

Ethics

Is the "Concept" of Brain Death Compatible with the "Reality" of Religious Death?

Abid Hussain, *MB*, *ChB* (*Edin*), *FRCA*, *DMS*, Consultant Anaesthetist, Central Manchester University Hospitals

Correspondence: <u>Abid.Hussain@mft.nhs.uk</u>

Keywords:Islamic bioethics, Brain death, Organ donation, Informed consent, Muslims

Abstract

The concept of brain death, which was originally designed as a prognostic tool allowing withdrawal of life support, has over the years evolved into a diagnostic tool for declaring death. The concept of "brain death is death" lacked convincing philosophical justification¹ from the time it was first proposed in 1968, and it defies well-established scientific truths. Despite these shortcomings, the brain death concept is accepted as legal death in many countries, it is "well settled yet unresolved"² and, "it is too flawed to endure and too ingrained to abandon"³. Whether or not brain death equates with religious death has been debated by religious scholars for many years, but it has taken more of a prominent role in the context of deceased organ donation. Leading judicial councils in the Islamic world have reached different conclusions: The International Figh Academy (IIFA-OIC), 1986, accepted brain death as Islamic death providing "all functions of brain cease irreversibly and the brain has started to degenerate as witnessed by specialist physicians"⁴ which does not equate with brain death as practiced in clinical medicine anywhere in the world. The European Council for Fatwa and Research (ECFR)⁵ in 2000 ratified this IIFA-OIC ruling. Both the IIFA-MWL⁶ and Islamic Organisation for Medical Sciences' (IOMS) have rejected brain death as Islamic death but allowed withdrawal of life support. Two recent *fatawa*(legal edicts) in the UK and the USA by contemporary Muslim scholars, notably, Butt⁸, a jurisconsult and a hospital chaplain specialising in medical bioethics, in 2019 and the Fiqh Council of North America (FCNA)⁹ in 2021, have also rejected equating brain death with Islamic death by comparing the traditional method of determining death with the diagnostic criteria currently used for brain death. Rashid¹⁰, a traditional Islamic scholar and a physician, has studied the opinions of Muslim scholars of the past and concluded that the permanent cessation of consciousness constitutes legal death in Islam, and he opines that the concept of higher brain death andbrainstem death in clinical practice both qualify aslegal death in Islam. These different approaches to the same problem have led to diametrically opposing views on brain death, leaving the Muslim public confused.

This paper looks at the history of the evolving concept of brain death over the last fifty years and the underlying criteria justifying brain death as death to try to answer the crucial question: Has medical science reached a sufficient level of understanding of death to create a new standard of legal death in religion, particularly Islam?

Introduction

Historically, death was not so difficult to define. A catastrophic injury to any one of the vital organs - heart,

lungs, or brain, would lead to a rapid deterioration of the other two organs culminating in death. However, with the advent and widespread development of intensive care units, artificial airways, and artificial ventilation, it



became possible to disrupt this natural cycle of events leading to death. Patients with severe brain injury and no hope of survival could continue to occupy ICU beds on artificial ventilation, putting a burden on hospitals and families, financially and emotionally. Some felt this problem required redefining death with greater precision. However, there were some other crucial factors at play at that time which led to defining a condition known as irreversible coma as "brain death", a concept which has been a source of controversy since its inception. Studying the competing narratives put forward will help structure the ethical debate on the issue and formulate policy.

The concept of brain death and its evolution

Despite what many people may think, "brain death" is not a uniform concept, but rather one that has evolved over time^{11,12}. Clinical brain death in its evolved form is not to be understood as "death of the brain" but death of the individual. The concept does not require all the functions of the brain to have ceased, as enshrined in USA law (UDDA Act, 1981) even though the term "whole brain death" is used. Some experts require that it must be physiologically impossible for the brain to function again¹³ while others merely accept that the brain will not actually function again¹⁴. The brain death theory also puts forwards the idea that actual death can be hidden by technology.

The evolution of the concept of brain death

In the late 1950s, with the advent of intensive care units, artificial airways, and artificial ventilation, it became possible to keep individuals who were in a permanent state of coma with no prospect of recovery alive.

In 1958, at the 23rd International Conference of Neurology, two French neurologists, Pierre Mollaret, and Maurice Goulon, presented a series of 23 patients with severe neurological impairment in a state of irreversible coma for which they proposed the term *coma dépassé*¹⁵.

In 1966, at the CIBA Foundation international symposium on "Ethics in Medical Progress: With Special Reference to Transplantation"¹⁶, one of the main issues was definition of death. Intense discussions took place concerning the issue of equating *le coma dépassé* with death for the purposes of organ procurement. At the meeting was Joseph Murray, a surgeon involved in transplantation and a future member of the Ad Hoc Committee of Harvard medical school. "Those criteria are excellent," he stated, "this is the kind of formulation that we will need before we can approach the legal

profession." However, there was strong opposition to Murray's statement, affirming, "if a patient has a heartbeat he cannot be regarded as a cadaver." No agreement was reached at the symposium on whether death should be redefined or not.

In December 1967, Christiaan Bernard of South Africa performed the world's first successful orthotopic humanto-human heart transplant¹⁷. With the consent of her father, Edward Darvall, and the local coroner present, Bernard took the heart of a 25-year-old young lady, Denise Darvall, who had sustained serious head injuries after being run over by a car¹⁸. No formal criteria for death had been fixed at that time. Bernard injected Denise's heart with potassium chloride at the urging of his brother, Marius, causing the heart to stop, thereby fulfilling the whole-body standard for death before removing the heart. Bernard transplanted the heart in to a 54-year-old man named Louis Washkansky, whom Bernard had told together with his wife that the chances of success were 80%, for which Bernard has been criticised by ethicists for misleading the patient and his wife.¹⁹ Washkansky died of pneumonia 18 days after his surgery.

In early January 1968, the Ad Hoc Committee of Harvard medical school was formed under the chairmanship of Henry Beecher, an anaesthesiologist. Beecher had written to the dean of the Harvard Medical School, Robert Ebert in October 1967, requesting to form a committee: "Both Dr. Murray and I think the time has come for a further consideration of the definition of death. Every major hospital has patients stacked up waiting for suitable donors."²⁰ Ebert did not reply immediately but approved Beecher's request on 4th January 1968. The Committee, which consisted of ten physicians, a theologian, a law professor, and a historian of science, issued a statement in June 1968 redefining irreversible comaas "brain death", followed by a publication in the Journal of the American Medical Association (JAMA) under the title, "A Definition of Irreversible Coma". The clinical signs put forward by the Harvard Committee to define brain death were identical to those described by Mollaret and Goulon, almost a decade earlier, for le coma dépassé. The Committee stated that its primary purpose was to define irreversible coma as a new criterion for death. This first sentence of the report made the assumption that someone in irreversible coma was a dead individual even if the heart and circulation continued to function. This assumption and its subsequent acceptance were done without presenting any philosophical justification which did not materialise until 1981. Giacomini, who has studied the original manuscripts of the Ad Hoc Harvard Committee came to the conclusion that the Committee,



"In constructing its definition had begun with the already familiar characteristic of organ donors...and ended up conveniently but coincidently with features consistent with a good vital organ source."²¹

The conclusion of the first draft of April 11th, 1968, gives an insight into the objectives of the Committee. It read, "The question before this committee cannot be simply to define death. This would not advance the organ transplantation since it would not cope with the essential issue of when the surgical team is authorized – legally, morally, and medically – in removing a vital organ"^{21.}

In the draft of June 3, 1968, a similar statement can be found: "With increased experience and knowledge and development in the field of transplantation, there is great need for the tissues and organs of the hopelessly comatose in order to restore to health those who are still salvageable"²¹. These drafts indicate that organ transplantation was a significant factor in writing the final report but not necessarily the prime goal of the Committee. The former chair of medicine of Massachusetts General Hospital Alexander Leaf said of Beecher, "He would have been the last person to have felt that one was doing this [defining brain death] to go in and get organs²²." Furthermore, Beecher had a history of blowing the whistle on unethical behaviour.

The Harvard Committee considered cessation of neocortical activity to be an important criterion for brain death and it was believed that a completely flat EEG was necessary for the diagnosis of brain death. Only a year later, this requirement was modified in a subsequent publication²³. Soon, questions were being raised in scholarly literature about the concept of death.

In 1970 at the American Association for the Advancement of Science (AAAS) meeting in Chicago, Beecher presented a paper entitled "New Definitions of Death: Some Opposing Views." Beecher made the claim that a human dies when there is irreversible loss of "personality, his conscious life, his uniqueness, his capacity for remembering, judging, reasoning, acting, enjoying, and so on."²⁴ This wasis in-line with the higher-brain criteria for brain death while the original report required loss of all functions of the central nervous system. However, spinal cord requirement was dropped as it soon became apparent that spinal cord function could persist in patients who had death of the brainstem and cerebral hemispheres.

The following year, in 1971, a publication appeared citing two cases showing that an individual could be in

an irreversible coma while still retaining some brain functions and respiration²⁵. The subsequent Hastings Report contrary to Henry Beecher's paper at the AAAS the previous year, stated that the Harvard criteria goes beyond the mere assessment of higher-brain function to include absent brain-stem reflexes. This forms the basis of whole brain death criteria.

The Hastings group report in 1972²⁶ stated that the Harvard report did not require the physician to pronounce death when its criteria were met raised the obvious question: Was an individual who fulfilled the Harvard criteria for brain death, dead or alive?

In 1981, President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioural Research put forward the rationale underpinning the brain death concept as "irreversible loss of the capacity of the body to organise and regulate itself, to function as a whole,"²⁷ and its report included what came to be the Uniform Determination of Death Act (UDDA). This rationale was endorsed by Bernat, an international expert on brain death: "This criterion [whole brain death] is perfectly correlated with the permanent cessation of functioning of the organism as a whole because the brain is necessary for the functioning of the organism as a whole. It integrates, generates, interrelates, and controls complex bodily activities. A patient on a ventilator with a totally destroyed brain is merely a group of artificially maintained subsystems since the organism as a whole has ceased to function"28.

This concept has been criticised by a number of commentators including Shewmon^{29,30}, Karakatsanis³¹ and Tsanakas³², Truog³ and Nair-Collins³³.

The 1981 report stated that death of an individual can be determined in two ways:

(1) irreversible cessation of circulatory and respiratory functions, or

(2) irreversible cessation of all functions of the entire brain, including the brainstem. A determination of death must be made in accordance with accepted medical standards.

In response to growing critics, in 2008 the President's Council on Bioethics decided to re-examine the rationale behind the brain death theory. The Council wrote, "And, perhaps most important, there are critics who have published evidence of ongoing integrated bodily activities in some persons meeting the criteria of "whole brain death" and who have claimed that this evidence



invalidates the rationale for today's consensus position. These challenges invite—indeed, they necessitate—a reexamination of the neurological standard enshrined in law and medical practice. In this report, the President's Council on Bioethics offers such a re-examination."³⁴ Meanwhile across the Atlantic in the UK, brainstem death criteria were published in 1976 by the Conference of Medical Royal Colleges as prognostic guidelines "to establish diagnostic criteria of such rigour that on their fulfilment the mechanical ventilator can be switched off, in the secure knowledge that there is no possible chance of recovery"³⁵.

In 1979, the Conference of Medical Royal Colleges decided that the prognostic guidelines published in 1976 would constitute a diagnosis of brain death meaning that the patient is dead³⁶. It was also claimed that the diagnostic criteria established for brain death criteria would suffice for whole brain death.

This claim was withdrawn in 1995 after a review by a Working Group of the Royal College of Physicians. The Conference of Medical Royal Colleges formally adopted the more accurate term "brainstem death" which was stated to be equivalent to death of the individual³⁷. Death being defined as "the permanent loss of the capacity for consciousness and spontaneous breathing". The eminent British neurologist, Christopher Pallis explains: "The single matrix in which my definition is embedded is a sociological one, namely Judeo-Christian culture... The "loss of the capacity for consciousness" is much the same as the "departure of the conscious soul from the body," just as "the loss of the capacity to breathe" is much the same as the "loss of the breath of life."³⁸

The UK's "brainstem death" criteria was a refinement of the USA's "whole brain death" criteria. These two opposing positions led a to a huge debate on the subject in the media and a six-month heated correspondence in the medical journals³⁹ following a rather provocative BBC Panorama programme on the subject entitled, "Are the Donors Really Dead," aired on BBC1 on the 13th October 1980. The USA's criticism of the UK's brainstem criteria was voiced by the President's Council for Bioethics in 2008, "The UK standard.... Such a reduction, in addition to being conceptually suspect, is clinically dangerous because it suggests that the confirmatory tests that go beyond the bedside checks for apnoea and brainstem reflexes are simply superfluous."33 Roberts and Versnick report two cases in Canada declared brain dead using brainstem criteria both of whom regained spontaneous breathing.⁴⁰

Brainstem criteria or whole brain criteria? The brainstem contains the reticular activating system essential for maintaining a state of wakefulness and transmitting impulses to the cerebral hemispheres responsible for generating consciousness. The brainstem is the most resilient part of the whole brain. The clinical tests for brainstem death do not test the reticular activating system directly. Loss of all brainstem reflexes implies loss of all brainstem functions which precludes discernible functioning of the cerebral hemispheres. So, if brainstem function is lost the brain cannot function. As Pallis puts it, "in the absence of brainstem activation, the cerebral hemispheres remain in a permanent state of coma." However, Shewmon through his thought experiment comes to the logical conclusion that, "we are forced to conclude that a person dies when the cerebral hemispheres are destroyed...,"41 which he backs up with German neurosurgeon Hassler's report the in successfully arousing patients comatosed from discrete brainstem injury by artificially stimulating the reticular activating system.⁴² This is one of the criticisms of the brainstem stem criteria as it gives rise to the absurd possibility of a conscious corpse. In the 1990s, it became clear that certain brain functions such as hypothalamic and pituitary functions remain in brain dead patients, and this was not consistent with the legal definition of brain death which required irreversible cessation of all brain functions (UDDA Act, 1981). "Cessation of all brain functions" in clinical practice became to be interpreted as "cessation of all critical brain functions." Singer, despite his utilitarian philosophical outlook, stated, "the brain death criterion for death is nothing other than a convenient fiction^{3,43}, a view corroborated by other scholars.44,45,46 Such a legal fiction is not designed to deceive but it does have the effect of implanting a false belief in the addressees.

Further analysis reveals more inconsistencies in the brain death concept. What is the underlying criterion for equating brain death with death? The proponents of the brain death concept contend that permanent loss of integrated biological function of an organism as a whole is sufficient basis for declaring an individual dead²⁸. However, integrated biological function can continue in brain dead patients without contribution from the brain³⁰. These somatically integrated functions include homeostasis, energy balance, wound healing, fighting infection and other functions.

Proponents will argue that these functions are only possible with the aid of artificial ventilation. But what is important is that these functions, normally associated with life, are present; the reason why they are present is



not so important. In some extreme cases of total lockedin syndrome the patient may be conscious and aware but may exhibit no more integrated functioning than brain death patients. Such locked-in syndrome patients are considered alive but require intensive care to keep them alive, similar to the brain dead patient.Proponents will point out that the locked-in syndrome patient is conscious, the brain dead patient is not.

There has been much criticism by experts regarding the definition of death and the presumption of equating brain death with actual death. Veatch has gone so far as to say, "It has now become clear that no reasonable person accepts the Harvard Committee position that "brain death" is a plausible definition of death."¹

An extension of the brain death concept -The "higher-brain death" concept

Considering all the inconsistencies with the brain death theory some philosophers have put forward the idea that "the person dies" with the "irreversible loss of capacity for consciousness" while the "human organism dies" with the "irreversible cessation of circulatory and respiratory functions".

The "higher-brain" standard for brain death holds that key functions of the brain such as memory, consciousness, and personality, are what make us a person, and since those functions originate in the cerebral hemispheres, it is the death of those portions of the brain that count as death of the person⁴⁷. A number of argumentative strategies have been put forward to support the concept of higher-brain standard for brain death, these include loss of "loss of personal identity", loss of "moral standing" and, loss of "prudential value". The higher-brain theory for death is objectionable because it suggests there are two types of death (personhood and biological). Some death related behaviours come into play after death of personhood, others after biological death. But in reality, there is only one death. An individual is either dead or alive. Although the higher-brain death theory is philosophically defensible as a theory, in practice it would pose considerable problems, as Laureys, an expert in persistent vegetative state (PVS) and brain injury points out: "Clinical testing for absence of consciousness is much more problematic than testing for absence of wakefulness, brainstem reflexes and apnoea in whole brain or brainstem death."48 The diagnostic criteria we have at the present for determining higher-brain death has a 30-40% false positive misdiagnosis rate for the

vegetative state⁴⁹.Shewmon and Holmes reported two cases in an abstract, at the International Child Neurology meeting in Tokyo in 1990, of children born without a cerebral cortex who were not only conscious but also had voluntary motor movements and rudimentary vision⁵⁰. One of these cases, Andrew, was reported by the Associated Press in 1989, "Boy born without a brain proves doctors wrong"⁵¹, when he was 5 years old and attending nursery school. Andrew with his brain anatomy should only have had a short vegetative life and considered dead according to the higher brain death criteria. These two cases proved that the cortical doctrine of consciousness was not true in these congenital situations.

Higher brain death is one step removed from "mental death". The concept of the biologically alive human "non-persons" played a key role in the professional acceptance of euthanasia of mentally ill, retarded, and demented individuals in Nazi medical crimes popularised by the book in 1920 entitled, "Permission to Destroy Life Unworthy of Living" by jurist Karl Binding and psychiatrist Alfred Hoche.⁵²

Consciousness is not an all or none phenomenon but part of a continuum and there is no universally agreed upon definition of consciousness. If we were to adopt the higher-brain standard, then patients in PVS would be considered dead even though they can breathe spontaneously and have other brainstem functions. They can maintain this status for years in some cases. Similarly, babies born with anencephaly who are unconscious but breathing for themselves would be considered dead under the higher-brain standard. It is unlikely the public would accept dissection in the anatomy room, a post-mortem examination or burial of unconscious individuals breathing for themselves.

If such a criterion of death was to be implemented, it would, theoretically, mean that an individual declared dead based on permanent loss of consciousness, could be subjected to major surgery for vital organ retrieval while breathing spontaneously. Would such an individual need an anaesthetic? "Brain dead patients do not require anaesthesia or sedation..."⁵³ according to the 1999 guidelines manual of the Intensive Care Society (UK). Brain dead donors are usually given a paralysing agent to prevent any spinal reflex movements during surgery, oxygen and any drugs required to control blood pressure and heart rate⁵⁴. Some authors have stated that nociception (pain) and awareness in donors cannot be excluded during thesurgical procedure of organ retrieval⁵⁵.



Ethics

			Brain death criteria		
	Biological death	Religious death	Whole brain	Brainstem	Higher-brain
Underlying criteria	Cessation of all biological functions that sustain life	Desoulment	Loss of integrated biological function		Loss of personhood
Diagnostic criteria	Irreversible cessation of circulation and respiration		Known cause + Loss of all brainstem reflexes + ancillary tests	Known cause + Loss of all brainstem reflexes	Diagnostic criteria are inaccurate at present

Γ 1 Γ	C 1.CC	C 1	·	1 1
HIG I COMPARISON	οτ απτργρητ	tormulations/	criteria	οτ αρατη
		101 mm mm mm mm mm mm		$o_i a c a i n$

A study by Grigg et al. showed 20% (11/56) of brain dead patients had EEG activity and demonstrated sleeplike cortical EEG in 4% for as long as 7 days⁵⁶. Brainstem auditory evoked potentials can persist and were demonstrated by Machado⁵⁷ in 27% (5/30) and by Sasaki⁵⁸ in 26% (5/19) of brain dead patients. Wijdicks and Pfeifer reported a study which showed that at autopsy, the brainstem was reported as normal or minimally ischemic in about 60 % of patients who were determined brain dead by clinical examination only⁵⁹. Some anaesthetists in the UK have suggested giving anaesthesia to brain dead patients⁶⁰. Advocating an anaesthetic for brain dead individuals is problematic as it casts doubt in them being actually dead. It is generally accepted amongst the medical profession that brain dead individuals do not feel pain, if there is some sort of sensation still present it is not similar to the pain that a living person feels. Some anaesthetists do administer anaesthesia to brain dead donors during organ retrieval but not because they believe the donors feel pain but for cardiovascular stability.

Fig. 1 shows different formulations of death with their underlying criteria and diagnostic criteria. The underlying principle for all the brain death formulations is the permanent loss of consciousness which is in line with the higher-brain death criteria. Consciousness is a critical function of an organism, permitting it to interact adaptively with its environment and it is crucial to the personhood of an individual.

Rashid¹⁰, by citing the opinions of past Muslim scholars, states that permanent loss of consciousness is legal death in Islam (*al-mawt al-hukmī*). Rashid puts forward the

following three pertinent points relevant to the discussion:

1. A state of consciousness in the dying process described by past Muslim scholars as *al-hayāt ghayr al-mustaqarrah*(unstable life) can be equated with legal death in Islam (*al-mawt al-hukmī*). At this point the soul has lost control of the critical rational components of the body resulting in permanent loss of voluntary movements, coherent speech, and eyesight¹⁰.

In 1985, the Islamic Organisation for Medical Sciences (IOMS) equated brain death with unstable life (*al-hayāt ghayr al-mustaqarrah*), allowing discontinuation of lifesupport systems but did not equate brain death with a formal declaration of legal death⁶¹. The IOMS reviewed its stand on the subject in 1996 and did not make any alterations to its original statement.

The term *al-hayāt ghayr al-mustaqarrah* contains the word "*hayāt*" meaning life, suggesting there is still life present.

2. Determination of legal death in Islam requires only dominant probability (*ghalabat al-zann*) and not certainty- "but it actually suffices to determine death as a predominant probability (*ghalabat al-zann*) from a pragmatic perspective"¹⁰.

In his *fatwa* Butt⁹ states the position of the four Sunni Islamic schools of jurisprudence is that where there is doubt regarding death, the declaration of death should be delayed until it can be positively ascertained. It would be reasonable to assume that equating brain death with death is surrounded by doubt and controversy. In practice it



may be impractical to archive absolute certainty, but we can try to achieve moral certainty.

3. Rashid points out that although intentional injury inflicted to an individual in a state of unstable life (*al-hayāt ghayr al-mustaqarrah*) is punishable in Islamic law, in the procurement of organs from such an individual who has given consent, because there is no intention to harm, his death is not being hastened as he is already legally dead, the action is for a good cause to benefit the life of another, so the punishment will be excused¹⁰. This, of course, assumes that unstable life (*al-hayāt ghayr al-mustaqarrah*) is accepted as legal death while the term itself suggests that there is life, even though death may be inevitable.

Although Rashid defends his position on the above three points in detail using the views of some past Muslim scholars, the higher-brain death criteria has not been adopted by any jurisdiction anywhere in the world even though it does have considerable support from Western scholarship. Muslims hold the legal rulings of their past scholars in very high regard, but these rulings must be in accordance with reality. The past Muslim scholars held the legal position that the maximum gestation period was 2-7 years or more, based on the knowledge available to them. The intention of these jurists may have been to protect the lineage, but no contemporary Muslim scholar would endorse this view as it defies current scientific knowledge.

If such a legal ruling was to be enacted in this day and age, it could mean a woman who was divorced 2 years ago, could bear a child out of wedlock and then claim child maintenance from her ex-husband with whom she has had no contact for 2 years, by attributing the child to him. Similarly, contemporary scholars have revised the legal rulings of past scholars on issues such as fast invalidators for medical interventions⁶² as our understanding of the human anatomy has improved. An individual can be declared legally dead after missing for a period of time, but if he turns up alive, i.e., evidence of being alive, then he is alive despite being labelled legally dead⁶³.

The Rational of Equating Brain Death with Actual Death

The mainstream prevailing view is that death is a biological phenomenon, not a concept nor a theory. On

that premise a logical approach to the problem would be to:

- 1. Define death based on a philosophical basis,
- 2. Determine the physiological criteria that satisfy the definition and,
- 3. Identify diagnostic tests required to determine when the physiological criteria have been fulfilled.

In science, when trying to understand certain difficult phenomena, we put forward a theory or a concept, and then proceed to check the validity of this theory with known observations and predictions to confirm or reject the theory. In 2008 The Academy of the Royal Medical Colleges justified declaring brain death as death because brain death will lead to "organ necrosis within a short period of time" and "cessation of heartbeat within a few days."64 This obviously does not happen because in the vast majority either the life support is withdrawn, or essential organs are extracted. However, if the brain dead individuals are provided with nutrients and oxygen, they may maintain many functions which require a high level of biological integration. Jahi McMath⁶⁵, for instance, continued to grow while she was brain dead, and she underwent puberty. The organs of brain dead individuals, in many cases, do not undergo necrosis within a short period of time nor does the heart cease to function within a few days. These patients can be kept going for years in very rare cases.

Not quite brain dead...A new protocol for determining death to increase the organ donor pool

In the face of a crisis of organ shortage for transplantation, a new protocol for determining death was introduced to increase the organ donor pool in the early 1990s⁶⁶. This is in effect a modification of the traditional cardio-respiratory criteria, and the criteria used by Bernard for the first human heart transplant. The protocol is referred to as donation after circulatory death (DCD). Controlled circulatory death (Maastricht class IV)⁶⁷ is applicable to organ donors who do not quite fulfil the criteria for brain death, or their facial injuries preclude the conducting of clinical tests for diagnosing brain death. If these individuals are not organ donors, then lifesupport measures would be withdrawn to allow them to die naturally. But because they are organ donors, artificial life support measures are maintained to preserve the organs until the time of organ retrieval. The life support measures are then stopped, allowing the heart and then the circulation to come to a standstill for a period which varies from 2-20 minutes (hands-off or notouch time) depending on country and location, after



which the individual is declared dead, and the organ removal process commences. This controlled cessation of circulation time is to ensure brain death has indeed taken place by depriving the brain of oxygen, so the underlying criteria for declaration of death in these cases is still brain death even though the diagnostic criteria used to determine death is circulatory. Organ donation babies have been declared dead after as little as 75 seconds of circulatory arrest.⁶⁸ The underlying rationale for declaring death in these cases is that 75 seconds of circulatory arrest rules out auto-resuscitation and since no attempt is going to be made to resuscitate such a patient, death can be declared. It is important to point out that even though the heart of the donor was healthy enough to function in the recipient, it would have been impossible to restore the health of the dying donor.

Ethical objections have been raised by some experts in the field and some have cast doubt on whether these donors after circulatory death (DCD) are truly dead or not^{69,70}, particularly because heart transplantation does take place from donors declared dead using DCD criteria⁷¹. While other experts have defended the position that DCD patients are indeed dead⁷². Resuscitation research shows that 10–15% of patients recover with normal or only moderately disabled cerebral function when they are successfully resuscitated after more than 5–6 minutes of cardiac arrest^{73,74,75}.

Some of the strongest proponents of DCD practices, such as Bernat and colleagues, recognise that such issues "remain controversial and that they may change with further research and ethical analysis"⁷⁶.

The Reality of Death in Religion

From a religious perspective, death is not a manufactured concept of the human mind. It is a reality created by the Almighty:

"He, who created death and life that He may test you [to see] which of you is best in conduct. And He is the Allmighty, the All-forgiving." Quran 67:2

All three Abrahamic religions (Judaism, Christianity, and Islam) generally define death as the departure of the soul from the body^{77,78}. This definition is fixed. The precise moment at which the soul departs from the body resulting in death is not accompanied by any physical sign that we can ascertain with precision for practical application, it is a metaphysical phenomenon. The diagnostic criteria used to determine the departure of the soul from the body will be dependent on medical advances and the technology

available. Using advanced diagnostic methods to determine desoulment of the body is permissible from a religious perspective. The traditional method used to determine this endpoint was the irreversible loss of heartbeat and breathing. These diagnostic criteria are still accepted by contemporary religious scholars as reliable signs of departure of the soul from the body.

Concept of brain death v Reality of religious death

Death is a natural biological phenomenon not a concept nor a theory, this is the mainstream prevailing view. It is a reality created by God Almighty whereas brain death is a concept of the human mind. The reality of death is independent of the limits of the human mind to formulate concepts about it. The reality of death is independent of who declares death or how widely a particular concept or theory about death is accepted.

Scholars from all the three Abrahamic faiths have discussed the feasibility of brain death being equivalent to death with proponents and opponents of brain death in each of the three Faiths. The arguments in each Faith are complex and non-conclusive. The principles involved are shared amongst these three Faiths:

- 1. Intention of an action is very important in religion as actions are judged by intention. Why do we want to diagnose death at its earliest point?
- 2. In religion, prevention of harm takes precedence over doing good.

The taking of one life to save another life is not acceptable even if the life to be terminated is likely to be short.

In Islam killing one innocent person is akin to killing the whole of humanity; saving a life is akin to saving the whole of humanity⁷⁹.

In the words of Pope John Paul II, "the respect due to human life absolutely prohibits the directand positive sacrifice of that life, even though it maybe for the benefit of another human being who might be felt to be entitled to preference"⁸⁰.

In Judaism there is the principle of (one life may not be set aside to ensure another life).

3. Amongst the purposes of religious law is to protect life and resources.



4. The burden of proof that brain death is actual (religious) death is on those who declare brain death as actual death and not on those who do not accept brain death, to prove that the brain dead person is alive.

If brain death is to be accepted as death in religious law (Judaism, Christianity, or Islam) then we must consider two important questions:

- 1. On what religious basis can brain death be accepted as death?
- 2. Do the diagnostic criteria currently used in clinical practice to determine brain death fulfil the religious requirements?

It should be stressed that the mere presence of a beating heart of an individual does not imply that the individual is alive since it is possible to remove the heart from a body and keep it beating in a machine such as the Transmedics Organ Care system⁸¹. Similarly, the heartbeat and other biological functions start before ensoulment of the foetus which occurs at 120 days according to most Muslim scholars. So, the mere presence or absence of a heartbeat is not conclusive proof in itself that the soul is invariably present or absent from the body.

Fig. 2 below shows comparison of different death formulations (criteria) with reference to the presence or absence of generally accepted signs of life. Declaring patients "dead" solely on the basis of "a definition" seems to contradict our common sense of what it is to be alive.⁸²

		Formulations/ Criteria for death			
	Actual death	Cardio- respiratory criteria	Whole brain criteria	Brainstem criteria	Higher- brain criteria
Irreversible loss of <u>all</u> brain functions	•	•	0	0	0
Irreversible loss of consciousness	•	•	•	•	•
Irreversible cessation of spontaneous breathing	•	•	•	•	0
Irreversible cessation of circulation	•	•	0	0	0
Irreversible loss of ability to maintain homeostasis	•	•	0	0	0
Irreversible decomposition of whole body	•	•	0	0	0
Increase in entropy in all organs	•	•	0	0	0
Irreversible loss of ability to grow	•	•	0	0	0
Irreversible loss of ability to absorb food	•	•	0	0	0
Irreversible loss of ability to excrete waste products	•	•	0	0	0
Irreversible loss of ability to fight infection	•	•	0	0	0
Irreversible loss of ability to heal wounds	•	•	0	0	0
Totally unresponsive to surgical stimuli	•	•	0	0	0

Fig. 2 Comparison of features associated with different formulations/ criteria for death in relation to actual death • = Present / True \circ = Absent / False



Those scholars who accept brain death as death give different reasons for acceptance. These include:

1. Since brain death is accepted as death by a very large body of professionals then it is permissible to accept on the principle of customary law. We also have to rely on the opinion of the experts. Unfortunately, most professionals have not given much thought to what brain death is. The real experts on the subject disagree amongst themselves about the concept of brain death as death. I personally conducted a survey amongst 41 consultant anaesthetists at our hospitals at Manchester University NHS Trust. The response rate was 40/41. All consultant anaesthetists have had intensive care training and are familiar with the term brain death. 62.5% (25/40) of the respondents did not think that it is possible for a dead person to continue to grow, fight infections nor heal wounds. Yet, all these features are present in brain dead individuals.

A formal survey, conducted by Joffe, of 192 American neurologists concluded that they do not have a consistent rationale for accepting brain death as death, nor a clear understanding of diagnostic tests for brain death⁸³.

2. The soul commands the body; with the permanent loss of consciousness, sentience (capacity to feel) and volition (capacity for decision making), it can be deduced that the soul has left the body.

Rashid¹⁰ while quoting al-Ghazali's work. Ihvā' 'ulūm al-dīn, writes "The meaning of the soul parting from the body is the separation (tasarraf) of the control of its actions from the body. The organs are tools of the soul to be used by it such as grasping with hands, listening with ears, seeing with eyes, and knowing the truth of things with the heart. And the heart here refers to the soul and the soul knows the things independent of an instrument. It is for that reason that it feels pain directly from the types of grief, distress and sadness and it enjoys varieties of happiness and pleasure."

Butt⁹ commenting on the same text writes: "Al-Ghazali presents cognitive functions as direct attributes of the soul without the medium of any part of the physical body. However, there is no clear scriptural basis for this, and this is rather pure conjecture which we know today to be untrue. Cognition, perception, volition, and thought are all functions of the cerebral cortex."

Pallis, who produced the accepted criteria for brainstem death said that in his definition he used "loss of the capacity for consciousness" criteria because it is embedded in Judeo-Christian culture.³⁷

If we confine the definition of death to "the permanent loss of consciousness" in a religious context when we know that consciousness is a function of the cerebral cortex does that imply the seat of the soul is confined to the cerebral cortex?

3. Some religious authorities have put forward their own criteria of what constitutes brain death. So, it seems on the surface they accept brain death as death, but they do not accept the diagnostic criteria used to determine brain death in clinical practice, so in reality, they reject brain death as it is practiced in clinical medicine.

The IIFA-OIC⁴ (Amman, 1986) and ECRF⁷ (Dublin, 2000) *fatawa* (legal edicts) accepted brain death as death with the condition that <u>all</u> brain functions have ceased, and the brain has started to degenerate in the case of IIFA-OIC.

The Pope John Paul II made a similar statement, "the complete and irreversible cessation of all brain activity, if rigorously applied, does not seem to conflict with the essential elements of a sound anthropology⁸⁴."

The diagnostic criteria used for brainstem death and whole brain death in practice do not test for cessation of <u>all</u> brain functions. In fact, it is well known that in the diagnosis of brain death some brain functions continue to persist.

4. Some scholars who accept the concept of brain death as death but do not consider the current diagnostic tests used to determine brain death as sufficient and stipulate additional tests such as angiographic scanning.

Brain death is physiological decapitation. Shewmon 5. has argued, "the 'physiologically decapitated' braindead body is just as much a living 'organism as whole' as a body with high spinal cord transection, the difference being the former is comatose and the latter is conscious⁷⁸⁵. He has also argued that the decapitation analogies, "in the final analysis are irrelevant to understanding clinical brain death, in which no such separation is involved." "Brain-body disconnection, which is the essence of the 'physiological decapitation' analogy, brings to light a number of paradoxes or mental (logical) disconnects between mainstream brain-death theory and mainstream brain-death practice."85



- 6. The brain contains the respiratory centre, so brain death is akin to permanent cessation of capacity for respiration which is considered as death in religion. Permanent loss of capacity for respiration is also present in an individual inflicted with a high cervical cord lesion whom no one would consider dead, they live out their lives on a ventilator as did Christopher Reeve after sustaining a C1-2 injury in 1995, which left him paralysed from neck down with permanent loss of capacity to breathe. He died in 2004 following an allergic reaction to an antibiotic.
- 7. The Muslim Law Council (UK), in its 1995 *fatwa*, accepted brainstem death as death in Islam in the context of organ transplantation. It stated, "The Council accepts brainstem death as constituting the end of life for the purpose of organ transplant." The Council provided no details of the reasoning behind their decision. It also raises the question: Should the declaration of death of an individual be dependent on whether he or she is an organ donor?

Despite widespread acceptance of brain death as death in modern medicine, a number of prominent Islamic fiqh councils around the world have rejected brain death as religious death, including the Indian fiqh academy⁸⁶, IFFA-OIC⁴, IFFA-MWL⁵, FCNA⁹ and ECFR⁷ as well as some Christian and Jewish bodies.

Verheijde and Potts concluded that: "It is therefore possible that heart-beating organ procurement from patients with impaired consciousness is de facto a concealed practice of active euthanasia and physician-assisted death, both of which, either concealed or overt, the Catholic Church opposes."⁸⁷. The US Halacha Committee of the Rabbinical Council of America and the UK London Beth Din have rejected the concept of brain death as actual death.⁸⁸

For the proper functioning of a modern civil society, it is necessary to draw a line in the dying process to differentiate between the living and the dead. Where exactly this line is drawn will vary depending on which country you are in, and it is based on local socio-political factors. The position of this line can be changed to better serve and reflect the needs of the local community. It comes down to what the local population will accept as death, and this can change with time. The status of being alive or dead determines the statutory rights of an individual in society. The declaration of legal death is not synonymous with actual death.

Similarly, the legal age of majority has been fixed by different countries from 15 years to 21 years, but this is

not necessarily the same as the actual biological transformation from childhood to adulthood, nor the age of majority set by different religions.

The danger of using man-made concepts is that manmade concepts change with time and location whereas reality is constant. An individual declared dead in the UK using brainstem criteria is not considered to be dead in the USA nor Australia nor Europe. Prior to 1979, a brainstem dead person was not considered to be dead in the UK but after 1979 the same person with the same severity of disease became dead.

Implications and strategies used to increase organ donation rates in the Muslim community

Advocates of organ donation in the past have suggested strategies to improve organ donation rates amongst Western Muslims. These strategies include reinterpretation of religious texts associated with organ donation and educating the public about the subject. This has happened to a certain extent. But the religious texts on death cannot be re-interpreted in the same way as for organ donation.

Figures from NHSBT (UK) show that there is a huge need for donated organs especially for ethnic minority patients⁸⁹. This fact, in combination with highlighting that there are so many different scholarly opinions (*fatawa*) on organ donation⁹⁰, albeit in various scenarios, allows individuals to pick and choose a *fatwa* which fits the purpose. However, not mentioning brain death at all when promoting organ donation amongst Muslims is a serious omission, because those Muslim scholars who consider deceased organ donation as permissible do require the donors to be Islamically dead as a condition of permissibility before essential organs are removed. The organ donation campaigns and internet sites "provide positive reinforcement and promotional information rather than the transparent disclosure of organ donation process"⁹¹.

The story of Elijah Smith^{92,93} demonstrates the importance of the public adequately understanding what the process of organ donation involves. Elijah Smith, a 22-year-old man was declared brain dead following a serious road traffic accident in 2013 in Ohio, USA. He had agreed to be an organ donor when applying for his driving licence the year before his fatal accident. When the local hospital made arrangements to remove his organs the parents of Elijah Smith, who were not against organ donation,



objected because they did not think he was dead yet. According to Mrs Smith, her son did not understand what he was agreeing to when he registered as an organ donor, and that, had he understood that organ removal takes place while on a ventilator and with a beating heart, he would not have registered as a donor. Elijah Smith's organs were removed under a court order against the wishes of his parents. Signing an organ donor card is akin to writing a Will, relatives cannot override the decision of the organ donor.

Fortunately, this would not happen in the UK under the deemed consent law because the NHSBT is committed to supporting the faith and beliefs of individuals throughout the organ and tissue donation process.

Concluding remarks

For the advocates of brain death, the advent of brain death was a great scientific discovery, the story of a lost paradise. For the critics of the brain death concept, the brain death story is one of deception and betrayal, a definition that defies scientific truths, invented to serve the needs, and demands of the transplant community. It was not scientific objectivity but professional interests that governed the implementation of brain death policies⁹⁴. Both narratives these are true to a certain extent.

As the definition of death has evolved over time this may indicate that death cannot be accurately defined, and the only stable definition may be "irreversible cessation of life." Which would imply any signs of life precludes the diagnosis of death.

In its current form, the brain death concept has inconsistencies, leading to allegations of legal fiction by some commentators⁴⁴. There have been calls to revise the legal statutory definition of death in USA95 or to abandon the dead donor rule^{96,97,98}. Some academics have entirely dropping the neurological advocated determination of death⁹⁹ and relying on the much simpler cardio-respiratory formulation contained in the first part of the Uniform Determination of Death Act. The cardorespiratory criteria, of course, is problematic in that both the heart and lungs can be re-animated and should human life be reduced to just two organs? The chief advantage of such an updated traditional approach, according to proponents, is that it most adequately characterizes the difference between life and death.

Even Bernat, perhaps the staunchest defender of brain death acknowledges that the brain death paradigm is flawed¹⁰⁰, as do other prominent commentators such as Seifert¹⁰¹, Potts, Byrne, and Nilges¹⁰², Joffe¹⁰³ and Shewmon¹⁰⁴.

Vol.10 - No. 4 | April 2022 | www.jbima.com

There is no underlying biological rationale for why brain death should be taken as actual death, none of the underpinning criteria put forward by the proponents stand up to scrutiny. The justification that brain death is death because the brain is the central integrator²⁸ of the body is not valid³⁰, the body does not disintegrate without a working brain; the rationale that the concept of brain death depended on this close temporal association between brain death and cardiac arrest^{64,105} is invalid, brain dead individuals' hearts can keep beating for years; the destruction of the respiratory centre in the brainstem leading to permanent loss of capacity to breathe is not a valid reason; what we are left with is the permanent loss of consciousness as the only defensible rationale philosophically but rejected by medicine. The fact that children born with no cerebral cortex have displayed consciousness with voluntary motor movements^{50,51} undermines the core basis of the higher brain death theory. What are we left with? A purely brain based definition of death is neither feasible nor necessary. The brain death concept has been a pragmatic approach with no credible underlying justification. It has solved a problem and served the needs of society in which it operates for over 50 years. From a secular utilitarian approach, whether brain death is actual death or not, is not so important, the important thing is that it is widely accepted by the public, it allows extraction of living organs from individuals declared dead and protects doctors against any charge of homicide. The dead donor rule for organ donation is important to the public even though its application may be questionable. Brain dead (whole brain or brainstem) individuals are as good as dead. They will never recover brain-dependent functions, including the capacity to breathe and the capacity to exhibit even minimal signs of conscious life. In the eyes of the law, they can be seen as dead and dead enough to remove their valuable organs. Making any changes for consistency, accuracy, truthfulness, greater and transparency risks undermining public confidence.

If greater consistency, accuracy, truthfulness, and transparency is a goal, one solution would be to disaggregate death from "death behaviours". So that organs could be removed, life support could be unilaterally withdrawn by doctors when a patient fulfils the criteria of brain death without declaring them dead.



This would mean abandoning the "dead donor rule" for organ retrieval. Such a policy would not be without risks.

And such an approach may not sit well in a religious context in which the sanctity of life is paramount. All brain dead individuals are not all the same, the severity of the medical condition varies. It is unlikely that pure brain dead individuals with all the other organs and systems functioning near normal are truly dead. Whether or not the soul has departed from an individual declared brain dead is impossible to ascertain with certainty. The only statement anyone can make for certain on this issue is that no one knows for sure. Labelling them "legally" dead does not change the reality. Legal death is not synonymous with actual death.

The fatawa of contemporary Muslim scholars would indicate that medical science has not yet reached a sufficient level of understanding of death to justify creating a new standard for legal death in Islam. The study of the evolution and analysis of the criteria underpinning the brain death theory supports this position. The brain death theory is not a medical fact but a value judgment, a conclusion looking for a justification. It may be that the true definition of death cannot be reduced to the isolated failure of one or two organs but the failure of multiple bodily systems to the "point of no return," meaning no amount of medical effort can prevent the body from losing its integrity to maintain homeostasis, and resist entropy and disintegration^{33,106}. The real integrator of the whole body is not the brain but the soul. To identify the "point of no return" with precision is elusive and may be impossible.

Rashid's approach to the problem has been to resort to the opinion of some Muslim scholars of the past in trying to define death, because "it is important to understand that Muslims accept a legal definition of death not a scientific one,"¹⁰, and to put forward the idea of two deaths (*hukmī* and *haqīqī*).Rashid states, "The permanent loss of consciousness" is legal death in Islam¹⁰. Such a philosophical approach requires no reference to the brain. It is based on the notion that the soul is the administrator of the body responsible for higher cognitive function, sentience (capacity to feel) and volition (capacity for decision making). Such a position is analogous to the higher brain death put forward by some western philosophers and from an Islamic perspective it seems to limit the seat of the soul to the higher brain. No jurisdiction has ever accepted higher brain death as legal death.

Brain death or the determination of death by neurological criteria remains controversial scientifically, culturally,

and legally, worldwide¹⁰⁷.Most commentators agree that death should not be treated merely as a legal construct nor as a matter of social agreement but instead, the standard used for determining death must be defensible on biological as well as philosophical grounds. If an individual is declared dead based on a particular criterion of death but continues to display obvious signs of live, then the criterion should be reviewed.

It would be helpful for the UK Muslims if a national body of UK Islamic scholars together with appropriate expertise from other specialists could issue a unified ruling on the issue of brain death in the context of Islamic death as the Fiqh Council of North America has done for the Muslims in the USA.

References

¹Veatch RM. "Would a Reasonable Person Now Accept the 1968 Harvard Brain Death Report? A Short History of Brain Death," Defining Death: Organ Transplantation and the Fifty-Year Legacy of the Harvard Report on Brain Death, special report, Hastings Center. 2018; Report 48, no. 6: S6-S9

²Capron AM. Brain death – well settled yet still unresolved. N Engl J Med. 2001;344(16):1244–1246.

³Truog RD. Brain death – too flawed to endure, too ingrained to abandon. J Law Med Ethics. 2007; 35:273–281.

⁴*MajallaMajma* ' *al-Fiqh al-Islami al-Duwalī*, Majma', Jeddah, Third Session, 1986; 2:809.

⁵The 6th Ordinary Session of the European Council for Fatwa and Research. 2000; Decision 2/6 https://www.e-cfr.org/blog/2017/11/04/sixth-ordinarysession-european-council-fatwa-research/

⁶ The Islamic Fiqh Council of Islamic World League Held in Makkah Al Mukaramah, Decree No. 2. (10th session) 1987.

⁷Haque, 2008; Birgit Krawietz, "Brain Death and Islamic Traditions: Shifting Borders of Life?" In Islamic Ethics of Life: Abortion, War, and Euthanasia, ed. Jonathan E. Brockopp: University of South Carolina Press, 2003. 194–213



⁸ Butt MZ. (2019) Organ Donation and Transplantation in Islam, An opinion.

https://nhsbtdbe.blob.core.windows.net/umbraco-assetscorp/16300/organ-donation-fatwa.pdf (Accessed 11the Dec. 2021)

⁹ Fiqh Council of North America, On Organ Donation and Transplantation. 2021; item no. 5 https://fiqhcouncil.org/on-organ-donation-andtransplantation/ (Accessed 11th Dec. 2021)

¹⁰ Rashid R. Islamic Response to the Debate on Organ Transplantation

https://www.academia.edu/43787756/Islamic_Response_ To_The_Debate_On_Organ_Transplantation_Bodily_Di gnity_Neurological_Death_and_the_Dead_Donor_Rule (Accessed 11th Dec. 2021)

¹¹Pallis C. Brainstem death: the evolution of a concept.SeminThoracCardiovasc Surg. 1990; Apr;2(2):135-52

¹²Pallis C. Death, brain death, brainstem death: the evolution of a concept. Minerva Anestesiol.1994; 60(10):607-9

¹³ Marquis D. Are DCD donors dead? The Hastings Centre Report. 2010;40(3): 24-31.

¹⁴Bernat JL, Capron AM, Bleck TP, et al. The cardiorespiratory determination of death in organ donation. Critical Care Medicine 2010; 38(3): 963-970

¹⁵Mollaret P, Goulon M. *Le coma dépassé* (preliminary memoir)]. Rev Neurol (1959) 101:3–15.

¹⁶Wolstenholme GEW, O'Connor M. Ciba Foundation Symposium - Ethics in Medical Progress: with Special Reference to Transplantation, 1966 Ciba Foundation

¹⁷Barnard CN. The operation. A human cardiac transplant: an interim report of a successful operation performed at Groote Schuur Hospital, Cape Town. S Afr Med J. 1967; 41(48):1271–1274.

¹⁸ McRae D. Every Second Counts: The Extraordinary Race to Transplant the First Human Heart. Simon and Schuster, 2006

¹⁹Kuhse H, Singer P. A Companion to Bioethics, 2nd edition, Wiley-Blackwell, 2012

²⁰ Beecher's letter to dean Ebert is preserved at the Francis Countway Library of Medicine at Harvard.

²¹ Giacomini MA. A change of heart and a change of mind? Technology and the Redefinition of Death in 1968, Social Science and Medicine 1997; 44, 1465-1482

²² Belkin GS. Brain Death and the Historical Understanding of Bioethics», in Journal of the History of Medicine and Allied Sciences, 58, 3 (2003)

²³ Beecher HK. (1969) The "definition of irreversible coma" N Engl J Med. 1969; Nov 6;281(19):1068-1071

²⁴Beecher HK, Dorr HI. (1971) "The New Definition of Views," Opposing Death. Some Internationale ZeitschriftfürklinischePharmakologie, Therapie, und Toxikologie [International iournal of clinical pharmacology, therapy, and toxicology]. 5, no. 2 (1971): 120-4, at 121.

²⁵Brierley JB, et al. "Neocortical Death after Cardiac Arrest," Lancet 2 (1971): 560-65.

²⁶Task Force on Death and Dying, Institute of Society, Ethics and the Life Sciences, "Refinements in Criteria for the Determination of Death," JAMA, 01 Jul 1972, 221(1):48-53

²⁷President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, Defining Death: Medical, Legal and Ethical Issues in the Definition of Death (Washington, D.C.: U.S. Government Printing Office, 1981), 32.

²⁸Bernat JL, Culver CM, Gert B. "On the Definition and Criterion of Death," Ann Intern Med 1981;94, no. 3: 391.

²⁹Shewmon DA Chronic 'brain death': Meta-analysis and conceptual consequences. Neurology 1998;51: 1538–45.

³⁰Shewmon DA. The brain and somatic integration: insights into the standard biological rationale for equating "brain death" with death., The Journal of medicine and philosophy, 2001;26 (5), pp457-78

³¹Karakatsanis KG. Brain death: Should it be reconsidered? Spinal Cord 2008; 46:396–401.

³²Karakatsanis KG, Tsanakas JN. A critique on the concept of 'brain death.' Issuesin Law & Medicine 2002; 18:127–41.



³³ Nair-Collins M. Death, brain death, and the limits of science: Why the whole-brain concept of death is a flawed public policy. 2010; The Journal of Law, Medicine, and Ethics38:667–83

³⁴Controversies in the determination of death, A White Paper of the President's Council on Bioethics

https://repository.library.georgetown.edu/bitstream/handl e/10822/559343/Controversies%20in%20the%20Determi nation%20of%20Death%20for%20the%20Web.pdf?sequ ence=1 (Accessed 17th Dec.2021)

³⁵Conference of Medical Royal Colleges and their Faculties in the UK. BMJ 1976; 2:31187-88

³⁶Conference of Medical Royal Colleges and their Faculties in the UK. BMJ 1979; 1:332

³⁷Criteria for the diagnosis of brain stem death. J Roy CollPhysns of London 1995; 29:381–82

³⁸Pallis C. "On the Brainstem Criterion of Death," in The Definition of Death: Contemporary Controversies, ed. S. J. Youngner, R. M. Arnold, and R. Schapiro (Baltimore: The Johns Hopkins University Press, 1999), 93-100.

³⁹Wijdicks EFM. The transatlantic divide over brain death determination and the debate, *Brain*. 2012; Volume 135, Issue 4, Pages 1321–1331

⁴⁰Roberts DJ, Mac Culloch KA, Versnick EJ, Hall RI. Should ancillary brain blood flow analyses play a larger role in the neurological determination of death? Can J Anaesth. 2010 Oct;57(10):927-35. doi: 10.1007/s12630-010-9359-4. Epub 2010 Aug 13. Erratum in: Can J Anaesth. 2016 Sep;63(9):1116. PMID: 20706879.

⁴¹Shewmon DA. Recovery from "brain death": a neurologist's apologia. Linacre Q. 1997 Feb;64(1):30-96. doi: 10.1080/20508549.1999.11878373. PMID: 11656743.

⁴²Hassler R. Basal ganglia systems regulating mental activity. Int J NeuroI12:53-72, 1977.

⁴³ Singer P. Is the sanctity of life ethic terminally ill? In Bioethics: An anthology, ed. Helga Kuhse and Peter Singer (Malden MA, Blackwell 200) 344-353, 347

⁴⁴Shah SK, Miller FG. Can we handle the truth? Legal fictions in the determination of death. Am J Law Med. 2010;36(4):540-85

⁴⁵ Marquis D. Death as a legal fiction. The American Journal of Bioethics, 14 no. 8(2014) 28-29

⁴⁶ Rich BA. Structuring conversations on the fact and fiction of brain death. The American Journal of Bioethics 14, no. 8 (2014): 31-33

⁴⁷Veatch RM. The whole-brain-oriented concept of death: an outmoded philosophical formulation. J Thanatol. 1975;3(1):13-30.

⁴⁸Laureys S. "Death, Unconsciousness and the Brain," Nat Rev Neurosci6, no. 11 2005; 904-05. Citations omitted.

⁴⁹Giacino JT, Fins JJ, Laureys S, Schif ND. Disorders of consciousness after acquired brain injury: the state of the science. Nat Rev Neurol. 2014;10(2):99–114.

⁵⁰Shewmon DA, Holmes GL: *Brainstem plasticity in congenitally decerebrate children*. [abstract] Brain &Devel 12(5):664,1990.

⁵¹Baskervill B. "Boy Born Without Brain Proves Doctors Wrong" Associated Press News July 13th, 1989, https://apnews.com/article/08099b98348a930469a232b9 250f1509 (Accessed 18th Dec. 2021)

⁵²Binding K, Hoche A: Die Freigabe der VernichtunglebensunwertenLebens. Ihr Mass und ihre Form. Leipzig, Meiner, 1920. [a scholarly translation by Walter E. Wright, edited by Patrick G. Derr, has been published under the title "Permitting the Destruction of Unworthy Life" in Issues Law Med 8(2):231-265, 1992.].

⁵³Morgan G, Morgan, V, Smith M. Donation of Organs for Transplantation: The Management of the Potential Organ Donor; a Manual for the Establishment of Local Guidelines. Intensive Care Society of the United Kingdom, 1999

⁵⁴Wetzel RC, et al. Hemodynamic responses in brain dead organ donor patients. Anesthesia and Analgesia 1985; 64:125–28

⁵⁵ Fitzgerald RD, Hieber C, Schweitzer E, Luo A, Oczenski W, Lackner FX.

Intraoperative catecholamine release in brain-dead organ donors is not suppressed by administrationof fentanyl. European Journal of Anaesthesiology. 2003;20(12), 952–956.



⁵⁶Grigg MM, Kelly MA, Celesia GG, Ghobrial MW, Ross ER. Electroencapalo-graphic activity after brain death. Archives of Neurology 1987;44: 948-54

⁵⁷ Machado C, Valdos P, Garcoa-Tigera J eta l. Brainstem auditory evoked potentials and brain death. Electroencephalography and Clinical neurophysiology 1991;80: 392-8

⁵⁸ Sasaki M, Sakamoto T, Yamashita M et al. Auditory evoked brainstem responses (ABRs) in brain dead status. No to Shinkei 1984;36: 917-24

⁵⁹Wijdicks EF, Pfeifer EA. Neuropathology of brain death in the modern transplant era. Neurology 2008; 70(15), 1234–1237

⁶⁰Boseley S. Transplant row over pain rule, Doctors call for anaesthetics for brainstem-dead donors. https://www.theguardian.com/uk/2000/aug/19/sarahbosel ey (Accessed 11the Dec. 2021)

⁶¹Haque, 2008; Birgit Krawietz, "Brain Death and Islamic Traditions: Shifting Borders of Life?" In Islamic Ethics of Life: Abortion, War, and Euthanasia, ed. Jonathan E. Brockopp: University of South Carolina Press, 2003. 194–213.

IOMS. 1985. Resolution. Majallat al-Majma (al-Fiqh al-Islami al-Duwali) 1985;3: 729–32.

⁶² Rashid R. What invalidates fasting related to body cavities

https://www.academia.edu/43158103/PART_2_WHAT_I NVALIDATES_FASTING_RELATED_TO_BODY_C AVITIES (Accessed 14th Dec. 2021)

⁶³A Romanian court has ruled that a man is dead, even though he's clearly alive – and the decision is final https://www.independent.co.uk/news/world/europe/roma nia-courts-constantin-reliu-vaslui-turkey-deported-deathcertificate-legal-system-latest-a8262196.html (Accessed 15th Dec. 2021)

⁶⁴ A Code of Practice for the Diagnosis and Confirmation of Death, Academy of Medical Royal Colleges 2008 https://aomrc.org.uk/wpcontent/uploads/2016/04/Code_P ractice_Confirmation_Diagnosis_Death_1008-4.pdf (Accessed 11the Dec. 2021)

⁶⁵Truog RD. Lessons from the Case of JahiMcMath, The Hastings Center Report, Dec. 2018

⁶⁶DeVita MA, Snyder JV. Development of the University of Pittsburgh Medical Center policy for the care of terminally ill patients who may become organ donors after death following the removal of life support. Kennedy Inst Ethics J. 1993;3(2):131–43.

⁶⁷<u>Thuong</u> M, <u>Ruiz</u> A, et al., New classification of donation after circulatory death donors definitions and terminology TransplInt 2016 Jul;29(7):749-59.

⁶⁸Boucek MMC, Mashburn C, Dunn SM, at al. Pediatric heart transplantation after declaration of cardiocirculatory death. The New England Journal of Medicine. 2008;359(7): 709-714

⁶⁹Joffe AR et al. (2011) Donation after cardiocirculatory death: a call for a moratorium pending full public disclosure and fully informed consent Philosophy, Ethics, and Humanities in Medicine. 2011; 6:17

⁷⁰Truog RD, Miller FG. Counterpoint: are donors after circulatory death really dead and does it matter? No and not really. Chest. 2010; 138:16-18

⁷¹Nair-Collins M, Miller FG. "Is Heart Transplantation after Circulatory Death Compatible with the Dead Donor Rule?" Journal of Medical Ethics. 2016;42, no. 5 319–20.

⁷²Bernat JL. "Point: Are Donors after Circulatory Death Really Dead, and Does It Matter? Yes, and yes," Chest. 2010;138, no. 1 13–16

⁷³ Brain Resuscitation Clinical Trial I Study Group: Steering Committee: Abramson NS, Safar P, Detre KM, Kelsey SF, Monroe J, Reinmuth O, Snyder JW. Neurologic recovery after cardiac arrest: effect of duration of ischemia. Crit Care Med. 1985;13(11):930–1.

⁷⁴ Brain Resuscitation Clinical Trial I Study Group. Randomized clinical study of thiopental loading in comatose survivors after cardiac arrest. N Engl J Med. 1989;314(7):397–403.

⁷⁵ Brain Resuscitation Clinical Trial II Study Group. A randomized clinical study of a calcium-entry blocker (lidoflazine) in the treatment of comatose survivors of cardiac arrest. N Engl J Med. 1991;324(18):1225–31.

⁷⁶Bernat JL, Capron AM, Bleck TP, Blosser S, Bratton SL, Childress JF, DeVita MA, et al. The circulatory-



respiratory determination of death in organ donation. Critical Care Medicine 2010; 38:963–70.

⁷⁷ The Quran 6:61 and 32:11

⁷⁸ The Bible, James 2:26

⁷⁹ The Quran 5:32

⁸⁰John Paul II, Pope: Address to the Pontifical Academy of Sciences Working Group on the Determination of Brain Death and its Relationship to Human Death, December 14, 1989. (Reprinted in L'Osservatore Romano, English version, January 8, 1990, p. 10; "Determining the moment when death occurs." Origins 19(32):523-525, 1990; "Determining the moment of death." The Pope Speaks 35(3):207-211, 1990.)

⁸¹ OCS Heart. https://www.transmedics.com/ocs-hcp-heart/ (Accessed 20th Nov. 2021)

⁸²Kompanje EJO, de Groote YJ. Sounding Board: Is mandatory recovery of organs for transplantation acceptable? Intensive Care Medicine 2015;41, no. 10 1836-1837

⁸³Joffe AR, et al. A survey of American neurologists about brain death: understanding the conceptual basis and diagnostic tests for brain death, Annals of Intensive Care. 2012 volume 2, Article number: 4

⁸⁴ John Paul II, Pope. 2000. Address to the 18th international congress of the Transplantation Society, August 29, 2000.

http://www.vatican.va/holy_father/john_paul_ii/speeches /2000/julsep/documents/hf_jpii_spe_20000829_transplan ts_en.html. (Accessed 20 Dec. 2021)

⁸⁵Shewmon DA. Mental disconnect: 'Physiological decapitation' as a heuristic for understanding 'brain death.' In The Signs of Life, eds. S. Sorondo and H. E. Marcelo, 2007;293–333. Vatican City: Pontifical Academy of Sciences.

⁸⁶ Indian Fiqh Academy at the 16th Fiqhi Seminar, 2007; Muhazzabpur, Azamgarh

⁸⁷Verheijde JL, Potts M. Commentary on the concept of brain death within the Catholic bioethical framework. Christian Bioethics. 2010; 16:246–56.

⁸⁸ Editorial. Religion, organ transplantation, and the definition of death. The Lancet 2011; 377:271.

⁸⁹ NHS Blood and Transplant Organ Donation and Transplantation data for Black, Asian and Minority Ethnic (BAME) communities, Report for 2018/2019 (Accessed 1st Dec. 2021)

https://nhsbtdbe.blob.core.windows.net/umbraco-assetscorp/17496/organ-donation-and-transplantation-bameactivity-report-2018-2019.pdf (Accessed 10the Dec. 2021)

⁹⁰Ali M, Maravia U. Seven Faces of a Fatwa: Organ Transplantation and Islam. *Religions*. 2020;11(2):99.

⁹¹Woien S, Rady MY, Verheijde JL, McGregor J. Organ procurement organizations Internet enrolment for organ donation: abandoning informed consent. BMC Med Ethics. 2006 Dec 22;7: E14.

⁹² Legal Battle in Ohio Over Organ Donation Highlights Controversy Over Defining Death, 2013; http://globalbioethics.org/gbi_old/news-articles-andpublic-addresses/news/legal-battle-in-ohio-over-organdonation-highlights-controversy-over-defining-death/ (Accessed 11the Dec. 2021)

⁹³ Nair-Collins, M. (2015). Clinical and ethical perspectives on brain death. Medicolegal and Bioethics,
69. https://doi.org/10.2147/MB.S70369 (Accessed 11th Dec. 2021)

⁹⁴Weisemann C. Bioethics in Cultural Contexts, 2006, Volume 28, Springer, New York. Rehmann-Sutter, M. Düwell, D. Mieth (Eds.): Chapter 13, 187-196, The Contribution of Medical History to Medical Ethics: The case of brain death.

⁹⁵Lewis A, Bonnie RJ, Pope T. It's Time to Revise the Uniform Determination of Death Act. Ann Intern Med. 2020; Jul 7;173(1):75-76.

⁹⁶ Miller FG, Troug RD, Brock DW. The Dead Donor Rule: Can It Withstand Critical Scrutiny? Journal of Medicine and Philosophy, 2010;299–312.

⁹⁷ Veatch RM. Abandon the dead donor rule or change the definition of death? Kennedy Institute of Ethics Journal 2004;14 (3):261-276.

⁹⁸Rodríguez-Arias D, Smith MJ, Lazar NM. Donation After Circulatory Death: Burying the Dead Donor



Rule, The American Journal of Bioethics, 2011;11:8, 36-43.

⁹⁹Troug RD. Is it time to Abandon Brain Death? Hastings Center Report, 1997;27 no. 1 29-37.

¹⁰⁰Bernat JL. The whole-brain concept of death remains optimum public policyJ Law Med Ethic Spring 2006;34(1):35-43, 3.

¹⁰¹ Seifert J. Is "brain death" actually death? Monist 1993; 76:175–202.

¹⁰² Potts M, Byrne PA, Nilges RG. Beyond Brain Death: The Case Against Brain Based Criteria for Human Death.2000 Dordrecht: Kluwer Academic Publishers.

¹⁰³Joffe AR. Are recent defenses of the brain death concept adequate? Bioethics 2010; 24:47–53.

¹⁰⁴Shewmon DA. Constructing the death elephant: A synthetic paradigm shift for the definition, criteria, and tests for death. Journal of Medicine and Philosophy 2010; 35:256–98.

¹⁰⁵Soifer BE, Gelb AW. 1989. The multiple organ donor: Identification and management. Annals of Internal Medicine 110, no. 10: 814–23.

¹⁰⁶Korein J. "The Problem of Brain Death: Development and History," Ann NY AcadSci 315 (1978): 19-38.

¹⁰⁷Bernat, JL. Comment: Is international consensus on brain death achievable? Neurology, 2015;84(18), 1878.