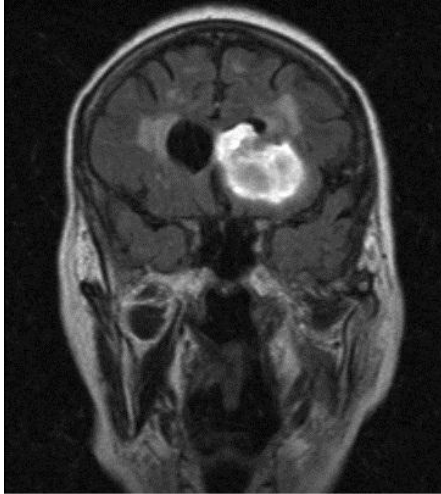


BRAIN STEM DEATH AND ORGAN TRANSPLANTATION

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BRAIN STEM DEATH



Brain stem death is a syndrome diagnosed by a specified series of bedside tests performed by specially qualified doctors at some time convenient to them and others involved in the care of comatose patients whose brain damage appears to be mortal. It is obviously a different state from that long recognized as death. How, then, has this syndrome become accepted by some of this country's medical profession – we don't know how many – as equivalent to death? For those who equate it with human death but object to the notion that there can be more than one kind of death, it is death.

The answer requires consideration of concepts with their associated definitions – essentially a philosophical question but unavoidable if some different understanding of what death is and when it occurs is to be entertained.

IN THE BEGINNING –

In 1976 – the rules for the identification of the brain stem death syndrome – unfortunately called 'brain death' at that time - were formally promulgated by a committee of the UK Medical Royal Colleges<sup>1</sup>. The stated purpose was "to distinguish between those patients who retain the functional capacity to have a chance of even partial recovery and those where no such possibility exists". In accordance with good medical practice, identification of the syndrome required withdrawal of "further artificial support" in order to spare relatives "from the further emotional trauma of sterile hope".

While that wording suggests a purely prognostic use of the published criteria – providing common ground for the identification of a stage in the dying process at which mechanical ventilation and other life-support measures should be discontinued so that the patient might be allowed to die with as much dignity as might remain – there was evidence of another interest, apart from that of the dying patient and his relatives. The preamble to the diagnostic criteria stated that they had been "written with the advice of the sub-committee of the Transplant Advisory Panel".

THE FIRST OFFICIAL EQUATION OF BRAIN STEM DEATH WITH DEATH

The first official equation of brain stem death with death was made in a Memorandum<sup>2</sup> published contemporaneously with the resumption of heart transplantation in the UK in 1979. The committee based that assertion on the concept that when “all functions of the brain have permanently and irreversibly ceased” a person “becomes truly dead”. That is, of course, the whole-brain definition, then widely accepted throughout the world, but ever more controversial at the present time.<sup>3,4</sup> The reductionist UK version was rejected by the US President’s Bioethics Council<sup>5</sup> in 2008.

The published series of bedside brain stem tests – with no testing for higher brain function or use of special investigatory techniques – was, surprisingly, considered sufficient by this expert committee for the safe diagnosis of total brain death and therefore of death on that concept. A prime purpose for the diagnosis and certification of death on that basis became clear with the publication by the Health Departments of Great Britain and Northern Ireland, in 1983, of ‘Cadaveric Organs for Transplantation – a Code of Practice including the Diagnosis of Brain Death’ which authorized removal of organs from the living bodies – not cadavers, of course – of those diagnosed “brain dead” on their criteria.

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#### BY 1995

There was so much published evidence of persisting brain function in patients diagnosed “brain dead” – including a very frank statement to that effect from Christopher Pallis<sup>6</sup> – that use of the term “brain death” to describe the state identified by the Code of Practice tests was officially discouraged<sup>7</sup> – the “more correct term brain stem death” being preferred. Thereafter the equation of that state with death in accordance with the brain death concept was clearly untenable. But that expert body wished to continue its support for the diagnosis of death for transplant purposes on essentially the same clinical criteria and this necessitated the invention of yet another definition of human death deemed to be satisfied when “brain stem death” had been formally diagnosed.

The “suggested” new definition of death<sup>7</sup> was “irreversible loss of the capacity for consciousness, combined with irreversible loss of the capacity to breathe”. Although there has been no noticeable general or within-professions discussion of this novel concept – or explanation that “after my death” on NHS Organ Donor Registration forms means death so defined and not death as commonly understood – that has remained the concept upon which death diagnosis by brain stem testing has been based ever since<sup>8</sup>.

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#### THE NEW DEFINITION OF DEATH

Is essentially consciousness based. The requirement that the capacity to breathe be lost too sits uncomfortably alongside and is not, as a matter of fact, satisfied by the prescribed tests which do not challenge the respiratory centre to the ultimate anoxic drive stimulus.

The permanent loss of consciousness is an essential feature of death, of course. When that state is diagnosed on the traditional criteria, still those by which almost all deaths are diagnosed universally these days, its permanent loss is guaranteed by the cessation of blood flow through all parts of the brain and the passage of sufficient time thereafter to ensure that irreversible necrosis of the whole brain is under way but do the prescribed tests of some brain stem functions suffice for the certain diagnosis of the permanent loss of consciousness in patients whose hearts are beating and still

perfusing their bodies – and, for all we know, parts of their brains – with oxygenated blood? Setting aside the problem of defining consciousness in any precise sense, the answer for pragmatic purposes depends upon their adequacy for the ascertainment of permanent loss of function in those elements of the brain essential for its generation.

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#### THE SCIENTIFIC UNDERSTANDING OF CONSCIOUSNESS

There is, to date, no truly scientific understanding of consciousness and it has been said that science cannot address the problem<sup>9</sup>, though several Nobel Laureates have tried to do so. The old idea that its generation depends upon an arousal system predominantly located within the brain stem – a theory based upon the animal experiments of Moruzzi and Magoun<sup>10</sup> some 60 years ago – still seems to hold sway in the field of clinical neurology<sup>11,12</sup> and appears to be the theory underpinning the 1995 Working Group's claim, repeated by the 2008 Working Party, that the irreversible cessation of brain stem function "will produce" the permanently unconscious state. However, there have always been caveats about the reticular activating system (RAS) – best regarded as a physiological rather than a precise anatomical entity<sup>11</sup>, or even as "little more than a metaphor"<sup>13</sup> – and about the possible rôle of inputs from the first and second cranial nerves. More recently there has been concern about the permanence of coma associated with brain stem lesions<sup>14</sup>, perhaps engendered by new understanding of the plasticity of the nervous system.

In light of such uncertainty it may be thought significant that neither the 1995 Working Group nor its successors have quoted scientific evidence in support of their assertions that "brain stem death" is a state of permanent unconsciousness.

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#### DO THE TESTS SUFFICE?

Do the tests suffice for the diagnosis of death on the stated premise? The answer must be "No". The RAS is not directly testable. Its brain stem elements can be said to be permanently out of action only when the brain stem is totally dead. The purely bedside tests lack the power to establish that state as a matter of fact<sup>15</sup>. They do not test for remaining blood pressure and heart-rate control by medullary centres, which may be evident during organ procurement surgery subsequently<sup>16,17</sup>, nor for oesophageal motility control, and the brain stem respiratory centre is not subjected to stringent testing (which may exacerbate brain damage or even cause death<sup>18</sup>).

In the era of evidence-based medical practice, it is no longer possible to maintain that brain stem death, as diagnosed by the officially prescribed clinical testing, is death. The clinical syndrome so identified, fails to meet the requirements of either of the two novel concepts and definitions of human death proposed by the Medical Royal Colleges<sup>2,7</sup> in 1979 and 1995.

It cannot now be considered good medical practice to seek to diagnose this syndrome for organ procurement purposes. The prescribed series of tests – particularly the caloric test and disconnection of the ventilator without sedation – must risk causing suffering in at least some of those so tested.

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#### ORGAN TRANSPLANTATION

The retrieval of organs from the so-called “brain stem dead” must now be seen as a pre-mortal surgical procedure upon a paralysed patient who is not certainly permanently unconscious. Protection against the legal consequences may be offered by the official Codes of Practice governing this activity and attending anaesthetists may cover the possibility of suffering by administration of general anaesthesia<sup>19</sup>. Prospective organ donors and those asked to give consent to the removal of their children’s organs after diagnosis of death by brain stem testing , should surely be given all the relevant facts about that diagnosis and procedure – and the option to specify general anaesthesia to cover it.

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Other sources of organs have been sought as organ procurement from the “brain stem dead” has decreased. One popular source is healthy (related or altruistic unrelated) donors. Another is those declared dead after brief periods of cardiac arrest induced by stage-managed withdrawal of life-support. In the latter case there may be prior cannulation and perfusion of the admittedly potentially-sentient dying patient in the interests of the wanted organs. The required observation period after what appears to be the last heartbeat is usually of the order of a few minutes – perhaps long enough to say that there will not thereafter be spontaneous resumption of coordinate cardiac action but not long enough to guarantee irreversibility, surely an essential feature of death. I have personally resuscitated many patients after much longer observed periods of cardiac arrest – the longest 40 minutes, that courageous neurologist returning to work soon afterwards.

The declaration of death (for transplant purposes) after 2-5 minutes is made on the basis that skilled resuscitation will not be undertaken thereafter, not that it cannot be achieved.

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#### OBFUSCATING HUMAN DEATH

Why is there so much obfuscation, and manipulation of thought, about so fundamental a matter as human death? There was never need for it as a consequence of the development of life-support techniques per se. When we recognized that further, extraordinary, life-support measures were pointless and unkind, there was no difficulty about their discontinuation to allow our patients to die. We saw that as our duty and last service to them – and that was later endorsed as good medical practice<sup>1</sup>.

The **answer** is to be found in the advent of organ transplantation, for which purpose death has been redefined variously since 1968. No other purpose is served by these redefinitions which are now recognized as biologically incoherent and mere legal fictions<sup>3</sup>.

#### CONCLUSION

The practice of human organ transplantation raises very serious ethical concerns, with consequences for that trust in the medical profession which is of fundamental importance to good medical practice.

- Evil committed for a good purpose remains evil.
- Even when it succeeds?
- Above all when it succeeds.



In my view it is **wrong**, because the procurement of viable complex organs necessitates abuse of the dying or harming the healthy – activities in which doctors should not be involved. That is not the current view of the populace which is, we are often told, overwhelmingly in favour of transplantation, but I wonder if that would be the case if it were fully and fairly informed about organ procurement practice.

It may be timely to remember the quotation from Victor Hugo with which the late Richard Nilges – a neurosurgeon who saw through “the crassly utilitarian concept of brain death” – prefaced his article in this journal<sup>20</sup> in 1990 :-

Evil committed for a good purpose remains evil.

Even when it succeeds?

Above all when it succeeds.

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## REFERENCES

1. Conference of Medical Royal Colleges and their Faculties in the UK (1976). Diagnosis of brain death. *BMJ*, 2, 1187-88.
2. Conference of Medical Royal Colleges and their Faculties in the UK (1979). Memorandum on the diagnosis of death. *BMJ*, 1, 332.
3. Shah, S.K., Truog R.D., & Miller F.G. (2011). Death and legal fictions. *J Med Ethics*, 10.1136/jme.2011.045385.
4. Henderson D.S. (2011). *Death and donation* (ISBN: 978-1-60899-622-3). Pickwick Publications, Eugene, OR 97401.
5. President’s Council on Bioethics (2008). *Controversies in the determination of death (a White Paper)*. Washington, DC. [www.bioethics.gov](http://www.bioethics.gov)
6. Pallis C. (1985). Defining death. *BMJ*, 291, 666.
7. RCP Working Group, endorsed by the Conference of Medical Royal Colleges (1995). Criteria for the diagnosis of brain stem death. *J Roy Coll Physns*, London, 29, 381-2.
8. Academy of Medical Royal Colleges (2008). *A code of practice for the diagnosis and confirmation of death*. Wimpole Street, London.
9. Pippard, B. Personal communication.
10. Moruzzi, G. & Magoun H.W. (1949). Brain stem reticular formation and activation of the EEG. *Electroencephalography and Clinical Neurophysiology*, 1, 445-473.
11. Goetz C.G. (2003). *Textbook of Clinical Neurology*, 2nd Edn. Elsevier Science.
12. Bleck T.P. (2007). *Ibid*, 3rd Edn.
13. Roth, M. Personal communication.
14. Parvizi J. & Damasio A.R. (2003). Neuroanatomical correlates of brainstem coma. *Brain*, 126, 1524-36.
15. Evans D.W. & Hill D.J. (1989). The brain stems of organ donors are not dead. *Catholic Medical Quarterly*, 40, 113-121.
16. Evans D.W. (2000). The demise of ‘brain death’ in Britain. In *Beyond Brain Death – the case against brain based criteria* (ISBN: 1-4020-0366-8). Eds. Potts M., Byrne P.A., & Nilges R.G. Kluwer Academic Publishers, Dordrecht, pp. 139-158.
17. Hill D.J. (2000). Brain stem death : a United Kingdom anaesthetist’s view. *Ibid*, pp. 159-169.
18. Coimbra C.G. (1999). Implications of ischemic penumbra for the diagnosis of brain death. *Braz J Med Biol Res*, 32, 1479-87.
19. Hill D.J. (2011). Death and donors. *Western Mail*, 29th August. <http://www.walesonline.co.uk/news/letters-to-the-editor/western-mail-letters/2011/08/29/western-mail-letters-monday-29-august-2011-91466-29319355/#ixzz1WPwtPft7>
20. Nilges R.G. (1990). The death of the brain. *Catholic Medical Quarterly*, 57, 26-29.