

Ad hoc committee of the WFN for Neuroethics

Brain death

(A European proposal for worldwide guidelines)

F. Gerstenbrand, H. Baumgartner

Introduction:

As coma dépassé, brain death was called by Mollaret and Goulon (1959) in the first description. Earl Walker described brain death (1984) as cessation of all functions of the entire brain. The first guidelines for brain death were based on the report of the President's Commission (1981), which defined legal and medical aspects. These were in principle accepted in most European countries. In the meantime worldwide discussions considering legal, religious, ethnic and cultural aspects are continuing. In view of the different position in the Western world and the cultural and religious communities in other parts of the globe it seemed necessary to develop a consensus paper which is in its first draft based on the European situation integrating historical development as well as international bioethical conventions. The paper includes current standards of scientific results and medical practice as well as ethical principles.

General statements to brain death:

Brain death is the irreversible loss of brain functions including the brain stem functions. Death of the brain is the death of a particular human organ, a "critical organ", the "central integrator" which functions can not be sustained even indefinitely with extraordinary medical care. Conditions of brain death defining the death of an individual. Brain death body cannot be maintained indefinitely, the brain death body is inexorably and imminently deteriorating to untreatable cardiovascular collapse.

Continuing treatment of a patient without any hope of regaining any level of brain function is neither in the interest of the patient nor ethically permissible. "The diagnosis of brain death shall be established by the medical community according to the current standards of scientific and medical practice". (Haupt & Rudolf, 1999). Brain death equating with death of a human body is reduced to a "mere collections of organs" (D. A. Shewmon 1998).

Definition of brain death:

Irreversible substantial damage of brain and brainstem. Total cessation of brain and brainstem functions, autonomic spinal cord functions (spinal reflexes, facultative) to differentiate – locked in syndrome vegetative state / apallic syndrome.

Criteria to confirm brain death:

Clinical criteria: coma, missing of any spontaneous motor action, no response to sensory stimuli, atonia of skeletal muscles, areflexia, idiomuscular contraction (facultative), missing of brainstem reflexes, pupils maximal wide, without any reactions, respiratory arrest, hypothermia - poikilothermia, reduced reability of the blood circulation (drug support can be necessary), autonomic spinal reflexes (facultative). Additional examinations: EEG – isoelectric, TCD –no blood flow. Other examinations (facultative): cerebral panangiography, cerebral CT, cerebral MRI, with MR-angiogram, evoked potentials.

Prerequisites for the diagnoses of brain death: history, aetiology (brain trauma, encephalitis, haematoma (intracerebral, extracerebral), brain oedema, infarcts, etc. Initial stage: acute midbrain syndrome/midbrain-upperpons-stage, acute bulbar brain syndrome/medullary stag. Clinical symptoms: coma -no brain functions, brain stem reflexes – missing, apnoea - demonstrable

Additional examinations: EEG-isoelectric, TCD-no blood flow.

Other examinations: Cerebral panangiography-no blood supply, cerebral CT, cerebral MRI-substantial lesions and tentorial Herniation foraminal herniation, MR-angiogram-no blood flow, evoked potentials – no reaction.

Program for diagnoses of brain death:

1.step: Clarification of aetiology :history, initial stage (acute midbrain syndrome / midbrain-upperpons stage, acute bulbar brain syndrome / medullary stage, neurological examination, , EEG, TCD, additional examination, Neurosonology, cerebral MRI, MR-angiogram, laboratory tests, CSF (facultative).

2.step: Exclusion of all processes, possible to develop a reversible coma with clinical symptoms similar to brain death: hypothermia, exogenous intoxication, relaxation treatment, metabolic derangement etc.

3.step: Beginning of diagnostic procedures: clinical symptomatology of full stage of brain death (coma, no response to external and internal stimuli, brain stem areflexia - pupillary functions, trigeminal reflexes, gag and cough reflexes, oculo-cephalic reflex, vestibulo-ocular reflex, apnoea, after disconnection to the respirator, no spontaneous breathing, blood gas rise in pCO₂.

Brain death examination program:

Team of independent specialists for the diagnosis of brain death: neurologist - clinical symptomatology, anaesthesiologist - respiratory arrest, EEG-specialist TCD-specialist, excluded members of the transplantation team.

Waiting time 6 hours, exceptions for prolongation to 12 hours (children, intoxication, etc.), reduction of the waiting time to 1 hour (under clear diagnostic conditions without EEG support).

Brain death protocol: during 6 hours (clinical examination), every 2 hours, EEG – monitoring, TCD – monitoring.

Change in waiting time:

Exceptions for prolongation of the waiting time: (12 hours) children, hypothermia (exogenous below 30), intoxication (exogenous, endogenous), subarachnoid haemorrhage, hypovolemic shock, relaxation treatment, no certain aetiology.

Reduced waiting time to (1 hour): penetrating head injury (gunshot), severe open brain injury, brain stem rupture, cardiac arrest without resuscitation, brain tumour, inoperable, mass haemorrhage in the brain.

The European proposition for brain death:

The European proposal for a consensus paper on brain death, presented at the International Congress on Brain Death in Havana, Cuba, in February 2000, demands the following:

1. Symptoms of brain death: coma, breakdown of all motor functions including brain stem reflexes . interruption of all sensory input and, demonstrable apnoea, hypothermia or poikilothermia, autonomic spinal cord reflexes (in 60%), in addition isoelectric EEG recorded during a two hour period transcranial Doppler sonography (TCD) confirming the interruption of blood circulation.
2. A waiting period of six hours, may be longer in certain cases (e.g. children, barbiturate poisoning etc.) and shorter in others (e.g. brain stem rupture, gun shot etc.).
3. Clarified aetiology (acute traumatic brain injury, encephalitis, etc.)
4. Monitoring and documentation of the clinical course, initial stage of an acute brain stem syndrome, full stage of brain death syndrome.
5. Independent team of specialists: neurologist for clinical symptoms, anaesthesiologist for intensive care support, EEG specialist and TCD specialist.

6. Members of the transplantation team are strictly excluded.

BRAIN DEATH, EUROPEAN PREPOSITION

1. SYMPTOMATOLOGY
2. CLASSIFICATION OF THE BASIC PATHOLOGICAL PROCESS
3. DEVELOPEMENT TO THE FULL STAGE
4. CLINICAL ADDITIONAL EXAMINATIONS

TEAM OF INDEPENDENT SPECIALISTS

1. SYMPTOMATOLOGY

- Coma
- MISSING OF SPONTANOUS MOTOR ACTIONS
- NO RESPONSE TO SENSORY STIMULI
- ATONIA OF SKELETON MUSCLES
- AREFLEXIA
- IDIOMUSCULAR CONTRACTIONS; FACULATIVE
- MISSING OF ALL BRAINSTEM REFLEXES
- PUPILS, MAXIMAL WIDE, WITHOUT ANY REACTION
- APNOE – DEMONSTRABLE
- HYPOTHERMIA - POIKILOthermia
- SYSTEMIC BLOOD CIRCULATION; ACTIONALLY DRUG ASSISTED
- SPINAL REFLEXES – FACULTATIVE (60 %).

2. CLARIFICATION OF ETIOLOGY

- TRAUMATIC BRAIN INJURY
- HYPOXIA
 - CARDIAC ARREST
 - STRANGULATION
 - DROWNING, ETC:
- HPOXAEMIA
 - VOLEMIC SHOCK, ETC.
- ENCEPHALITIS, DIFFERENT ETIOLOGY
- BRAIN TUMOR
- SUBARACHNOIDAL HEMORRHAGE
- HAEMATOMA
 - INTRACEREBRAL
 - EXTRACEREBRAL

- BRIAN INFARCT
- INTOXICATION
 EXOGENOUS (DRUG, ETC.)
- RELAXATION TREATMENT
- ANIMAL POISONING
 SNAKE BITE, ETC.,
- HERB POISONING
 BELLA DONNA ETC.
- METABOLIC COMA
- HYPOTHERMIA, EXOGENOUS

3.DEVELOPMENT TO THE FULL STAGE OF BRAIN DEATH

- INITIAL STAGE
 ACUTE MIDBRAIN SYNDROME, STAGE IV
 MIDBRAIN-UPPERPONS STAGE
 ACUTE BULBARBRAIN SYNDROME, STAGE II
 MEDULLARY STAGE
- FULL STAGE OF BRAIN DEATH
 CLINICAL SYMPTOMATOLOGY
 SPINAL REFLEXES (60 %)
- EEG-ISOELECTRIC
 TCD –NO BLOOD FLOW.

4.CLINICAL AND ADDITONAL EXAMINATIONS

- SYMPTOMATOLOGY OF BRAIN DEATH
 CLINICAL MONITORING
 2 hours, documentation list
- EEG-ISOELECTRIC
 2 hours, recording
- TCD
 2 hours, recording
- FACULTATIVE EXAMINATIONS:
 MRI, cerebral
 MR-angiogram, cerebral
 EVOKED POTENTIALS
 PANANGIOGRAPHY, cerebral
- WAITING PERIOD 6 HOURS
 EXCLUSION CRITERIAS TO 12 HOURS
 CHILDREN

HYPOTHERMIA, EXOGENOUS BELOW 30 °
ACUTE INTOXICATIONS
 EXOGENOUS
 ENDOGENOUS
SUBARACHNOIDAL HEMORRHAGE
HYPOXEMIA
 HYPOVOLEMIC SHOCK
RELAXATION TREATMENT
NO CERTAIN ETIOLOGY
REDUCED WAITING TIME TO 1 HOUR
PENETRATING HEAD INJURY, GUNSHOT
SEVERE OPEN BRAIN INJURY
BRAINSTEM RUPTURE
CARDIAC ARREST, WITHOUT RESUSCITATION
BRAIN TUMOR, INOPERABLE
MASS HEMORRHAGE IN THE BRAIN

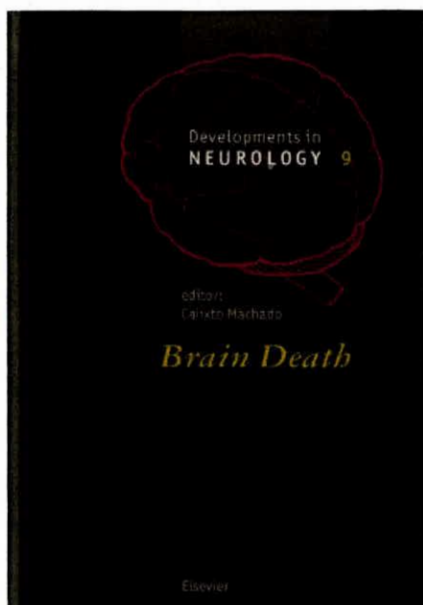
5. TEAM OF SPECIALIST FOR DIAGNOSIS OF BRIAN DEATH INDEPENDENT

- NEUROLOGIST-CLINICAL SYMPTOMATOLOGY
- ANAESTHESIOLOGISTS-RESPIRATORY ARREST
- EEG-SPECIALIST
- TCD-SPECIALIST
- EXCLUDED MEMBERS OF THE TRANSPLANTATION TEAM
-

European brain death codes:

The analysis of European national brain death codes demonstrates that the concept of brain death as defining the death of the individual is widely accepted. The diagnosis of brain death according to the recommendations of the various nations is a necessary prerequisite for the explantation of cadaveric organs. The most notable differences between the various European countries lie in the concept of brainstem death, as in the United Kingdom, as opposed to that of total brain death in other countries and in the technical confirmation methods to corroborate the clinical signs of brain death.

Brain Death: Proceedings of the Second International Conference on Brain Death, Havana, Cuba, February 27-March 1, 1996



Calixto Machado

Elsevier, 1995 - 300 Seiten

★★★★★

0 Rezensionen

Hardbound. Over the centuries people were deemed dead when they stopped breathing and when their hearts stopped beating. Technological advances, however, have faded the frontiers between life and death. In the first symposium on this issue of brain death, delegates from twenty-one countries attended to discuss many controversial issues concerning brain death and related issues. This book is based on the second international symposium on the subject, and reflects the work of several groups, commissions and networks within this field, reflecting the tremendous actuality of the subject. Prominent scientists, therefore, present a rich source of knowledge in this volume, which will contribute to the knowledge of this and future generations. Any reason to enlarge knowledge of death (and life) is very much a matter of human dignity.

Bibliografische Informationen

Titel	Brain Death: Proceedings of the Second International Conference on Brain Death, Havana, Cuba, February 27-March 1, 1996 <i>Band 9 von Developments in neurology, ISSN 0166-5960</i> <i>Band 9 von International Congress Series</i>
Herausgeber	Calixto Machado
Ausgabe	illustriert
Verlag	Elsevier, 1995
ISBN	0444822674, 9780444822673
Länge	300 Seiten

Product details

Hardcover: 310 pages

Publisher: Elsevier (4 Oct. 1995)

Language: English

ISBN-10: 0444822674

ISBN-13: 978-0444822673

Product Dimensions: 17.8 x 1.9 x 25.4 cm