MEDICAL AND ETHICAL DILEMMA IN BRAIN DEATH

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MEDICAL AND ETHICAL DILEMMA IN BRAIN DEATH (Abstract): For centuries, death has been defined, medically speaking, as the irreversible cessation of breathing and of nervous and cardiac activity. What radically changed this definition was the introduction of the concept “brain death” in 1968, by the”Ad Hoc Committee of the Harvard Medical School”. According to it, the irreversible coma was associated with brain death and considered to be a criterion for the diagnosis of the deceased individual. The evergrowing need for transplant organs (provided this respects the dead honor rule, stipulating that organs can’t be harvested unless someone is deceased) lead to making arbitrary decisions regarding the establishment of the exact time of death during the process of „losing life”. What actually triggers the controversy related to the concept of brain death is the dilemma of associating this concept with that of biologic death or death of the person, the difference between the two being made by whether the mental characteristics are accepted or not in defining and individualizing the death of the human being. Given these circumstances, a dilemma appears- that of defining the death of the individual: we define death, as it has been for centuries, as the moment when the cardio-respiratory function no longer exists, which leads to the loss of tens of thousands of lives that might have been saved through transplant. Yet, this may lead to manipulating the border between life and death, with the risk of trespassing each individual’s right to life.

Key words: BRAIN DEATH, ETHICS, IDENTITY.

Defining the death of a human being in a unitary and generally valid way is as relative and difficult as defining life itself, for the former depends directly on the latter, both relating to a sum of multiple, various ways of manifestation. Death is taken into account in terms of ways of seeing the world, or the individual, and it is reflected and conditioned by social organization, tradition, religion and so on.

Defining death also depends on the value system specific to each field of activity, the medical definition itself being influenced by philosophy, theology, scientific discovery and not to forget, political and social priorities, etc.

From a philosophical perspective, defining death depends on the one providing the definition. According to Hegel, the main figure of idealism during the 19th century philosophy, “death is the triumph of species over individual, thus underlining the benefits of the individual disappearance on the progress of the entire mankind” (1).

Epicurus stated that “…Death is nothing for us, for when we exist, it doesn’t, and
when it comes up, we no longer exist. The whole of good or evil is given by sensations, and death is the very absence of such.” This materialistic approach is based on the assumption that death is a spontaneous ending of our sensuous experience and, thus, a form of non-existence. Therefore the matter is not of transition, but simply an abrupt ending (2).

Camus, an important name for existentialism, asserts that every man is free to give meaning to his own death, an idea set on the borderline between idealism and materialism. Although hesitating to answer fundamental questions regarding the clash between life and anything that might come after, such a thesis emphasizes the very act of dying, a gesture that becomes fundamentally important in the man’s interior and individual search (1, 3).

According to the Orthodox Church, death is, first of all, a spiritual phenomenon that stands for the primordial dismissal, the man’s separation from Life, therefore God himself, as a result of disobedience. Physical death is the derived effect of spiritual death and it involves the separation of the soul from the body, the first step to going back to the Fountain of Life. This is why the patristic tradition calls the dissolution of the body “God’s benefaction towards man, so that evil will not linger forever after” (4, 5).

Legally speaking, death is associated with the suspension of the individual’s civil status, thus making him no longer be a subject to law.

Relating to physiological mechanisms, life represents the sum of the physical, chemical and mechanic actions through which the body accomplishes its functions: metabolism, reproduction, excitability. On this background, death may be seen as a process that brings these functions to an end, as a consequence of complete and definitive disappearance of input, transportation and use of oxygen at cell level (6).

Anthropologists define human life as a sum of three levels, interconnected and hierarchically placed: organic/physiologic, psychic and social. The life of the organism is based on the integration and coordination of body functions necessary to maintain the organism as a whole. Psychic life depends on the physiologic one and, in the case of the adult, conscious man; it contributes to the perception, integration and reaction of the individual. Social life definitely requires for the previous two levels, and it represents the person’s integration and status. Given this definition, one must sense the difference between the death of the biological organism and that of the person, the latter being the cessation of all three levels, the climax of which is the social life, places at the top of the hierarchy (7, 8).

THE CONCEPT OF BRAIN DEATH

If so far as the last few decades, death was the interruption of all three levels of life, the development of medical technology allowed that physiologic life to be maintained in situations where the psychic and social levels no longer exist. Still, there remains the question of life and death coexisting within the same body. If we are to speak only physiologically and to analyze death as a process generally known by means of the phrase “the cells are born together and die separately”, then the answer is affirmative. Purely from a biological point of view, the individual’s death is defined as disintegration of the body as a whole, but after its moment, certain organs and systems may still keep traces of life for different periods of time, depending on how long they can survive without oxygen.
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(for instance, the nervous cell dies within the first 3-5 minutes, whereas hair and nails may still keep a lively aspect for days) (9). Practically, however, medicine’s technical possibility to maintain the cardiac and respiratory functions—thus to insure the physiological level, despite the brain’s stopping its activity, and leading to an impossible social life—widely opened the door to new dilemmas that continue to be active topics for debates. The starting point was the necessity to find a new way of defining death, adequate for the remarkable progress in medicine. It is due to this progress that in some cases the traditional criterion of defining death, which is the cessation of heart and respiratory activity, has become inadequate and impractical. Suddenly, the medical world finds itself caught in its own virtuousness (10). The way out, not completely though, seems to be the introduction of the term brain death. Ever since this moment, in 1968, the concept of brain death triggered a multitude of medical, ethical, judicial and social problems. The fact that its introduction lead to such controversy on all aspects for over 40 years shows that a unique answer and solution are mere illusions (11).

As well as the attempt to solve the issue of defining death on the new background created by the progress in the reanimation field, the concept of brain death came up just in time to allow harvesting for transplant organs. The connection between the two events is more than obvious (12).

Were we to follow the temporary evolution of organ transplant and defining brain death, it would be clear that their development was parallel, as a consequence of progress in science and medical technology, but without any mutual conditioning. It was only in the ‘60s, when the first successful transplants are performed, using organs from dead donors, that the connection between the two is noticed (13).

The introduction of the brain death concept one year after the first successful heart transplant was considered by some authors to be the identification of a utilitarian solution meant to solve a problem both medical and social that was becoming ever more acute—the reduced number of transplant organs. However, this approach carried the risk of attempting for a definition of death according to necessity and not to scientific truth. Furthermore, there was the risk of transforming patients in a state of brain death into sheer instruments for reaching other people’s targets.

Initially, brain death was the equivalent of the death of the entire brain. Subsequently, some authors affirmed that the death of the brain stem equals brain death since it involves the disappearance of the integrative functions (respiration, cardiac activity), in which case the cortical activity is no longer sustainable. As a consequence of the organ crisis, the notion of imminent cerebral death is introduced, in which are included those who do not meet all the criteria for brain death (13, 14).

Imminent brain death is characterized by complete loss of cortical functions and progressive weakness of brain stem functions. It is considered that they represent potential organ donors, for they are in a state of profound coma, as a consequence of massive and irreversible cerebral lesions of unknown origin; they depend on mechanical ventilation and have at least 3 abol-

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1 The concept of Cerebral Death was elaborated in 1968 by the Ad Hoc Committee of the Harvard Medical School. The criteria offered by this committee were three clinical signs: absence of visible reaction to external stimuli, absence of breathing and of spontaneous muscular movement for at least 1h, absence of reflexes (pupil, cornea, etc) and a paraclinical sign: the flat EEG line for at least 10 minutes.
ished brain stem reflexes (15). Each of these concepts was supported by some researchers and fought by others with more or less relevant arguments.

**BRAIN DEATH - THE CONTROVERSY CONTINUES...**

Those who support the concept of whole brain death consider the brain to be the integrative unity of the organism. Its death will shortly lead to the disintegration of the human body as a whole and to the inevitable settling of death. This argument implies that heart failure is inevitable and that it happens soon after the ending of brain activity. Despite all this, in the case of some brain dead patients, a part of the integrative functions are kept (i.e. some automatic movements due to medullar reflexes).

In this context, the brain is simply a modulator, and not the central integration unity. Also, the patients with high cervical lesions have the same lack of integrative unity and yet they are not declared deceased. All the more so, brain death doesn’t actually stand for the death of the entire brain, since research has shown that some brain dead patients recorded maintained functionality of certain brain areas, such as the secretion of antidiuretic hormone. Those who support the concept of brain death do not deny this reality, but demonstrate that the areas still functional are not essential for carrying out the brain’s integrative functions (13).

The assumption that heart failure is unavoidable soon after brain death contradicts clinical experience, as there have been cases when spontaneous heart blocking in brain dead patients occurred no sooner than days or weeks after the end of cerebral activity (16).

The ones supporting the concept of brain stem death start from the idea that death is the irreversible loss of consciousness and of the capacity to breathe, shortly followed by the cessation of spontaneous heart beats.

Showman attacks this concept, claiming that the anatomic substrate necessary to express consciousness is maintained in the case of patients with massive, irreversible lesions of the brain stem, but with the integrity of brain hemispheres. Anatomic integrity is an argument for maintaining the brain functions; therefore one cannot have the certainty of lack of consciousness. In order to support this argument and to contradict the identification of the brain stem death with the death of the organism, there are patients in a vegetative state, with loss of consciousness, and patients with high cervical lesions, lacking the ability to spontaneously breathe; however, neither the former nor the latter are considered deceased (15, 17).

Higher brain death represents the irreversible loss of consciousness, considered to be the major attribute of human life. It is associated with the notion of imminent brain death, defined as the total loss of cortical functions, coming from the progressive weakness of the brain stem functions. In order to measure the degree brain affection, the FOUR (Full Outline of UnResponsiveness) score is used; it is calculated based on eye movement responsive to stimuli, motor response, brain stem reflexes and spontaneous breathing. Those who stand against this concept show that imminence is not similar to the event per se, and thus, the vegetative patients are not considered deceased, although they suffer from loss of consciousness (18, 19).

Out of all these concepts that came to be as a consequence of the need to identify the optimum moment for harvesting viable
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organs for transplant, only the one of whole brain death is accepted in most countries; it is considered that just the patients with both the brain stem and the cerebral hemispheres destroyed are actually in a state of brain death and can thus be declared dead.

Despite all this, from a physiological point of view death is a process that cannot be reduced to one moment only. Thinking of death as a progressive process, between the emergence of brain death and the ending of all functions with the loss of the integrity of organs, we can at the most appreciate how far a certain moment is compared to the beginning or the ending of this process (20).

Referring to this aspect, Shewmon even builds a parallel from the point of view of life and the individual’s identity; one between the period of time stretching from brain death and organism death and the time covered by the fetus from the moment of conceiving until birth (15).

Vital functions do not all collapse at the same moment, since in ICU (intensive care unit) some of them can be artificially maintained as a result of the development of resuscitation techniques and also that of life support. This is what makes the outline of clear and valid criteria for declaring the time of death very difficult.

The increasing need for transplant organs on the one hand, and the possibility of harvesting organs exclusively from deceased-declared persons, on the other hand, have forcefully lead to making arbitrary decisions regarding the setting of the exact time of death along the process of “losing life”.

Seeing death as a process, harvesting organs from people in stages preceding death (but before all the criteria for its diagnosis are met) is one of the key elements of the ethical debate concerning the establishment of the exact time of death. It thus becomes essential to protect the person that is still alive, for the harvesting vital organs actually represents the moment of death (21).

In terms of these medical concepts and ethical principles, two polar opinions have been structured. On the one hand, cerebral death is seen as an artificially created term, requested by the increasing need for transplant organs; this term cannot be fully identified with the death of the individual. On the other hand, the artificial support of the respiratory and cardio-circulatory functions for a limited period of time in the case of a patient diagnosed with cerebral death does not mean his survival, but merely creating the conditions necessary for the harvesting of transplant organs from a corpse (5, 22).

This controversy has been lasting for over 40 years, in which time some of those who advocate for one of the opinions (for instance, Shewmon initially defended the central role of the brain and later on changed his position to that of considering the clinical signs of cerebral death as potential effects of serious lesions, including medullar shock). All these lead to yet another argument for the fact that there is no unique answer to this matter.

However, society holds its reserves in considering someone in a state of brain death as actually dead, mainly because of the light this casts upon the clear definition of death (22). Were we to consider organ transplant, ceasing the medical care of someone considered dead might lead to the impossibility of harvesting certain organs such as the heart, which might cause prejudice to potential receivers and deprive them of a surviving chance. This approach also has implications from the point of view of human dignity (at least for what it was, if not for what it is at that precise moment!).
given that the patient in the state of cerebral death is declared dead, whereas his body is still kept alive, deprived both of the rights of a living person and those of a deceased. The artificial support of vital functions is obtained by means of aggressive treatments aiming exclusively at preserving the organs to be transplanted to another person/other people. The one who actually benefits this medical maneuver is not the one in the state of brain death, with no chance of surviving, but the one who might receive his organs. In this case, we might consider the idea of an abuse or of exploitation of a defenseless body to the benefit of another individual.

Art. 3 from the universal declaration of human rights guarantee each human being the right to life; in the case of euthanasia we can even speak of a human right to death. What can be appealed to in the case of a neither dead nor alive human? Does a cerebrally dead still have the right to an identity? (23).

Taking into account the fact that brain death and somatic death may occur in different moments in the case of the same patient and the fact that between the end of cardio-respiratory activity and that of cerebral activity there may be a period varying from hours to days, it is essential to accurately decide when the person can be declared dead, with all the ensuing consequences.

In Romania, judicially speaking, death is defined in the 95/2006 Act referring to health reform, where the matter of organ transplant is mentioned and brought under regulation. In title VI chap. II regarding “Donation and donor of organs, tissues and human cells”, art 147, align. 1, the deceased donor is defined as the person that was found to have ceased cardio-respiratory activity, nonresuscitable and irreversible (somatic death), and in align. 2 of the same article, the deceased donor with cardiac activity is defined as the person that was observed to have irreversible cessation of all brain functions (brain death) (24).

It is thus decided that organs may be harvested both from those in a state of brain death and from the ones with nonresuscitable and irreversible cardio-respiratory cessation, as they are declared dead.

In the light of these aspects, we can conclude that both medically and legally, brain death is considered to be a person’s time of death. This conclusion influences all the judicial consequences as to the ending point in the civil capacity (25).

Another issue rising from the acceptance of brain death as the end of someone’s life is identity. Personal identity was defined keeping in mind two aspects: physical continuity (same body, same brain) and psychological continuity (same memories, same character). J. Locke says that the second perspective is necessary, considering memory and consciousness to be definitive for man, and Bernard Williams claims that body identity is a condition necessary for the idea of identity. The moral argument may lead only to the human being dignity that needs to be respected and that should be protected by the right to identity. Once the individual has lost the functions that define a human being - feelings, consciousness, memory etc- it is only moral to have his dignity respected, if not for what he is at the very moment, at least for what he was all his life (25).

CONCLUSIONS
Making the difference between the death of a person (also at a mental and social level) and the death of the biological
body may lead to a different interpretation concerning the definition of death and therefore of the moment it is generated, according to the criteria is uses. The concept of cerebral death keeps triggering controversy, despite the fact that in the case of the traditional definition of death, as the irreversible cessation of the cardio-respiratory activity, establishing the time of death raises no medical, ethical or legal issues. Medically speaking, the biological organism is still alive as long as the heart continues to beat, conditioned, however, by artificial respiration. Nonetheless, according to the definition of the human being from a legal and ethical perspective, a person is declared deceased when all the levels definitive of his or her life no longer exist. In these situations, it is also impossible to preserve the biological level unless the essential biological functions are artificially supported. The controversy of brain death actually springs from the identification of this concept with that of biological death of the person; what differentiates the two is made by whether the mental features in the definition and individualization of the human life and death are accepted or not.

Regardless of which of the two opinions we advocate, we are facing a dilemma, for they are two indisputable facts: on the one hand, organ transplant helps save lives, and on the other no one can be killed and neither can his death be rushed by or for harvesting organs. All this considered, we return to the dilemma of defining the death of the individual: we define death, as it has been done for hundreds of years, as the moment of cessation of cardio-respiratory function, which will lead to the loss of many lives that might be saved by transplant or we go on manipulating the borderline between life and death, with the risk of defying the right to life.

ACCREDITATION

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REFERENCES


**NEWS**

**CEDRUS DEODARA NEEDLES – ANTIBACTERIAL ACTIVITY AGAINST FOOD-BORNE BACTERIA**

*Cedrus deodara*, also known as Himalayan cedar, has been widely used as food and drug in China. The needles have nutritional value due to a high content in proteins, vitamins and minerals. This study reports the antibacterial activity of a water-soluble extract from needles on five food-borne bacteria (*Escherichia coli, Proteus vulgaris, Staphylococcus aureus, Bacillus subtilis, Bacillus cereus*). The extract showed a potent antibacterial activity with minimum inhibitory concentrations (MICs) from 0.78 to 12.5 mg/ml; the minimum bactericidal concentrations (MBCs) were in the range of 1.56-25 mg/ml. The mechanism of action was investigated by transmission electron microscope; changes of external morphological features of *Staphylococcus aureus* (broken cell walls and membranes, release of cytoplasm) were revealed. The main constituent in the extract, shikimic acid, was isolated and was found to be responsible for the antibacterial activity of the extract. Taken together, these results suggest that *Cedrus deodara* needles are an important source of natural antibacterial agents with potential uses in both food and pharmaceutical industry. (Zeng W-C, He Q, Sun Q, Zhong K, Gao H. Antibacterial activity of water-soluble extract from pine needles of *Cedrus deodara*. *Int J Food Microbiol* 2012; 153: 78-84).

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