ANIL AGGRAWAL'S
Internet Journal of Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 8, NO. 2
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_008_no_002/reviews/tb/page001.html

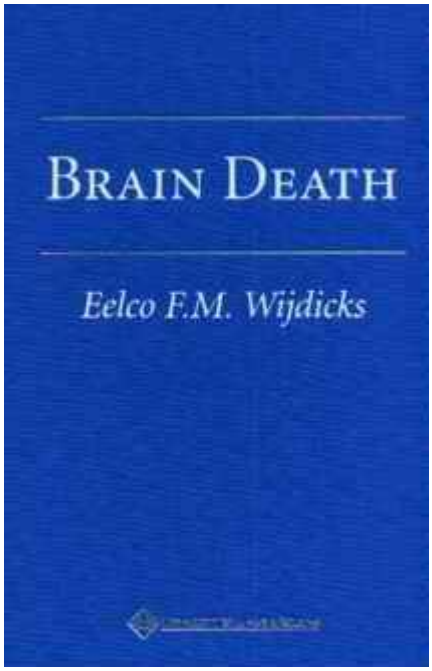
Book Reviews: Technical Books Section

...A RARE JEWEL WRITTEN ON BRAIN DEATH ...The amount of effort that has been put in any work is usually evident by the amount of research that has been undertaken for it. And in this respect, this book scores full points. The history of brain death, the beliefs of various religious bodies regarding organ transplantation, the various laws regarding declaration of brain death are all the aspects that have been well researched. This is the kind of information that is rarely found in books of this nature. This shows that there has been a wholehearted effort to make this book as authentic as possible...

Brain Death edited by Eelco F.M. Wijdicks. Hard Bound, 9.4" x 6.3" x 0.7".
Lippincott Williams & Wilkins, 530, Walnut Street, Philadelphia, PA 19106, USA. Publication Date April 15, 2001. 270 pages, ISBN-10: 0781730201. ISBN-13: 978-0781730204. Price $59.95

Amazon Link: Click here to visit

Click cover to buy from Amazon



Brain death is one of the three most talked about and most controversial topics in medicine during the last half a century, euthanasia and human cloning being the other two (though not necessarily

in that order). Even among these three, brain death holds special position because it changed the meaning of the most important and inevitable truth of life viz. death. Death, since time immemorial, has been (rather had been) considered to be the cessation of breathing and circulation i.e. the loss of function of heart and lungs. The brain was nowhere in the picture. Contrast that with today when a person's heart, lungs or in fact any organ can be removed from his body even before they loose their function i.e. they are still alive (while the person is dead [brain dead]). It is this journey of the definition of death and the progress in refinement of the various criteria used for the declaration of brain dead that have been described in the first chapter. Not just the progress but also the criteria as they are being followed in different parts of the would have been described.

The next chapter deals with pathophysiology of brain death. The importance of this chapter, as the authors themselves claim, lies in organ transplantation. It tells about the various changes that occur in different organs after brain death and in what time, so that the physician can keep an eye on them and correct them when required so that these organs can be kept as healthy as possible till the time of transplantation. Chapter 3 deals with neuropathology of brain death, of respirator brain and forensic implications of brain death. While the former is important to know the time when the changes in the brain have become irreversible so that the patient can be removed from the ventilator, the latter's importance is evident y the heading itself. Although forensic aspect has not been given its due importance, still something is better than nothing. The very fact that the author discussed about the topic people seldom talk about shows that he wants to delve into this matter also.

View this book on Amazon

...The importance of the chapter [on pathophysiology of brain death], as the authors themselves claim, lies in organ transplantation. It tells about the various changes that occur in different organs after brain death and in what time, so that the physician can keep an eye on them and correct them when required so that these organs can be kept as healthy as possible till the time of transplantation...

The next couple of chapters deal with the methods of diagnosing brain death in adults and children respectively. More than the adults, it's the children whose description is more important as many people (read medical professionals) believe that these criteria are the same in both adults and children. So it becomes imperative that they should be told about the difference between the two. Following this is the chapter describing the various states that resemble brain death and how they can be differentiated from it. This is (according to us) the second best written chapter in the book (the credit for the best chapter would undoubtedly go to the first chapter, describing history of brain death). It describes all the relevant conditions in appropriate detail, neither being too exhaustive nor too meager. The next three chapters deal with religious, legal and philosophical - ethical aspects of brain death respectively. Normally people don't give much importance to them, as they are not at all considered relevant to medical practice. They are thought of as orthodox thinking that have no role in such a scientific subject as medicine. But what people with such beliefs forget is that these very beliefs (religious and philosophical) that present maximum resistance to any new idea. The biggest example for this resistance and consequent upheaval is the time when abortion was tried to be legalized throughout the world (around late 1960's and early 1970's). Although brain death never met that kind of resistance, still one can't ignore these feelings (religious) and they have to be taken care of adequately, willingly or otherwise. As far as legal aspects go, nothing can be done unless sanctioned by the law. The first thing that has been required

to use organs from people who are brain death is the relevant changes in the law so that such a procedure can be undertaken. Such is the importance of legal matters in the society and it has to be respected.

...The last chapter deals with procurement of organs and preparation for transplantation - another example of well thought out inclusion of a topic (chapter) in the book. An obvious question at this stage would be - what is the use of this chapter in this book? The answer is quite obvious when one looks at the people who declare a person brain death. In many jurisdictions it is the work of the neurologists, neurosurgeons and the like who are the treating doctors...

The last chapter deals with procurement of organs and preparation for transplantation - another example of well thought out inclusion of a topic (chapter) in the book. An obvious question at this stage would be - what is the use of this chapter in this book? The answer is quite obvious when one looks at the people who declare a person brain death. In many jurisdictions it is the work of the neurologists, neurosurgeons and the like who are the treating doctors. In such a scenario it is their duty to maintain the hemodynamic stability of the patient till he/she is taken up for surgery (for transplantation). So they must be aware of the various changes that take place in the body after brain death (described adequately in chapter 2) and their management (described in chapter 10). This chapter won't make anyone an expert in management of such patients, but it does give a brief overview of how things are to be done. In addition there is adequate list of references for detailed study.

If we take brain death as a clinical entity, the book is arranged exactly in a way a case is worked up in the wards. It (the book) starts with history of brain death followed by etiopathogenesis, going on to the diagnosis (in adults and children separately) and then the differential diagnosis. The only misfit in this whole scheme of things is the management of such patients. While the editor has kept it as the last chapter, we feel its inclusion after the chapter dealing with other states resembling brain death (more appropriately as chapter 7 instead of 10) would have been more appropriate.

The amount of effort that has been put in any work is usually evident by the amount of research that has been undertaken for it. And in this respect, this book scores full points. The history of brain death, the beliefs of various religious bodies regarding organ transplantation, the various laws regarding declaration of brain death are all the aspects that have been well researched. This is the kind of information that is rarely found in books of this nature. This shows that there has been a wholehearted effort to make this book as authentic as possible.

This book is one of the rare jewels written on brain death that should be present with every medical practitioner since each one of them has to deal with such cases sometime or the other in their career. We would call it a MUST BUY for every medical practitioner.

-Puneet Setia[1] and Avneesh Gupta[2]

1. Department of Forensic Medicine and Toxicology,
Postgraduate Institute Of Medical Education And Research (PGIMER),
Chandigarh
India

2. Department of Pathology
Metro Health Medical Center

Cleveland, OH
USA



Dr. Puneet Setia is working as a senior resident in the department of Forensic Medicine and Toxicology at the prestigious All India Institute of Medical Sciences. He has previously worked in several other institutions of repute such as the Maulana Azad Medical College, New Delhi and the Postgraduate Institute Of Medical Education And Research (PGIMER), Chandigarh. He did his graduation from Maulana Azad Medical College (MAMC), New Delhi. His research interests include evaluation of new techniques for the determination of brain death and Forensic Radiology, especially the use of radiology in demonstrating coronary narrowing at the post-mortem examination. He is associated with Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology as a writer and book reviewer. He can be contacted at puneetsetia@rediffmail.com



Dr. Avneesh Gupta qualified as a forensic pathologist from India with honors and is now working at the Department of Pathology, Metro Health Medical Center, Cleveland, Ohio. He has to his credit a number of publications in leading journals around the world. His landmark thesis on "Cranial Cerebral Damage In Fatal Road Traffic Accidents With Special Reference to Circle Of Willis" can be accessed by clicking here. He is associated with Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology as a journal associate, writer and book reviewer. He can be contacted at avneeshgupta2000@yahoo.com. During his spare time, he enjoys meeting friends and traveling.

Excerpts from the book:

Brain death is an area which has assumed vital importance in recent times, especially since the beginning of heart transplantations by Professor Christiaan Barnard (1922 - 2001) at Groote Schuur Hospital in December 1967. Before this marvellous feat, the world over, the declaration of death was done on the basis of the so-called "tripod of life" - heart, lungs and brain. For the first time in late sixties, doctors - especially the cardiac surgeons - stared at the paradoxical situation of retrieving a "beating heart" (useable for heart transplant) from a "dead patient". How were they going to get a "beating heart" from a "dead patient", when the person was to be pronounced dead only on the stoppage of all three vital organs!

It was in circumstances like these, that the new concept of brain death arose. The book under review is a beautiful attempt at summarizing the key issues of this intricately complex problem. The book won rave reviews from our reviewers. The board of editors decided to run some excerpts from the book so the readers could have an idea, how useful this book is.

Let us begin with some excerpts from chapter 4 entitled "Clinical Diagnosis and Confirmatory Testing of Brain Death in Adults", written by the editor himself. The reader gets to read some astounding facts in this chapter. Sample this: what would you call a person who is shivering or perhaps sweating and even trying to sit up? Dead or alive? Most of us, even physicians, would tend

to think that this person cannot be dead. But wait! Wijdicks tells in this chapter that such movements are possible in brain dead individuals. Here is what he has to say on pages 73-4

SPINAL ACTIVITY

Arm elevation with neck flexion (A) and spontaneously (B) (Please Click to enlarge)



Body movements after death have been observed, generally during the apnea test but also during nurse preparation for transport, at the time of abdominal incision for organ retrieval, and in the morgue itself. As early as 1971, Goulon et al. supplemented their original paper with additional descriptions of body movements brought on by light stimulation-triple retreat of the legs, adduction or abduction of the arm to the stimulated area, and head rotation. These movements have puzzled the mind and have frightened family members. Evidence that the movements represent only spinal activity is the consistent clinical documentation of brain death with confirmation by an isoelectric electroencephalogram or the absence of intracranial flow. The most impressive body movement is a brief attempt of the body to sit up to 40 to 60 degrees but generally not in a full sitting position. Arms may be raised independently of each other; legs seldom move. Rhythmic flexion of the hip and knee mimicking stepping has occurred at the pontomedullary stage of herniation, but it disappears in brain death. These are slow movements, lasting 10 to 20 s. A painful stimulus rarely produces these complex movements, but we and others have observed them after forceful flexion of the neck or rotation of the body (e.g., when replacing bed linen; see accompanying Fig. 4-8). A videotape has recently become available. Head turning consistently to one side and back arching may occur. Sometimes a body may partly roll over and dislodge catheters. These movements have been named "Lazarus signs," referring to the biblical person said to have been raised by Jesus, but the term is disrespectful to the patient or family and should be avoided in conversation.

Some of this spinal activity may be triggered by the ventilator, synchronous with pulmonary insufflation, and disappear after disconnection of the ventilator. A recent prospective study of 38 patients with brain death, mostly young adults, found a surprisingly high frequency of spinal-generated movements (39%), but included a triple flexion response, facial myokymias, and finger jerks.

Other manifestations include the undulating toe sign (snapping the big toe leads to an undulating movement of the toes resembling those of a sea anemone), persistent Babinski response, any tendon, abdominal, or cremaster reflex, flushing, shivering, sweating, and myoclonic twitching in limb muscles. The most commonly observed reflexes and movements are shown in Table 4-2.

Usually these movements are single events, but if they are recurrent, paralytic agents should be used to prevent them during organ retrieval.

TABLE 4-2. Spinal movements and reflexes in brain death

Cervical spine
Tonic neck reflexes (neck flexion)
Neck-abdominal muscle contraction
Neck-hip flexion
Neck-arm flexion
Neck-shoulder protrusion
Head turning to side
Upper extremity
Flexion-withdrawal reflex
Unilateral extension-pronation
Isolated finger jerks; finger pinch-finger flexion
Flexion elevation of arm; joining of hands possible
Trunk
Asymmetric opisthotonic posturing of trunk
Flexion of trunk, causing partial sitting movements
Abdominal reflexes
Lower extremity
Plantar flexion of toes after percussion
Triple flexion, Babinski sign

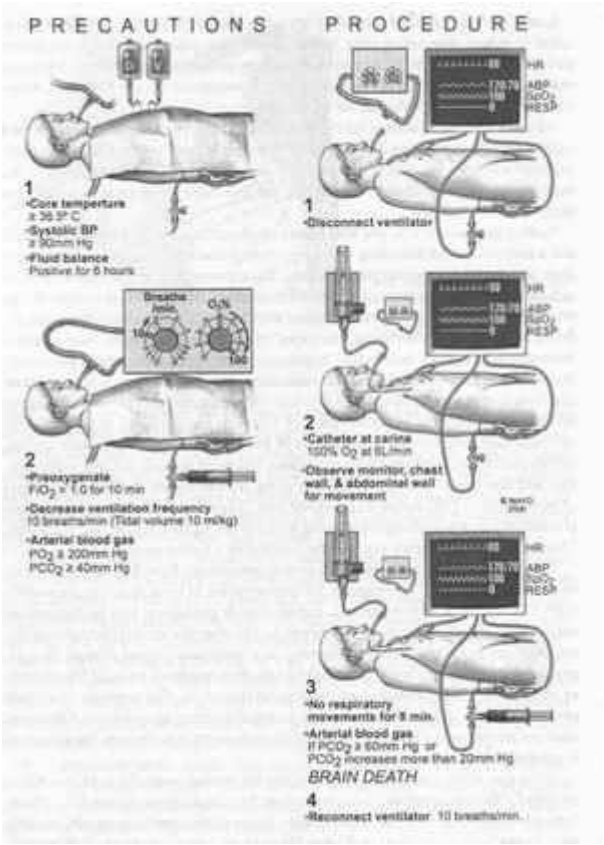
And here are some excerpts from pages 155-158, where H. Richard Beresford of the Cornell University Law School, New York discusses some legal aspects of brain death.

SOME ILLUSTRATIVE CASES

The following cases exemplify legal challenges to determinations of brain death. While the involved physicians were not themselves defendants, errors they might have made - whether technical, judgmental or normative-are important considerations in the cases.

People v Eulo

Figure 4-7: Performance of the apnea test. The apnea test should be optimized by precautionary measures (*left*). 1. Increasing core temperature to reduce possible effect of hypothermia on C02 production; reducing chances of hypotension by stabilizing blood pressure and hemodynamic state. 2. Preoxygenation aiming at PO2 of at least 200 mm Hg, correcting possible hypocapnea (often due to hyperventilation; caused by high tidal volumes of the mechanical ventilator or possibly due to hypothermia). The apnea test can proceed as follows (*right*). 1. Disconnect the ventilator while monitoring heart rate and blood pressure and possible respiratory excursions. 2. Provide adequate oxygen source, preferably with a catheter at the carina. 3. If no respiratory movements are observed, draw new blood gas. If PCO2 rise fulfills criteria, reconnect ventilator. Any drop in blood pressure (BP less than or equal to 70 mm Hg) or cardiac arrhythmia should prompt the physician to abort the procedure and perform a confirmatory test (EEG, TCD, cerebral blood flow study). ABP, arterial blood pressure; BP, blood pressure; D, dopamine; HR, heart rate; RESP, respirations; Spo2, oxygen saturation by pulse oximetry; V, vasopressin. (This figure appears on page 72 of this book. Please Click to enlarge)



This case [People v Eulo, 63 NY 2d 341, 472 NE 2d 286 (1984)] established that it is lawful to determine death by neurological criteria in the state of New York. At issue was whether a criminal

defendant or the physicians who removed a gunshot victim's mechanical ventilator caused his death. The physicians, including a neurosurgeon, had determined the victim was "brain dead" before the ventilator was removed. A neurologist, testifying as an expert witness for the defendant noted that the apnea test was not rigorously performed (please see figure on the right) and that the electroencephalogram (EEG) which was read as isoelectric had enough artifacts as to cast some doubt on this interpretation. The court nevertheless determined that other evidence of irreversible loss of brain function was sufficient to justify the determination of brain death, and affirmed a jury verdict that the defendant was guilty of murder.

The attending physicians' errors here, if any, were technical. The medical records did not reflect that oxygenation was supplied during the apnea test or that an arterial PCO_2 determination was made, and the physicians had no clear recollection of how the test was performed. While the EEG did not reveal any unequivocal brain wave activity, there were electrical artifacts that could have obscured cerebral rhythms. There was, however, ample evidence that the victim was unresponsive to stimuli, was flaccid and areflexic, was apneic under the test as conducted, and had sustained massive brain injury. Under these circumstances, both trial and appellate courts were willing to accept the conclusion of the attending physicians that the victim was dead by neurological criteria when the ventilator was removed. It should be noted, however, that this case was decided before detailed clinical guidelines concerning brain death had been widely vetted and disseminated. A court today might be less willing to accept a determination resting heavily on an apnea test of uncertain rigor.

In re Alvarado

At issue in this case [In re Alvarado, 547 NYS 2d 190 (S Ct NT Cty 1989), vacated 550 NYS 2d 353 (S Ct App Div 1990)] was the validity of New York's brain deaths regulations as applied to an infant. A clinical determination of brain death was made by attending clinicians within a few hours of the infant's birth and while cardio respiratory functions were being maintained with a ventilator. When the parents were advised that their baby was brain dead, they insisted that the ventilator not be removed. After further discussion, hospital officials notified the parents that they would remove the ventilator unless forbidden by court order. The mother then initiated legal proceedings to obtain such an order. About 6 weeks after the initial determination of brain death, a court-appointed child neurologist examined the infant. She testified that the baby was immobile, unresponsive to stimuli, had mid-position unreactive pupils, no ocular response to oculocephalic or oculovestibular using ice water caloric testing, no rooting, sucking, cough or corneal reflexes, and did not breathe during an apnea test in which 100% O_2 was delivered via an endotracheal tube. Two electroencephalograms were isoelectric. On cross-examination, the expert conceded that "some brain cells" were "alive" in the medulla - although the basis for this testimony does not appear in the published opinion of the court.

The trial court then concluded that the infant was dead by neurological criteria and that the New York regulations were constitutional as applied in this case. However, it continued a preliminary order restraining the hospital from removing the respirator for an additional 5 days to allow the parents to move the child to another facility or to appeal. The parents appealed and the respirator was continued.

Three months later the state appellate court vacated the trial court decision on the basis of unspecified "new medical findings" indicating that the infant was not brain dead. As part of this ruling, the hospital agreed to seek judicial review before conducting further tests to determine whether the infant was brain dead. It is most unfortunate that the "new medical findings" were not described in the appellate court's opinion. Based on the expert's admission on cross-examination that some medullary cells were functioning, one can speculate that the infant may have exhibited some response to palatal or tracheal stimulation or that some sort of rudimentary respiratory movements were observed. The error here - if indeed it was an error - could have been technical in the sense of not performing sufficiently vigorous palatal or tracheal stimulation, or judgmental in the sense of not attributing significance to whatever reflex responses might have been observed. Certainly there is no hint of normative error here - unless one takes the position that in the current state of neurological knowledge it is not possible to diagnose brain death in an infant. There was a good faith effort by a knowledgeable physician who applied generally accepted criteria for assessing cerebral and brainstem functions.

People v Lai

In this case [People v Lai, 516 NYS 2d 300 (S Ct App Div 1987)], a criminal defendant raised the issue of normative error in the determination of brain death. As in the Eulo case, the defendant asserted that the physicians who removed a respirator from a "brain-dead" victim caused his death, not the defendant who had shot him in the head. In support of this claim, the defendant secured the testimony of a physician and a priest. Each testified that, under the then current state of technology, death could never be accurately and conclusively diagnosed until after cessation of cardio respiratory functions. In other words, the physicians allegedly violated a professional normative standard by relying on neurological criteria to diagnose death. The court rejected this argument, citing Eulo for the proposition that it is lawful to determine deaths by neurological criteria when respiratory and circulatory functions are maintained by mechanical means.

Gallups v Cotter

In this case [Gallups v Cotter, 544 So 2d 585 (AL 1988)], a neurosurgeon and another physician were sued for the tort of outrage. Parents of a brain-injured child alleged that the defendants had failed to obtain parental consent before removing the child's ventilator. The defendants, in consultation with other neurosurgeons, had determined that the child was dead by neurological criteria, having performed several examinations over an 11-day period and having obtained three electroencephalograms, all of which showed no detectable cerebral activity. Testimony at the trial was conflicting as to whether the parents verbally agreed to removal of the ventilator after the determination of brain death was made. The trial judge awarded summary judgment to the defendants because it was found that they had not acted intentionally or recklessly as was required to sustain a claim of outrage under state law. The state supreme court affirmed this ruling, observing that there was no evidence that the defendants "had a desire to inflict extreme emotional distress or that they knew severe emotional distress was likely to result from their actions."

Arguably the defendants made a judgmental error in not assuring themselves that the parents understood their child was dead and were ready emotionally for removal of the ventilator. But neither the trial nor appellate courts viewed this as the sort of error that should produce civil liability, nor was there any suggestion that either court perceived any technical error in the way the

physicians made their determination. Since state law authorized determination of death by neurological criteria and the defendants were careful about making their determination, there is no basis for positing a normative error.

In re Haymer

Whether a physician might have erred in determining death or relating to family members was not an issue here [In re Haymer, 115 Ill App 3d 349, 450 NE 2d 940 (IL App 1983)]. However, the court's ruling provides guidance that might forestall a claim of technical or judgmental error in future cases. The court had decided it was lawful to apply neurological criteria to determine death in a 7 month-old child who was being maintained on a mechanical ventilator. It then faced the question of whether the time of death for legal purposes was when brain death was diagnosed or when the ventilator was removed. In choosing the time of diagnosis, the court relied on evidence that there was at that time "irreversible cessation of total brain function, according to usual and customary standards of practice." Most brain death statutes accord with this view so the signal value of the court's ruling is limited. But in states without brain death statutes, this case may be useful to physicians concerned with accurately recording the time of death.

The book is full of such facts related to the issue of Brain Death. We are sure our readers would enjoy the book as much as we at the journal office did.

Order this book by Clicking here

Request a PDF file of this review by clicking here. (If your screen resolution can not be increased, or if printing this page is giving you problems like overlapping of graphics and/or tables etc, you can take a proper printout from a pdf file. You will need an Acrobat Reader though.)

Editor's recommendation. This book is recommended by the editor.