

## MOMENT OF DEATH

Encyclopedia Halachit

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### A. DEFINITION OF THE TERM

Death is the irreversible end of life. Biologically, death is a progressive process in which various cells, tissues and organs die at different times depending on their sensitivity to the absence of oxygen and energy sources.

The determination of the exact moment of death in an individual person depends on the social-philosophical-legal and religious acceptance of specific criteria, even if some cells or parts in the body are still biologically alive.

A number of different definitions of the moment of death include the following:

- The death of all body cells (biological death).
- Absolute and irreversible cessation of all cardiac, circulatory and respiratory activities and functions (cardiopulmonary death).
- Total and irreversible cessation of all brain activities including the brainstem (brain death).
- Other definitions of death include total irreversible loss of upper brain function, brain absence as in anencephalics, and persistent irreversible coma, but these definitions are not accepted anywhere in the world.

The determination of the exact moment of death is needed for many reasons in Jewish law, such as laws of marriages, remarriage and levirate marriage; laws of inheritance; laws of

murder; laws of ritual defilement; Sabbath laws; medical needs including the termination of medical interventions, burial and organ transplantation.

## B. HISTORICAL BACKGROUND

Throughout the centuries and in all civilizations, there was a consensus that death occurred when both breathing and heartbeat ceased (1). In the eighteenth century, a great debate occurred throughout Europe concerning the determination of death and immediate burial of the deceased. In 1772, the Duke of Mecklenburg issued a decree prohibiting immediate burial and requiring a three day wait after the establishment of cardiopulmonary death by physicians before burial could occur. The signs of death required by this decree were the appearance of livedo reticularis and the putrefaction of the flesh (2). The goal was to prevent the burial of live people, in view of the occasional error by physicians in declaring the absence of respiration and heartbeat to be irreversible. Concerns about such errors were so widespread that it was customary in those days to bury the dead in specially built coffins which allowed air to enter and contained bells which could be heard above ground if the buried person was still alive (3).

The Duke's decree caused a heated debate among the rabbinic authorities of that era. The reformers who headed the *Haskalah* (Enlightenment) movement, such as Moses Mendelsohn, supported the decree (4). Some physicians also supported the decree in view of the imprecise nature of the signs of death except for livedo reticularis. The great rabbinic decisors of that time, such as Rabbi Jacob Ben-Zvi Emden, known as *Yavetz*, argued strongly against the Duke's decree, rejecting all the reform rabbinic rationalizations and justifications and demanding that

Jewish deceased be buried shortly after doctors determine their death, in order to avoid the prohibition against leaving bodies unburied overnight (5).

The Duke's decree, however, was adopted as law in many lands, thereby prohibiting burial on the day of death. The law was accepted *de facto* even among the Jews. The topic arose again during the era of Rabbi Moshe Sofer, known as *Chatam Sofer*, who wrote:

“it appears to me that in the land of the Kaiser, they became accustomed by royal decrees to delay burial of the dead so that [Jewish law in this regard] was forgotten until they thought the matter to be halakhically correct” (6).

*Chatam Sofer* retaught the basic Jewish laws relating to the establishment of death. He ruled that the dead should be buried shortly after death is established by accepted clinical criteria.

In previous generations, in the absence of resuscitative technology, there was practically no difference in time between the cessation of cardiac and respiratory activities, i.e., heartbeat and breathing. Both occurred within a few minutes of each other with the inability of doctors to change the outcome. Recent advances in medical knowledge and technology have created two new realities relating to the definition of the moment of death:

- Cardiopulmonary resuscitative techniques can now artificially prolong respiration for extended periods, thus also prolonging cardiac activity. This technique, therefore, allows wide separation of the time when spontaneous respiration stops and when the heartbeat ceases
- Advances in surgical techniques and increases in medical knowledge permit organ transplantation. The latter necessitated a new definition of the moment of death.

During the 1960s, the term brain death began to be discussed. This term refers to the irreversible cessation of all brain functions including spontaneous respiration while cardiac function and blood circulation remain intact (7). A group of scholars from Harvard University in the United States first established medical criteria for brain death in 1968 (8). At the end of the 1960s, various national and international organizations accepted brain death as death. These include the World Health Organization (WHO), the World Medical Association and many other European and American groups. During the first few years of the basic formulation of brain death, more than thirty different measurements and tests were put forward to confirm the diagnosis of brain death (9). Since then there has been nearly universal acceptance of the concept of brain death in the West (10). At first the clinical and laboratory criteria to establish brain death were used only for adults and children over five years of age (11). In 1987, criteria were adopted, which were summarized by various scientific and legal organizations in the United States, for the establishment of brain death in younger children (12).

Most countries in the world (13) and most physicians and philosophers accept brain death as death, both socially and legally. In the state of New Jersey religious objections to the definition of brain death are legally recognized (14). There are, however, groups who still oppose brain death as a definition of death, for various reasons:

- The Japanese consider brain death before cardiac standstill to be an unnatural premature definition of death which interferes with their cultural rites surrounding death (15).
- In India and China, certain religious groups oppose the concept of brain death (16).
- Some American Indian groups also oppose brain death for religious and cultural reasons (17).

- Denmark is the only Western country whose Ethics Board advised against adopting the brain death definition of death because of the emotional perception that a person whose heart is still beating is alive (18), but they nevertheless permit organ harvesting from brain-dead persons.
- A few Western philosophers and physicians also do not accept brain death but require cessation of the heartbeat (19).

In **Jewish law**, the matter is in dispute among rabbinic authorities. A rather stormy controversy among orthodox Jewry in Israel and in the United States is still ongoing. Many national and international conferences have been held to discuss this topic. Many essays and treatises and several books have been written on brain death in Jewish law. The dispute has gone beyond an academic rabbinic-halakhic disagreement in that personal and political considerations seem to have exacerbated the controversy.

### C. SCIENTIFIC BACKGROUND

**Cardiac death** is the determination of the moment of death as that time when both spontaneous respiration and heartbeat cease. It is established by listening for breath sounds and heart sounds, by examining the peripheral pulses, measuring the blood pressure, and taking an electrocardiogram (ECG). Opinions differ as to how long all these signs should be absent before one can definitely state that a person is dead.

The heart has its own independent pacemaker. Therefore, under certain circumstances where there is sufficient oxygen, blood flow and nutrients for the heart, its internal auto-

rhythmicity may allow it to continue beating even without any influence from the brain or nervous system. This auto-rhythmicity of the heart can continue for minutes, hours, days, and even weeks, even outside the body, if one places the heart in a laboratory vessel with appropriate conditions of oxygenation, perfusion and nutrient supply. Therefore, the heart can continue to beat even when brain function and spontaneous respiration have completely ceased as long as the heart is properly perfused and oxygenated.

**Brain death**, which represents the irreversible cessation of brain and respiratory functions is established by the series of tests described in Appendix I.

The common causes of brain death include serious head trauma, massive intracranial bleeding, brain injury due to insufficient oxygen or blood circulation to the brain, malignant brain tumors, serious metabolic disturbances, and vital organ failure. In large medical centers, 25 to 30 brain dead cases occur annually (20).

Brain death requires the total and absolute irreversible cessation of all brain functions including the brainstem. Thus, for this determination one must satisfy the following:

- identify the cause for the irreversible brain damage
- rule out potentially reversible causes such as serious metabolic or hormonal dysfunctions, and various poisonings
- perform all the confirmatory tests at normal body temperature (20)

Brain death requires the following clinical manifestations:

- coma or total lack of response to the environment including painful stimuli
- absolute absence of brainstem reflexes
- absolute absence of spontaneous respiration (apnea)

Over the years the tests to establish brain death have improved so that nowadays they are extremely reliable for adults and children over 5 years of age.

Differences of opinion exist among specialists about how best to determine brain death in infants and young children (21).

The **lungs** are responsible for the exchange of vital gases, for the entry of oxygen during inspiration and the expulsion of carbon dioxide during expiration. Respiration differs from the beating of the heart in that respiration is totally dependent on the respiratory center in the brainstem. Nervous connections from the brain control the chest muscles and the diaphragm which rhythmically expand and contract the lungs thus producing inspiration and expiration, respectively. Therefore, cessation of spontaneous respiration is the inevitable result of irreversible damage to the respiratory center in the brainstem.

A direct connection exists between the brainstem and respiration, but there is no such connection between the brainstem and the heartbeat. Cessation of the heartbeat causes cessation of oxygen and blood flow to the brain with resultant death of the brain. The brain can also die if other vital organs such as the liver or kidneys fail, in that certain toxins normally detoxified by the liver or kidneys poison the brain cells. In this respect there is no difference between the heart and other vital organs. If they cease to function, the brain dies, albeit at a different rate.

The medical definition of brain death is the complete and irreversible cessation of all brain functions including the brainstem. Nowadays, it is generally accepted that both upper brain (i.e., cerebral) death and brainstem death are required for the establishment of brain death. However, the definition does not require absence of peripheral nerve functioning. Thus, the presence of peripheral nerve function or peripheral reflexes in the extremities do not negate the diagnosis of brain death. Similarly, there is no requirement that all neuroendocrine and

integrative functions such as those originating in the hypothalamus (22) be totally nonfunctioning. On the other hand, any person who is still able to breathe spontaneously is alive. Therefore, patients in a persistent vegetative state (PVS), anencephalic newborns, patients with severe dementia or other serious brain disease, are not considered or defined as being dead.

There is, however, a school of thought which is quite articulate and may be growing, that is supporting cerebral death as adequate for a determination of death (23). They argue that sentience determines personhood, humanity and life. This radical change in thinking would consider as dead individuals in the permanent vegetative state and anencephalic babies. Thus far this definition has not been adopted by any official body, to our knowledge.

In most people diagnosed as brain dead, the heart stops beating in a few hours or at most a few days in spite of respiratory support. Rare cases have been described where the heart continued to beat for a number of months (24).

Cardiac death can be determined in any patient under all circumstances. By contrast, brain death is only determined on patients who are connected to artificial respirators. In the absence of such a respirator, and without spontaneous respiration on the part of the patient, the heart would stop and die in a matter of minutes.

#### **D. CLASSIC JEWISH SOURCES**

There are numerous references to death in the Bible, but there is **no definition** of the **moment** of death. Many rabbinic and talmudic references to death relate to the laws of the Sabbath, the laws of ritual defilement by corpse contact, the laws of the beheaded heifer (*eglah arufah*), the laws of



the deserted wife (*agunah*), and the laws of the terminally ill (*goses*). All these are exceptional circumstances. There is no clear definition, however, of death for normal and routine death.

In general, rabbinic authorities agree that the moment of death is determined during the process of death and is not identical to the biological death of all of the organs, tissues and cells of the body (25).

For the Jewish legal definition of death, a number of prerequisites exist:

- The activity of the organ whose ceased function defines the moment of death must have done so absolutely and irreversibly
- The person resembles a corpse and does not move any limb (26)
- The person is unconscious and has no cognition (27).

Some Rabbis do not require the absolute death of an organ or organism to define death but only the absolute and irreversible loss of activity or function of that organ or organism. Others rule that the entire critical organ, and not only the function, must be completely destroyed anatomically.

There follow a number of the key talmudic sources upon which the rabbinic literature relating to the definition of death is based:

If a building collapses on the Sabbath and someone may be trapped in the rubble, one must desecrate the Sabbath, if necessary, to try to save the victim. If one finds him alive, one extricates him and tries to save his life. If he is found dead, one leaves him there until after the Sabbath. How far does one dig to determine whether the victim is dead or alive? Up to the nose! An additional

view is up to the heart. The main sign of life is in the nose as it is written (28),  
*all in whose nostrils was the breath of the spirit of life* (29).

This is the pivotal talmudic passage upon which all the rabbinic decisors base their discussion of the definition of death.

The talmudic Sage who rules "up to the nose" is interpreted to mean that if one finds no spontaneous respiration at the nose, the patient is certainly dead (30) because if there is no life at the nose in that no air (literally: spirit) emanates from there, he is certainly dead (31). According to this view, a person is considered dead when it is clearly evident that he is not breathing at all and therefore one may no longer desecrate the Sabbath on his behalf to extricate "a corpse".

The other talmudic view is that one examines the victim "up to the heart" to establish death (32). The Jerusalem Talmud (33) and many of the early rabbinic decisors (34) substitute the word 'navel' for 'heart', perhaps referring to abdominal respiratory effort.

There is an argument among the Rabbis concerning the opinion that death is determined by examining the nose:

- Some Rabbis assert that the sign of respiration is only one of the signs of life and must be combined with other signs such as the heartbeat (35). According to this view, death occurs when respiration, heartbeat and peripheral pulses are all absent (36).
- Some Rabbis opine that respiration is the main sign of life; however, if signs of life in other organs exist, then the absence of respiration is insufficient by itself to establish death (37).
- Other Rabbis assert that respiration is the only real sign of life and its irreversible absence indicates death. The Talmud derives it from a biblical verse -- "*All in whose nostrils is the breath of the spirit of life*" (38) thus demonstrating that respiration is "the sign" and not just a

technicality. In this view, the talmudic Sages only argue about how best to determine absence of respiration -- at the nose or at the navel where diaphragmatic movement can be observed (39).

According to this view, even the Sage who says that one examines the heart also rules that absence of respiration is the key sign of death but can best be determined at the heart. This is based on the ancient understanding that the heart receives pneuma from the lungs and delivers it to the brain via the blood vessels. It was accepted that air and not blood flows through the heart and blood vessels so that they were considered parts of the respiratory system (40). The heart's importance is due to the fact that it pumps "pneuma" to the lung, not because it pumps blood to the organs. Such was the understanding of the ancients concerning the function of the heart (41). Thus, examining the nose, navel or heart all relate to the establishment of the presence or absence of respiration. This view also posits that the absence of the function of life (i.e., respiration) and not that of a single organ determines death. The nose itself is only the indicator as are the heart, the navel or the absence of the vital function of respiration.

Although the talmudic discussion of death concerns the rare case of a collapsed building, it serves as the fundamental text for all rabbinic rulings on this matter, including 'routine' death (42).

The final ruling in the Codes of Jewish law is that the nose test is the determinant of death (43) since the absolute and irreversible absence of respiration establishes death (44).

Another talmudic sources upon which the rabbinic literature relating to the definition of death is based upon is the following:

A person does not convey ritual uncleanness until his soul departs, even if he has severed arteries. Even a patient in his last agonies is obligated to fulfill the

law of levirate marriage. People who are beheaded, however, convey uncleanness as corpses even if they are still moving convulsively. The latter is considered only post-mortem reflex action like the severed tail of a lizard which moves convulsively (45). So, too, someone with a broken neck with most of it severed or whose back is ripped open like a fish or someone who is decapitated or whose body is cut in half at the abdomen, conveys ritual uncleanness even if one or more organs or limbs are still shaking (46).

Some Rabbis conclude from this source that any person close to death lacking cognition and who cannot survive is defined as dead (47).

Other Rabbis require full decapitation, in which case the body is no longer connected to the brain, and convulsive movements of the body are meaningless and do not indicate the presence of life. Only when the body is intact does movement indicate life (48). Decapitation alone is not, in and of itself, a sign of death but a Jewish legal situation in which the patient is considered as a corpse in that he conveys ritual defilement to anyone who touches the corpse (49).

By contrast, some Rabbis rule that decapitation is an absolute definition of death because of the absolute and irreversible destruction of the brain. Thus, any patient who has absolute and irreversible destruction of the brain, even if he is not decapitated, is defined as dead or “physiologically decapitated” (50). Thus, even if the heart is still beating, such a patient is considered dead in Jewish law (51). Furthermore, a patient need not always be “inanimate like a stone” to be considered dead since movements which do not indicate integrated life are meaningless (52).

Further talmudic sources upon which the rabbinic literature relating to the definition of death is the following:

No evidence of a man's death to enable the widow to remarry may be tendered before his soul has departed, even though witnesses saw him with his arteries cut or crucified or being devoured by a wild beast (54).

The Talmud and rabbinic writings do not specify the definition of the departure of the soul. Some Rabbis rule that since the concern is for a woman to be able to remarry, it is sufficient to examine for a heartbeat, but examination of the nose for signs of respiration is not necessary (55). Medically, such a ruling seems inappropriate since it makes it more difficult rather than easier to allow her to remarry. Therefore, it seems logical to use the absence of respiration as the main test of death (56).

Cessation of heartbeat as a sign of death is first discussed by Rabbi Zvi Ashkenazy (57).

In his responsum, he writes:

“respiration which emanates from the heart through the lungs is recognizable as long as the heart lives. It is clear that there is no respiration unless the heart is alive for from it is respiration derived ... thus, it is clear that life is dependent on respiration determined at the nose because warm air [pneuma] from the heart emanates from the nose. It is mixed with cold air in order to cool the heart. If there is no heartbeat there is no breathing.”

Some Rabbis interpret this responsum literally in that the heartbeat itself is the definitive indicator of life or death (58). Other Rabbis write that respiration is the only true indicator of life or death. The responsum of Rabbi Ashkenazy was written according to the understanding of

physiology in those days that the heart is part of the respiratory system and pumps pneuma to the lungs. Therefore, since it is now known that the heart pumps blood and not air, the cessation of the heartbeat is irrelevant to the determination of death since it is not connected directly to respiration (59).

The direct and specific definition of death in Jewish law was first discussed by Rabbi Moshe Sofer who wrote:

“if a person lies like an inanimate stone, has no pulse, and then ceases to breath, our holy Torah considers that person to be dead” (60).

All Rabbis agree that this definition refers to a patient in deep coma with no reaction to painful stimuli (“lies like an inanimate stone”), without heartbeat or blood circulation (“has no pulse”), and absent respiration (“ceases to breathe”).

Some Rabbis interpret this responsum literally and require all three criteria to be fulfilled, including cessation of the heartbeat (61).

Other Rabbis consider the only definitive criterion to be the cessation of spontaneous respiration (“and then ceases to breathe”) and the other two signs are important only to confirm the irreversibility of the absent respiration (62).

## **E. MODERN RABBINIC RULING**

In Jewish law, it is clear that there is a moment when death is established even though some body cells and tissues may still be alive. The disagreements among the modern rabbinic decisors relate to the establishment of the organ or function which determines that moment.

- Some Rabbis rule that a person is considered halakhically dead only after the irreversible cessation of both **respiration and heartbeat**, i.e., “cardiac death” (63).

These Rabbis differ about what to do for a “brain dead” patient still connected to a mechanical ventilator. Some rule that everything must be done to continue to support the patient’s life until the heart stops, or at least to leave the patient alone but not disconnect the respirator (64). Others rule that it is permissible to disconnect the respirator as an act of removing an impediment to dying thus leading to cessation of the heartbeat in a short time. Until the heartbeat stops, however, it is prohibited to hasten death by the removal of organs for transplantation (65).

- One Rabbi rules that the cessation of **blood circulation** is the fundamental sign of death because many biblical sources indicate that blood is life and the removal of blood causes the departure of the soul. So, too, destruction of certain organs which the talmudic Sages defined as “organs that the soul is dependent upon” (primarily the heart, the brain and the liver) also constitutes death, if this destruction causes lack of circulation to those organs, even while other parts of the body are still perfused (66).
- Another Rabbi rules that **the brain is the organ which determines life and death**. Therefore, complete destruction of the brain, including all its cells and components, is the definitive sign of death (67). Indeed, rabbinic sources speak of mortal injuries to the brain causing a person’s death (68).
- Other Rabbis assert that the halakhic definition of death is the moment when spontaneous **respiration** absolutely and irreversibly ceases, even if the heart is still beating (69). This view opines that the Torah and talmudic Sages define life and death to depend on the

function of breathing. However, since respiratory arrest in some circumstances is reversible, halakhah requires that the cessation of respiration be irreversible and is so determined according to the best medical knowledge of each era. Nowadays, the irreversibility can be established by the cessation of cardiac function or by the absolute cessation of function of the brainstem.

Some Rabbis consider brainstem death to be the equivalent of physiologic decapitation (70). Other Rabbis consider brainstem death as the halakhic definition of death because the cessation of spontaneous respiration is irreversible (71). Indeed, in the past, death was determined solely by examining for the presence or absence of respiration.

Some Rabbis question the reliability of the medical-scientific methods of determining death. However, undoubtedly the medical sophistication in establishing brain death nowadays is far more precise than the ancient or medieval establishment of cardiopulmonary death. Nevertheless, recent rabbinic decisors state decisively that if the halakhically-accepted signs of death are present, one need not be concerned about the very rare case of a medical error (72).

Based on the above-mentioned criteria, the establishment of the moment of death as being defined as the complete and irreversible cessation of spontaneous respiration is not a change in the halakhah. What has changed is the medical technology to establish that the cessation of respiration is absolute and irreversible.

According to this definition of death (i.e., irreversible cessation of respiration), there is no basic importance to the brain itself other than its control of respiratory function. Therefore, even if certain specific parts of the brain such as the hypothalamus continue to function, it does not change the definition of death. The halakhic definition of brain death thus differs from the



medico-legal definition of brain death which considers the status of the brain itself to determine whether a person is dead or alive.

## **F. ETHICAL BACKGROUND**

According to the view that the moment of death is determined as part of a continuous biological process, the basic considerations by which to establish that moment are cultural, philosophical, religious and legal, but not necessarily scientific. This means that the basic definition of death as the irreversible cessation of function of one or more organs despite the continued biological life of some cells and tissues, is dependent upon legal, cultural or religious definitions. This definition calls upon the medical community and its technology to confirm the absoluteness and irreversibility of that cessation of function. Basic legal principles utilizing scientific facts and testing establish the moment of death somewhere along the continuum of biological death.

Conceptually, three components are needed to establish the time of death:

- A philosophical basis and conceptual definition of the meaning of death
- Scientific criteria to confirm that definition
- Specific medical diagnostic examinations to establish that the defining conditions have been met (73).

In the past, the moment of death was established by the absence of both breathing and heartbeat. In recent years, most countries in the world have adopted the brain death definition of death.

From a historical viewpoint, this definition of death came about as a necessity because of the development of sophisticated resuscitative technology and the development of organ transplantation. Only thereafter were philosophical and moral arguments put forward to justify the acceptance of brain death as death (73).

The **philosophical basis** for the acceptance of brain death is that the entire brain including the brainstem is the source of personhood in terms of cognition, intellect, free will and sensation, as well as the site of integration of all the body's vital functions. The brain thus makes a person into a complete human being as a unified unit. If the brain ceases to function, the integrated functioning of the various body organs is lost even though each may continue to function independently.

In a pluralistic society, a universally accepted definition of death can be legislated for society's needs (inheritance, murder, discontinuation of treatment, use of organs for transplantation, etc.). However, one must also allow a minority to differ from the norm established by the majority (74).

Indeed, some people object to the brain death definition for various reasons:

- **Emotional**, such as the feeling that a warm body with a beating heart cannot be defined as a corpse.
- Concern about the **slippery slope**, whereby the definition of death may be expanded to include cerebral or upper brain death even if the brainstem is still functioning (i.e., spontaneous respiration is still present). This cerebral death definition would include patients in a persistent vegetative state (PVS) or permanent coma, patients with severe dementia, and

anencephalic newborns (75). These attitudes raise concern for the slippery slope whereby different and changing definitions of death will develop due to changing social needs.

- **Scientific**, because even if the brainstem is irreversibly damaged, some cells of the brainstem and other parts of the brain may still be functioning; hence, there is no medical proof for 'whole' brain death (76).

Even after decades of the societal acceptance of brain death, there is still confusion about this definition. The widespread use of the term 'brain death', indicates some doubt about it representing the usual death. When absence of pulse and breathing was the definition of death, no one used the term 'cardiac death'. It was death. This confusion about the term brain death occurs even among medical professionals (77). Thus, if one accepts the definition of brain death the term 'brain death' should not be used; rather one should speak of 'death'.

The **Catholic church** has not issued a religious definition of death but leaves it up to individual physicians to determine the moment of death of their patients (78). There is no objection to brain death in Catholic teaching (79). **Islamic scholars** accept brain death for some, but not all, purposes. Other religions also address the issue of brain death (80). **Protestant** attitudes on this issue are not clearly stated (81) nor is the view of **Buddhism** (82).

## Footnotes and References

1. See Black's *Law Dictionary*, 4th edit. 1968. See also the detailed discussion of ancient definitions of death in M. Farrell and D.L. Levin, *Crit Care Med* 21:1951, 1993.
2. See Farrell and Levin, loc. cit.
3. See A. Steinberg, *Assia*, Vol. 7, 5754, pp. 209 ff.
4. Mendelsohn tried to justify the decree in his article in *Hameasef*, *Adar* 5545 and in *Bikurei Itim*, 5583, pp. 82 ff. See also A. Steinberg, *Noam*, Vol. 19, 5737, pp. 210 ff.
5. *Yaavetz*, letter dated 2 *Tammuz* 5532, published in *Bikurei Itim*, 5584, pp. 229-232.
6. *Responsa Chatam Sofer*, *Yoreh Deah* #338. This responsum was written in 1837, about 60 years after the Duke's edict which was then widely followed even by Jews.
7. French neurologists were the first to describe the brain death syndrome ('coma de passe') in 1959 - see P. Malloret and M. Goulan, *Rev Neurol* (Paris) 101:3, 1959.
8. Ad Hoc Committee of the Harvard Medical School to examine the definition of brain death. *JAMA* 205:337, 1968.
9. P.M. Black, *N Engl J Med* 299:338, 1978; Leading Article, *Lancet* 1:363, 1981; J.L. Bernat et al., *Ann Inter Med* 94:389, 1981.
10. See a partial list of organizations who dealt with this issue in A. Steinberg, *Noam*, Vol. 19, 5737, pp. 210 ff. See also P.M. Black, *N Engl J Med* 299:338, 1978.
11. See President's Commission, *JAMA* 246:2184, 1981.

12. Task Force for the determination of brain death in children. *Pediatrics* 80:298, 1987.
13. See a listing of countries in Farrell and Levin, loc. cit.
14. See C.D. Zweibel, *J. Halacha and Contemporary Society*, Spring, 1989.
15. R. Kimura, *Kennedy Inst Ethics J* 1:123, 1991; J. Nudeshima, *Lancet* 338:1063, 1991.
16. See Farrell and Levin, loc. cit.
17. President's Commission: *Defining Death*, Washington DC, 1981, p. 41.
18. The Criteria of Death. A report from the Danish Council of Ethics, Dec. 1988, published by B.A. Rix, *J Med Ethics* 6:5, 1990.
19. See R.M. Veatch, *JAMA* 248: 1102, 1982; P.A. Byrne et al., *JAMA*, 242:1985, 1979.
20. American Academy of Neurology, *Neurology* 45:1012, 1995.
21. R.E. Mejie and M.M. Pollack, *JAMA* 274:550, 1995.
22. See J.L. Bernat, *Arch Neurol* 49:569, 1992. See also R.D. Truog and J.C. Fackler, *Crit Care Med* 20:1705, 1992.
- 23.
24. See J.E. Parisi et al., *N Engl J Med* 306:14, 1982.
25. See Responsa *Chatam Sofer*, *Yoreh Deah* #338. *Issur Ve'Heter* 59:1 and *Rama, Orach Chayim* 330:8 state that we cannot precisely define the moment of death nowadays. *Mor Uketziyah, Orach Chayim* 328 and Responsa *Tzitz Eliezer*, Vol. 10 #25:4 disagree.
26. See *Rashi*, *Yoma* 85a, s.v. *ad hechan*.
27. See *Hagra* in *Eliyahu Rabbah*, *Oholot* 1:6.
28. *Genesis* 7:22.
29. *Yoma* 85a.

30. Maimonides' *Mishnah Commentary*, Yoma 85a.
31. *Rashi*, Yoma 85a, s.v. *ad chotmo*.
32. This is the version of *Rashi*, *Meiri*, Yoma 85a as well as *Responsa Chacham Tzvi* #77 and others.
33. Yoma 8:5.
34. *Rach*, *Ran*, *Piskei Rid*, R. Jonathan of Luneil, *Rivevan* and *Rosh*, Yoma 85a; *Tur* and *Bet Joseph*, *Orach Chayim* 329.
35. See A. Rabbinowitz and M. Konigsberg, *Hadarom*, Vol. 32, 5731, pp. 59ff. and J.D. Bleich, loc. cit.
36. *Responsa Shevet Halevi*, Part 7 #235:2, Part 8 #67:2 and #86, s.v. *sham*. See also A. Steinberg, *Or Hamizrach*, 36 (1), *Tishri* 5748, pp. 48 ff and 36 (3-4), *Nissan-Tammuz* 5748, pp. 280 ff.; A. Steinberg, *Assia*, Vol. 7, 5754, pp. 209 ff.
37. *Responsa Maharsham*, Part 6 #91.
38. Genesis 7:22.
39. See *Pnei Moshe*, Jerushalmi Yoma 8:5; Rabbinowitz and Konigsberg, loc. cit.; A. Steinberg, *Assia*, Vol. 3, 5742, pp. 393 ff.
40. See C. Singer: *A Short History of Medicine*, Oxford Univ. Press, 1928, pp. 56-58. See also E. Reichman, *The Torah U-Madda J.* Vol. 4, 1993, pp. 148 ff; D.J. Furley and J.S. Wilkie: *Galen on Respiration and the Arteries*, Princeton Univ. Press, 1984, pp. 17-18.
41. See *Rashi*, Shabbat 134a, s.v. *delo minsheta*, *Rashi*, Chullin 45b, s.v. *telata*; *Pachad Yitzchak*, s.v. *telata kanei* questions *Rashi's* view.
42. See *Responsa Chatam Sofer*, *Yoreh Deah* #338.

43. Maimonides' *Shabbat* 2:19; *Tur, Shulchan Aruch, Orach Chayim* 329:4.
44. *Tur, Shulchan Aruch*, loc. cit.
45. *Oholot* 1:6.
46. Maimonides' *Tumat Met* 1:15.
47. *Eliyahu Rabbah* and *Sidrei Tahorot*, *Oholot* 1:6.
48. Rabbi B. Rabinowitz, *Assia*, Vol. 1, 5736, pp. 195 ff.
49. J. Levy, *Hadarom*, Vol. 33, 5731, letter to the editor; J. Blidstein, *Hadarom*, Vol. 33, 5731, pp. 73 ff.
50. Responsa *Iggrot Moshe, Yoreh Deah*, Part 3 #132; Rabbi M.D. Tendler, *Ann NY Acad Sci* 315:394, 1978; F. Rosner and M.D. Tendler, *J Halacha Contemporary Society*, 1989, pp. 14 ff; Rabbi S.Z. Auerbach, cited by A. Steinberg, *Assia*, No. 53-54, 5754, pp. 5 ff.
51. A. Steinberg, *Assia*, Vol. 7, 5754, 1993, pp. 209 ff.
52. A. Steinberg, loc. cit., based on Maimonides' *Mishnah Commentary*, *Oholot* 1:6.
53. *Yebamot* 120a.
54. See Responsa *Imrei Yosher*, Part 2 #2; Responsa *Levushei Mordachai* #124; Responsa *Divrei Chayim*, Part 2 #64; Responsa *Shoel Umeshiv* 3rd edit., Part 1 #100.
55. See A. Steinberg, *Noam*, Vol. 19, 5737, pp. 210 ff.
56. Responsa *Chacham Tzvi* #77.
57. Responsa *Tzitz Eliezer*, Part 9 #46, Part 10 #25:4 and Part 17 #66; Rabbi Bleich, loc. cit.
58. A. Steinberg, *Assia*, Vol. 7, 5754, 1993, pp. 209 ff; E. Reichman, *Torah U-Madda J*, Vol. 4, 1993, pp. 148 ff.
59. Responsa *Chatam Sofer, Yoreh Deah* #338.

60. Responsa *Shevet Halevi*, Part 7 #235, Part 8 #67:2 and 86. s.v. *sham*; Responsa *Tzitz Eliezer*, Part 9 #46, Part 10 #25:4 and Part 17 #66; Rabbi J.D. Bleich, *Keviyat Zeman Hamavet*, 5752.
61. A. Steinberg, *Assia*, Vol. 7, 5754, pp. 209 ff.
62. Responsa *Minchat Yitzchak*, Part 5 #7-8; Responsa *Tzitz Eliezer*, Part 9 #46, Part 10 #25:4, Part 13 #89:12-13, Part 17 #66 and Part 21 #28; Responsa *Shevet Halevi*, Part 7 #235, Part 8 #67:2, and 86, s.v. *shom*; Rabbi A. Soloveichick, *JAMA* 240:109, 1978.
63. Opinion of Rabbi J. Elyashiv - personal communication.
64. Rabbi S.Z. Auerbach - personal communication.
65. Rabbi Z. Schechter, *Assia*, Vol. 7, 5754, pp. 188 ff., and *J Halacha Contemporary Soc.* No. 17, 1989, pp. 32 ff.
66. Rabbi S.Z. Auerbach, cited by A. Steinberg, *Assia*, No. 53-54, 5754, pp. 5 ff.
67. *Tanchuma*, Exodus 9; *Mechilta*, Exodus 14:7 and *Rashi* there; *Tanchuma*, *Beshalach* 8.
68. Responsa *Iggrot Moshe*, *Yoreh Deah*, Part 3 #132 and *Yoreh Deah*, Part 4 #54 (concerning Rabbi Feinstein's position see Rabbi S. Yisraeli, *Assia*, No. 42-43, 5747, pp. 95 ff.; Rabbi M.D. Tandler, *Responsa of Rav Moshe Feinstein*, Vol. 1, 1996, pp. 67 ff.; M. Halperin, *Assia*, Vol. 7, 5754, pp. 137 ff.; A. Steinberg, *Assia*, No. 53-54, Elul 5754, pp. 5 ff; *Nishmat Abraham*, *Yoreh Deah* 339:2); Rabbi S. Goren, *Shanah Beshanah*, 5734, pp. 125 ff; Israeli Chief Rabbinate Council, in *Techumin*, Vol. 7, 5746, pp. 187 ff.; *Barkai*, Vol. 4, 5747, pp. 11 ff; *Assia*, Vol. 6, 5754, pp. 27 ff and pp. 123 ff. English translation by Y. Jakobovits, *Tradition*, Vol. 24, pp. 1 ff, 1989 (See the appendix to this section); Rabbi M. Eliyahu, *Barkai*, Vol. 4, 5747, pp. 18 ff.; Rabbi S. Yisraeli, *Barkai*, Vol. 4, 5747, pp. 32 ff and *Assia*, Vol. 7, 5754, pp. 167 ff.; Rabbi A. Shapira, *Or*



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69. Responsa *Iggrot Moshe, Yoreh Deah*, Part 3 #132; Rabbi Tendler, loc. cit.
70. Israeli Chief Rabbinate (note 68 above). A. Steinberg, loc. cit., Rabbi Bleich, loc. cit. pp. 45 ff.
71. See Semachot 8:1; Responsa *Chatam Sofer, Yoreh Deah* #338; Responsa *Maharatz Chayot* #52; Responsa *Maharsham*, Part 6 #91; Responsa *Chayim Shaal*, Part 2 #25.
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