

SEMILLA 01: Crossing the veil

0. CONTACT DETAILS

0.1 Surname and first name

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0.3 Let us get to know you a little bit through your participation in websites, blogs, social networks, etc.

[Jorge Tirado-Caballero \(researchgate.net\)](#)

[Jorge Tirado Caballero - Google Académico](#)

[\(29\) Jorge Tirado Caballero | LinkedIn](#)

0.4 What is your background and in which institution do you work?

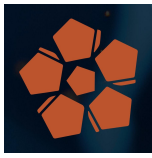
Degree in Medicine from the University of Seville, Spain.

Specialist in Neurosurgery at the Intercenter Neurosurgery Unit of the Virgen Macarena Hospital – Virgen del Rocío Hospital (Seville, Spain).

Associate Professor of Health Sciences at the Faculty of Medicine – University of Cádiz (2022-2023)

0.5 Gender

Male



0.6 Age range

31-40

1. ESSENTIAL DIMENSION

1.1 Seed name

Crossing the veil: the border of being and the echo of silence

1.2 Seed summary

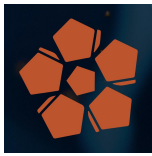
Brain death involves the complete and irreversible cessation of the functions of both cerebral hemispheres and the brainstem. In contrast to vegetative or comatose states, where some areas of the brain may remain functional, in brain death brain activity disappears completely, resulting in the de facto death of the patient.

This process can be observed in patients who have suffered an insult to their brain (understood as a clinical process or disease) that causes irreparable structural brain damage. Examples of pathologies that can result in brain death are traumatic brain injury, cerebral haemorrhage or hypoxia.

These patients are admitted to an intensive care unit at the time of diagnosis, connected to a mechanical ventilator that oxygenates their body. This is why, although brain and brainstem activity has disappeared, the rest of the organs continue to function.

Distinguishing the exact moment when the activity of the nervous system completely fades away can be difficult, blurring the barrier between life and death and posing those grey states that occur in between.

The concept can be complex, as it is difficult to understand that a person has died, but all organs except the brain continue to function. During brain death, the patient's heart continues to beat, his liver continues to metabolise substances, his lungs continue to exchange oxygen for carbon dioxide (always with the need



for a mechanical ventilator), his kidneys filter body waste and continue to produce urine....

The crucial importance of this diagnosis lies precisely in the continuity of the function of the remaining organs of the deceased person. In many cases, brain death is the prelude to organ donation.

In this way, the death of one person contributes to improving or even saving the lives of other human beings. This life-death-life cycle is repeated periodically in intensive care units around the world, with Spain being a reference country worldwide. In this sense, encephalic death represents the tragic end of a life, but also a hope for many other people on waiting lists for transplants who are waiting for a call that can give them a new opportunity.

1.3 Metaphor

Imagine the human body as a huge orchestra. The brain plays the role of the conductor, harmonising the work of the different instruments so that they sound in a coordinated way. When the conductor disappears, the instruments may continue to play, but probably in a totally uncoordinated way.

The life support of intensive care units allows the remaining organs to maintain their function after brain death, making organ donation possible after a diagnosis of brain death.

Another possible metaphor is that of an hourglass that is running down but donates its last grains to other clocks so that they can last longer.

1.4 Keywords

Brain death, Traumatic brain injury, Intracerebral hemorrhage.

1.5 Scientific field (general)

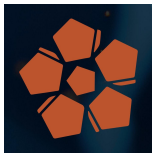
Neurosciences

1.6 Scientific subfield (specific)

Neurosurgery

Intensive Care

Neurocritical



1.7 Resources (File)

[carpeta compartida](#)

1.8 Resources (Links)

[Brain death: how is that determined? \(youtube.com\)](#)

https://trasplantes.net/images/PDF/protocolo_CHUAC_muerte_encefalica.pdf

[Brain Death Imaging | Radiology Key](#)

2. ADDITIONAL DIMENSIONS

2.1 SYNAESTHETIC DIMENSION

This dimension seeks to associate certain sensory characteristics to the seed.

2.1.1 What colours does this seed suggest to you?

The ultraviolet spectrum of the process of death as the disappearance of being.
The greys of this process of progressive fading.

2.1.2 What sounds or music does this seed inspire you?

A dull, continuous sound, like air passing through a forest. Also underwater sounds, giving the sensation of resonance, disconnection and isolation.
Likewise, this silence echoes in other human beings, it is a sound that resonates beyond us, beyond the self, to contribute to the vital construction of others.

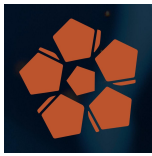
2.1.3 What aromas would you associate with this seed?

Ashes, wilted flowers. Also bleach, metal and other odours that can appear in an ICU, typical of the cleanliness and sterility of an intensive care unit.

2.1.4 What flavours does this seed evoke in you?

Metallic taste, cold on the palate, until it fades into tastelessness.

2.2 EMOTIONAL DIMENSION



This dimension seeks to explore the personal meaning of the seed.

2.2.1 What was your motivation to dedicate yourself to this field of research?

What are your personal reason to suggest this seed?

The diagnosis of brain death is one of the activities that may emerge during our neurosurgery shifts. Relatively frequently our unit is contacted, sometimes late at night, to come down to confirm and certify the brain death of a patient in the intensive care units. Our job is to confirm with a targeted examination that the patient's brain and brainstem have completely and irreversibly lost their function, certifying the patient's brain death.

Personally, I feel involved in this clinical process as I am aware that it not only results in the death of a human being, but also gives a glimmer of hope to many people waiting at home for a compatible organ.

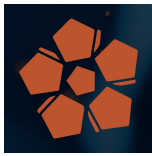
2.2.2 What metaphysical reflections does this seed provoke in you?

Who am I really? In the process of encephalic death, the brain dies, constituting the death of the patient, but its organs continue to function. Am 'I' my heart, my liver, my kidneys, my bones...? Are all these structural elements a way of preserving my true self, understood as my nervous system? If I donate my organs, am I somehow destroying my self?

The reflection on the identity of the self and how this 'self' is housed in the brain is perhaps the most interesting, bearing in mind that we consider the death of the brain to be the death of that person, even if all the rest of his or her body is healthy. In this way the border of 'being' is blurred, considering that part of us can give a chance to other 'beings', but considering that our 'being' has disappeared permanently with the death of our brain. The echo of silence supposes in this sense the transcendence of the 'I' in other human beings, the reverberation of the last decision that I make (if I am a donor or have expressed such a will at some point) or that is made about my being to give a vital option to another person.

2.2.3 What ethical reflection or challenges would you associate with this seed?

The human brain is the centre of our identity. It is where all our thoughts, ideas and memories are generated, processed and stored. Our behaviour, our phobias and phobias are linked to the structure and electrical activity of our brain. This is why we consider that the death of the brain is also the death of the individual, as the individual's identity will have irreversibly disappeared.



Brain death has posed many ethical challenges, mainly linked to the idea of the irreversibility of the process. Sometimes this situation is not understood by the relatives of the patient, who continue to see how their body remains alive, and the monitors continue to show cardiac and respiratory activity. Sometimes they even cling to the idea of a miracle that can reverse the process, showing reluctance to end the clinical process.

Those in charge of the National Transplant Organisation explain to relatives that the process cannot be reversed and that the patient is not in a terminal, vegetative or comatose state, but has died. They also present the option of donating their organs in order to preserve the life of other human beings. This is a huge ethical conflict, as we are talking about a family who is grieving the loss of a loved one and yet must make the decision at that moment to have their organs harvested to help other people.

2.2.4 What aesthetic dimensions does this seed suggest to you?

The emptiness, the metal, the darkness that consumes the human being at the moment when his 'I' disappears. Crossing the veil of life and death, fading away, the greys in the process. Also, after this process, the appearance of lights, hopes, around it. The contrast between the greys to the darkness of the process of death and the light of life for others is perhaps the clearest aesthetic dimension. Also the metaphor of the sand running out in a clock that donates its last grains to other clocks is perhaps in itself an aesthetic dimension of the process.

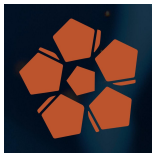
2.3 PROCEDURAL DIMENSION

This dimension seeks to explore the scientific processes that are usually followed when investigating this topic.

2.3.1 Description of the research process

The order in which the different Brain Death (BD) tests are performed is important to avoid interference between them and to facilitate their recall.

The diagnosis of brain death requires certification by at least THREE doctors (doctor in charge of the Transplant Unit, the intensivist responsible for the patient and a neurosurgeon or neurologist). After a diagnostic neurological examination for BD, the adult patient requires at least 6 hours of observation (if there is a filiable cause of brain mass destruction) or 12 hours if the cause is unclear. This observation period may be waived if additional tests are provided to confirm the diagnosis (a flat electroencephalogram or transcranial Doppler with absence of cerebral flow).



CLINICAL NEUROLOGICAL EXAMINATION OF BRAIN DEATH:

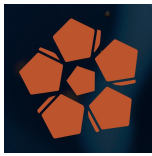
A. **Absence of brain function:** In BD there is an areactive coma with no motor or vegetative response to intense algesic stimulus at supraorbital level (cranial nerve territory).

B. **Absence of brainstem activity:**

a. **Abolition of reflexes:**

- i. **PHOTOMOTOR.** Mode of examination: A strong light stimulus is applied to both eyes. Normal response: elicits direct and/or consensual pupillary contraction to some degree. In BD no response (neither direct nor consensual).
- ii. **CORNEAL.** Mode of examination: Both corneas are stimulated with a gauze or cotton swab. Normal response: palpebral contraction or tearing will occur. In BD there is no response.
- iii. **OCULOCEPHALIC:** This is also called the 'doll's eye' reflex. How to explore it: It is performed by holding the patient's eyes open and provoking rapid horizontal (or vertical) turns of the patient's head. Normal response: The conjugate deviation of the gaze in the opposite direction to the head turn is triggered and then returns to its initial position. In BD there is no response and the gaze remains fixed.
- iv. **OCULOVESTIBULAR GAZE.** Method of examination: The patient's head should be held 30° above the horizontal with both eyes open. Inject 50 cc of cold saline through a tube through the external auditory canal (EAC). Wait at least 1 minute for the appearance of a response and at least 5 minutes before performing it on the other side. Normal response: There is a nystagmus with a slow component that turns the eyes towards the irrigated ear and a fast component that 'turns away from the cold'. In BD there is no response.
- v. **COUGHING AND GAGGING.** How to explore: The trachea is stimulated by insertion of a probe. Normal response: Cough is triggered. In BD there is no response.

b. **ATROPINE test:** explores the destruction of the nucleus ambiguus. How to test: The patient's heart rate (HR) is observed before and after administration of i.v. bolus atropine. Dose: 0.04 mg/kg body weight. Normal response: A cardioacceleratory response appears with an increase of more than 10% of the previous HR. In an BD situation the post-atropine HR should not exceed 10%.



c. Apnea test:

How to perform it:

- Pre-oxygenation with oxygen for about 20 minutes.
- Perform a first baseline arterial blood gas measurement under these conditions.
- Disconnect the patient from the ventilator and during the test maintain an O₂ supply (6 l/min) through the orotracheal tube to avoid severe hypoxaemia.
- With the patient uncovered, monitor the appearance of thoracic and/or abdominal respiratory movements during the disconnection time.
- Perform a second arterial blood gas measurement after 8-10 minutes of disconnection, or earlier if hypoxia is present (saturation < 90 %) and reconnect to the ventilator.
- For the test to be valid, the final PaCO₂ must be higher than 50-60 mm Hg (more if there is a previous clinical history of chronic CO₂ retention). Normally the PaCO₂ increases 2-3 mm Hg / min.

Normal response: CO₂ accumulation is a powerful stimulus for some thoracic or abdominal respiratory movement.

No respiratory movements occur in BD.

COMPLEMENTARY TESTS IN THE DIAGNOSIS OF BRAIN DEATH.

Electroencephalogram (EEG): This is the most frequently used test. The EEG recording is carried out on the scalp with superficial cutaneous or needle electrodes and records the electrical activity produced in the cerebral cortex for 30 minutes. In an EM situation there must be electrical silence during the 30 min of the recording.

Transcranial Doppler:

This is based on the emission of pulsed signals at low frequency (2 MHz) and their reception after colliding with the red blood cells circulating in the cerebral arteries. The reflected signals present a change in frequency according to the speed of blood flow. The processing of these received signals allows the generation of a curve called a sonogram.

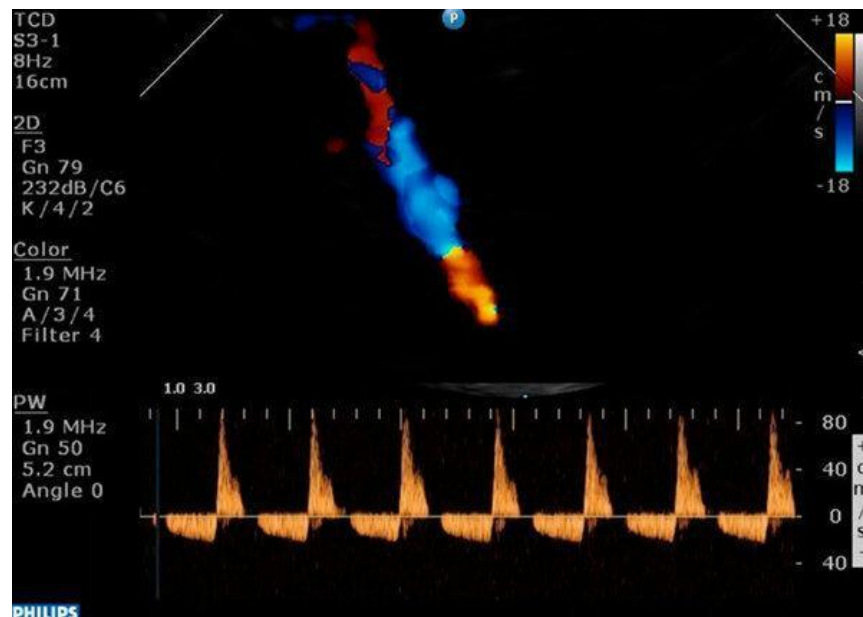
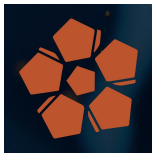
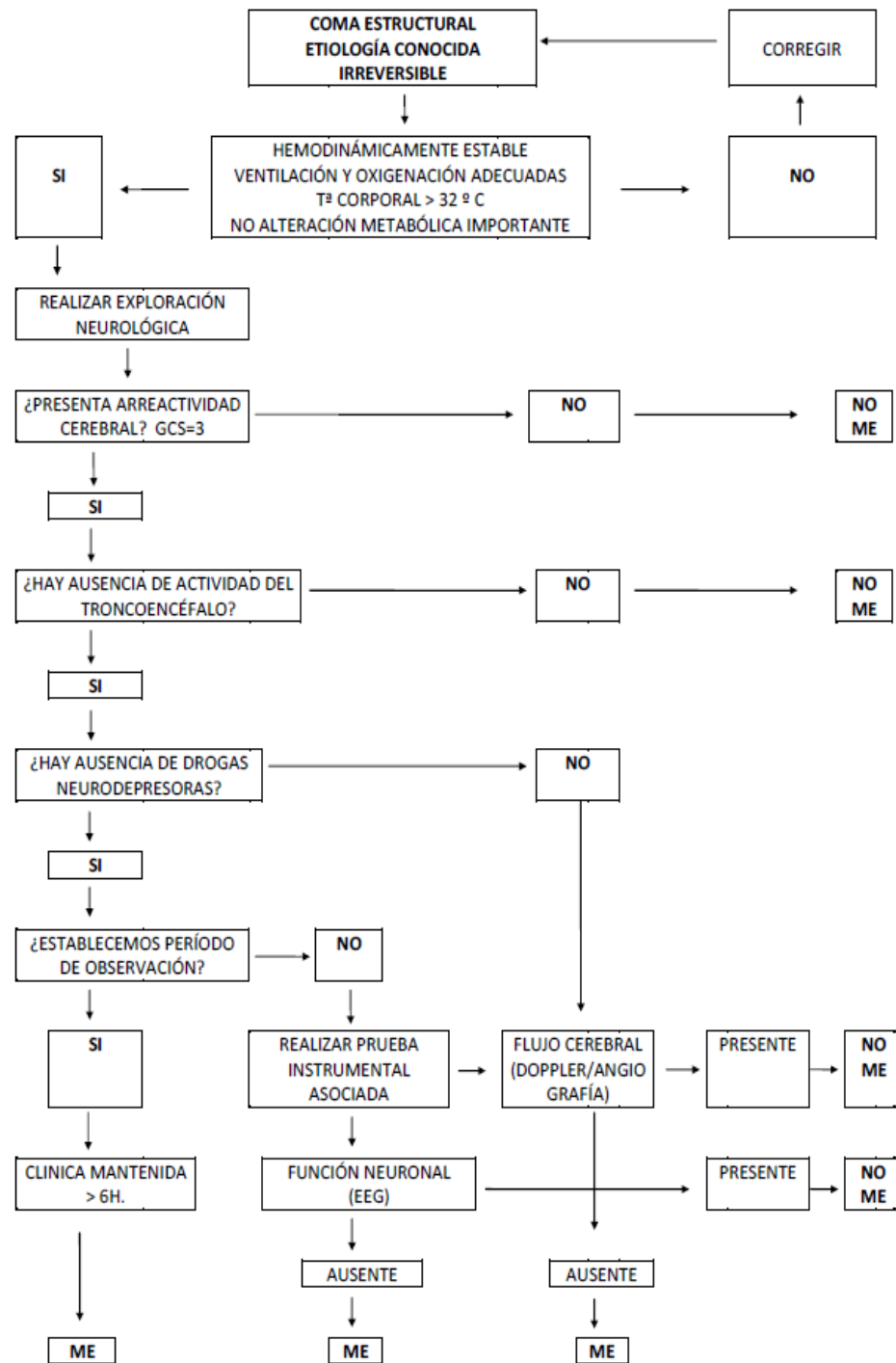
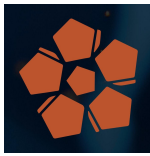


Image source: Fulminant listerial infection of the central nervous system in an otherwise healthy patient: A case report. June 2009; [Journal of Medical Case Reports](#) 3(1):7383

Progression to ME occurs after an earlier, and still transient if responsive to treatment, phase of decreased diastolic waveform resulting from an increase in intracranial pressure (ICP) above the mean AT leading to cessation of cerebral perfusion. When this situation continues for some time, the following irreversible patterns appear:

- Separation of the systolic and diastolic wave by a fall in flow to zero between the two,
- Reversal of diastolic flow, also called 'reverberant flow' or 'biphasic oscillatory flow', which is the most characteristic of ME.
- Spicular systolic flow by absence of diastolic flow with persistence of only small systolic waves.
- Total absence of signal: the absence of flow is only assessable when flow has previously been detected in the same artery by the same explorer. To avoid false diagnoses that occur in the presence of transient ICP peaks, it is recommended to confirm the maintenance of the findings by repeating the test after at least 30 min.

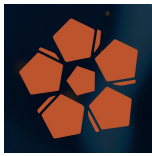
2.3.2 Research process diagram



2.3.3 Link to the descriptive video of the process

[Brain death: how is that determined? \(youtube.com\)](https://www.youtube.com/watch?v=...)

2.3.4 What tools are typically used in this field of research? Whether instruments, technologies, hardware or software.



ART ^ NEUROSCIENCES

ICU monitors to assess cardiac response.
Mechanical ventilators to assess respiratory response.
Transcranial echo-Doppler.
Electroencephalography monitor.
Arterial gasometer.

3 PERSONAL SUGGESTIONS

4 INVOLVEMENT OF THE SCIENTIST IN THE CREATIVE TEAM

4.1- What role would you like to play in the co-creation process of the SciArt work?

Participate punctually in the conceptual discussion and co-creation of the work