Resuscitation 127 (2018) e14–e15

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Letter to the Editor

Time for a new definition of death?

At a time when, in France, the National Conference on Bioethics is opening, must we think and develop a new definition of death?

The Western world now recognizes two types of biological death: "real and constant" death (i.e., prolonged and definitive arrest of cardiac, respiratory and cerebral functions), and encephalic death (i.e. beating heart, breathing maintained by an artificial process, complete cessation of all cerebral vasculature, and absence of any encephalic electrical activity). To these two biomedical notions recognized by the law both for the certification of deaths and for the authorization of organ harvesting for transplants, a third type of death, coming from the field of medical anthropology, has recently been defined: social death [1], that is to say the more or less deliberate exclusion by society of a biologically alive individual (like the zombies of Haitian voodoo), which concerns patients who have become invisible or absent, such as the elderly retirement homes, long-term prisoners, chronic psychiatric patients, and homeless people [2].

But is it enough? In other words, must we rethink death? The latest advances in basic research show that death is not a single phenomenon, but rather a succession of events stopping as the body-machine progresses (to take a Cartesian view of the human body) [3]; this gradual extinction joins the tantric vision of increasing bodily lightness described in *Bardo Thödol*, the Tibetan Book of the Dead. Humanities have all their role to play in this evolutionary approach, because it is indeed evolutionary medicine that is involved: the definition of death has continued to vary according to religious and philosophical currents, but also scientific discoveries and controversies between scientists. The human and fundamental sciences can no longer and must not do without one another, because they are the basis of an emulation, that is to say of mutual enrichment.

Table 1
List of definitions of death in the Occidental world (17th c. – present).

17th–18th c.	Notification of death "by evidence", on the initiative of the pastor (excepted for forensic cases where this initiative is left to a doctor or a surgeon who will make the first physical examination). Signs of death are: the sensation of the last breath, the end of agony, immobility, the absence of reaction to stimuli, apnea (tested by the absence of condensation on a mirror placed close to the mouth), pallor, lower body temperature. Practitioners, in case of doubtful death (drowning, plague, childbirth) can also use 2 other techniques: feather on a nostril, glass filled with water on the stomach.
1742	Publication of the *Dissertation on the uncertainty of the signs of death and the abuse of burials and precipitated embalming* (by Bruhier d'Ablaincourt, Paris, France).
1745	Publication of the *Memoir on the need for a general regulation on burials and embalming* (by Bruhier d'Ablaincourt, Paris, France): appearance of the concept of "apparent death" opposing the "real and constant death". Bruhier proposes the creation of death verification officers (chosen from doctors/surgeons), and isolates the "signs of death". Only sure sign of death: abdominal green patch.
1755	Publication of the *Letters on the certainty of the signs of death* (by Antoine Louis, Royal Academy of Surgery, Paris, France): the unmistakable signs of death are cadaverous rigidity and the flaccidity of the eye. To wait for the appearance of the putrefaction is useless (too late) and considered "dangerous" on the sanitary level (proliferation of miasms).
End of 18th c.	François Thiéry (France) proposes the concept of "intermediate death" (transitional but irreversible state where, after the last sigh, death takes possession of the whole body.) Buffon speaks of a "death by pieces" (death is generalized to the whole body, progressively). An idea comparable to that of Tantric Buddhism developed in the *Bardö Thödol* (Book of Tibetan Deaths) which describes a "progressive extinction of vital breaths".
1800	Beginning of the medicalization of death and its administrative accounting (creation of civil status officers), and decree of the prefect of Seine (Paris, France) creating a medical service for the verification of deaths, then in 1839 a service of inspectors who supervise.
19th c.	Scientific craze for finding "indubitable signs of death". Most of the time, it is recommended to wait until the signs of putrefaction occur (abdominal green spot), leaving the body to be stored in mortuary deposits. Others propose the identification of: Hippocratic facies, absence of pulse, rigidity, drop in temperature, lack of response to stimulation (loud cry in the ear, bottle of ammonia placed on a nostril, sting, burn, pinching on the soles of the feet, at the end of the fingers or the nipples, etc.).
1848	Proposition of the sign of Bouchut (France): absence of perception of the cardiac pulsations to the auscultation of the heart by the stethoscope of Laennec.
2nd half of 19th c.	Use of tools to objectify the signs of death (thermometer, reagents confirming the acidity of the body, lancet showing the absence of bleeding at the cut of the superficial veins/arteries, lighter to create non-bleeding blisters, etc.).
1941	The corpse can not be buried or autopsied in France until 24 hours have elapsed since the declaration of death (to watch for the appearance … or not, of signs of decomposition/putrefaction).
1948	One French circular retains as the criterion of death the cessation of any cardiac activity.
1950's	Professor Mollaret (France) creates the notion of "out-of-date coma" (state where the relationship life is abolished and the vegetative life condemned if it is not supplemented); Professor Vigouroux (France) creates the notion of "prolonged coma" (a state in which the vegetative life is maintained spontaneously but the subject, unconscious, is totally dependent on the care given to him).
1968	Harvard Committee proposes the concept of "brain-dead state" (absence of cerebral vasculature objectified by 2 flat and 30-minute EEGs at least 4 hours apart in the absence of sedation and sedation, hypothermia, or absence of intra-cranial enhancement in arteriography). It is a philosophical and religious revolution: one declares dead a hot corpse whose heart is still beating. The same year, introduction of the concept in France with the circular Jeanneney (April 24, 1968, promulgated and annexed to the *Code of Public Health*)… a few days before the realization of the first French heart transplant by Professor Christian Cabrol.

https://doi.org/10.1016/j.resuscitation.2018.04.012
Received 8 April 2018

So, what are the professional as well as societal issues waiting to be answered? Are the biological definitions of death sufficient? Obviously no, judging by the quarrels of interpretation leading to the cessation or not of the care for this or that patient. How to improve them, in this case? Is a third biological definition of death necessary? Are neurobiologists the keystone of such a new definition? Unless it is possible to consider biological markers of death? In which case would death become quantifiable? Is there a universal definition of death, at the risk of offending cultures (for example Far Eastern considering mummies of Buddhist monks of the 17th-19th c. as simply “asleep” and still dispensing their benefits to the faithful)?

The Western definition of death has changed continuously over the last three centuries (Table 1) [4–7]. Should it continue to evolve? The advance of the intensive care techniques profoundly modified the durations of agony and the survival times, and perhaps also the essential meaning of death. For the philosopher Jankélévitch, death is the moment of irreversibility. And now, with the progress of resuscitation, irreversibility is evolving. Is not this the moment for a new definition of death? We invite the international community of clinical physicians (especially in resuscitation and palliative care), researchers, anthropologists and ethnologists, representatives of religious communities, philosophers, etc. to share with us their wishes, their ideas, their criticisms of the fluctuating and difficultly palpable concept of death. A synthesis will be drawn up for the purpose of proposing to improve a new definition of death, within the framework of the National Conference on Bioethics, and more broadly in that of the European Community and the World Health Organization (WHO).

References

[1] Charlier P, Hassin J. Social death: ethical and medical anthropology aspects. Ethics Med Public Health 2015;1:512–6.
[2] Charlier P, Deo S, Hassin J, Hervé C. Social death, melancholia, and zombies: same patterns. Med Hypotheses 2017;101:59–60.
[3] Latil M, Rocheteau P, Châtre L, Sanulli S, Mémet S, Ricchetti M, Tajbakhsh S, Chrétien F. Skeletal muscle stem cells adopt a dormant cell state post mortem and retain regenerative capacity. Nature Comm 2012;3:903.
[4] Ameisen JP, Hevieu-Léger D, Hirsch E. Qu’est-ce que mourir? Le Pommier. 2010.
[5] Ariès P. L’Homme devant la mort. Paris: Seuil; 1977.
[6] Carol A. Une histoire médicale des critères de la mort. Communications (Seuil) 2015;2(97):45–55.
[7] Voyelle M. La mort et l’Occident de 1300 à nos jours. Paris: Gallimard; 1983.

Philippe Charlier[a,b,c,*]
[a] *Section of Medical Anthropology (DANTE Laboratory EA4498, UVSQ), UFR of Health Sciences, 2 avenue de la Source de la Bièvre, 78180 Montigny-Le-Bretonneux, France*
[b] *CASH & IPES, 403 avenue de la République, 92000 Nanterre, France*
[c] *Quai Branly Museum, 222 rue de l'Université, 75007 Paris, France*
E-mail address: philippe.charlier@uvsq.fr

Djillali ANNANE
Resuscitation Department, University Hospital Raymond Poincaré (AP-HP, UVSQ), 92380 Garches, France

* Corresponding author at: Section of Medical Anthropology (DANTE Laboratory EA4498, UVSQ), UFR of Health Sciences, 2 avenue de la Source de la Bièvre, 78180 Montigny-Le-Bretonneux, France.