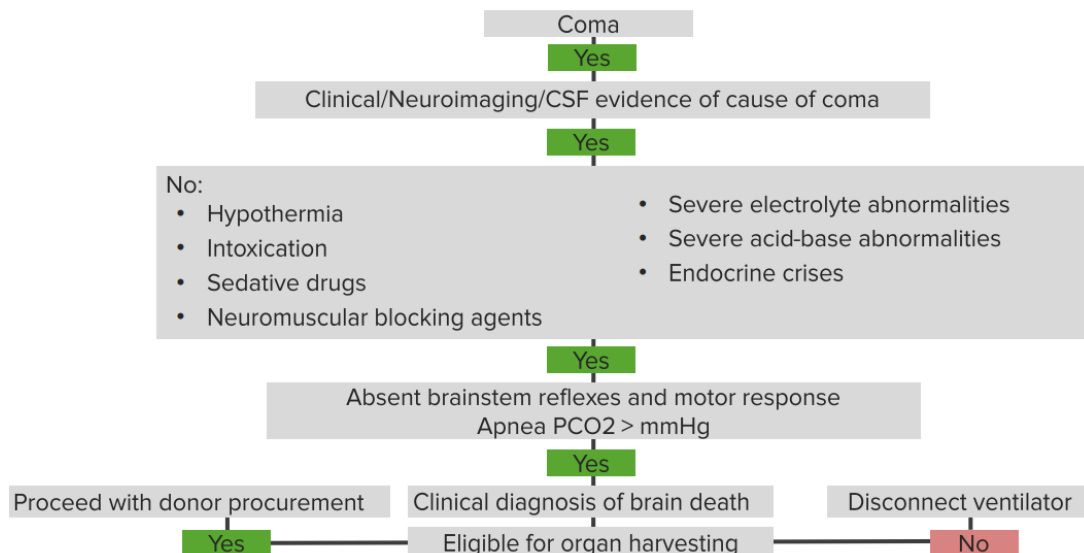
1. No change after 12-72 hours
2. Repetition of the proof of symptoms

OR

Instrumental diagnostics (for example null lines-EEG for 30 minutes)

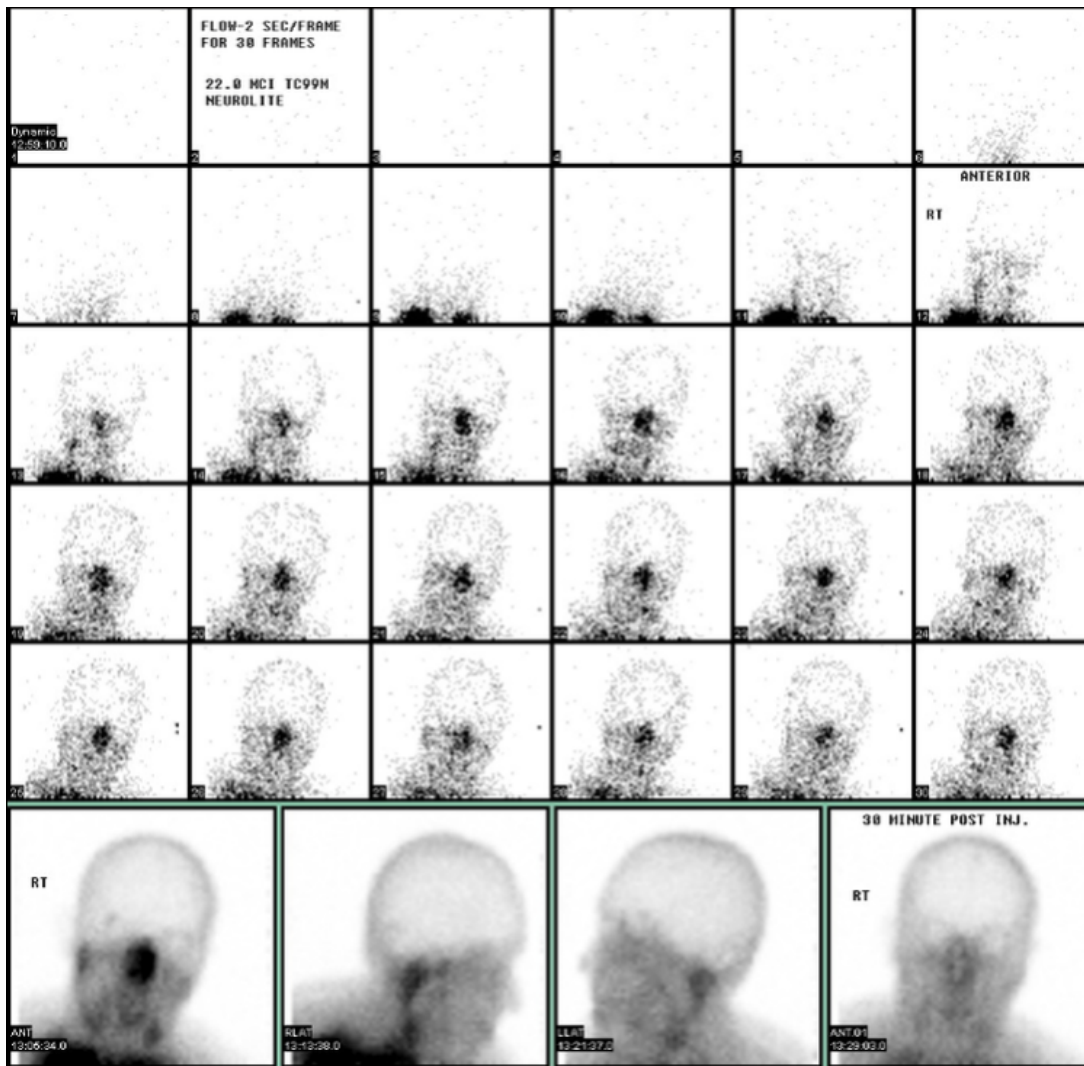
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BRAIN DEATH



If the diagnosis of brain death is made, there are three ways for the further process of the patient:

1. He remains connected to the machines till the natural decrease
2. It is decided by a living will or relatives that the machines are shut down
3. By consent for organ donation, the machines remain switched on until the removal of the organs (organ explantation)



[Image](#): "Radionuclide scan of the head with Tc-99m Neurolite shows lack of intracranial blood flow and "hot-nose" sign from the diversion of blood flow to the external carotid arteries." by JasonRobertYoungMD. License: [CC BY-SA 4.0](#)

Organ Donation

It is juridically necessary to define brain death as a form of death as in order to remove donor organs from a person, the **cardiovascular system** has to be working. Otherwise, liver, kidneys, and spleen can suffer damages from the shortage within a short period of time.

When a person dies without his heart stopping is primarily the case in the following diseases:

- Brain tumor
- Craniocerebral trauma
- Brain hemorrhage

Nevertheless, most accident victims have never made a statement about their organs being donated after brain death or not. This makes the possibility of help even thinner. It is problematic as the number of people who are waiting for a new organ increases.

Ethical Considerations

Many people mistrust the medicine. The imagination to be not totally dead frightens them. Additionally, there is strong opposition to the concept of “brain death” whose arguments are quite viable. The critique stretches from religious concerns to medical doubts. In the process, two basic questions arise:

- **Can brain death be considered equally to death?**
- **Can brain death be surely diagnosed?**

This is the reason why it is important to enlighten the brain functions. So, the observation of the **Lazarus signs** for a family member can be irritating. They include **spinal cord reflexes** which direct to arm and leg movements. A sensitive explanation of the processes helps the relatives to understand and accept the irreversibility of brain damage.

Additionally, it is possible that persons who are diagnosed as brain dead according to the upper process can still make central-nervous body regulations. They sweat and digest, regulate their body temperature and fight viruses. Men diagnosed as brain dead can have an erection. Pregnant women in the state are able to bear an unborn life – the birth of healthy children is documented in more than ten cases.

Definite brain death can hardly be determined. The roman-catholic church, therefore, demands a null line electroencephalogram (EEG) for six hours for a **flawless diagnosis**. Many scientists and medicines require **instrumental brain diagnosis without exception** as well. Processes like the null line EEG, magnetic resonance imaging (MRT) or angiography must be performed to filter patients out whose brain stem is only damaged. The demand to be under **anesthesia** during the organ removal “for safety” also seems to be reasonable.

It can be discussed where life ends and death begins as there is no clear border. The consideration is especially difficult when somebody from the close environment is affected. In the case of strangers, it can be considered cooler.

Brain dead patients whose organs are removed cannot feel pain. Whether they want to be alive in this state or whether they would prefer to help someone other with his organs should, therefore, be determined during the lifetime.

References

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