BRAIN DEATH
Minimal standards
Introduction

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Brain Death
Basics

Brain death, irreversible break down of all brain functions including brain stem functions
EEG-isoelectric line
Circulatory arrest in brain vessels

Waiting period between 2 to 6 hours (Europe)
- Extension to 12 hours (children, hypothermia, intoxication, unknown origin)
- Reduction to 1 hour (severe brain damage, gun shot, etc.)

Accepted in Europe and American countries

Brain stem death official diagnoses in UK and some other countries.

Brain Death
Medical definition

The diagnosis of brain death is established by the medical community according to current standards of scientific and medical practice (Haupt & Rudolf, 1999).

Diagnoses supported by strict verification of clinical symptoms, confirmed by experienced neurologists.

EEG obligatory, TCD facultative

Acceptance of brain death diagnosis by national law

Brain Death
Basics for law

Brain Death: irreversible loss of brain functions and brain stem functions.

Death of brain is the death of a particular human organ, „critical organ" the „central integrator"

Function of brain cannot be sustained even for a while with extraordinary care (Wijdiks, 2001).

Total cession of brain and brain stem is based on an irreversible substantial damage of brain including brain stem function, spinal cord can start autonomous functions.

Differential diagnoses:

Vegetative state/apallic syndrome (Jennett & Plum, 1972; Gerstenbrand, 1967).

Locked in Syndrome (Plum & Posner, 1966).

Brain Death, European preposition
EFNS – SIG on Ethics in Neurology

- Aetiology of primary pathological process (intoxication, cardiac arrest, etc.)
- Aetiology of brain process (haematoma, encephalitis, traumatic brain injury, etc.)
- Clinical course to Brain Death syndrome
  initial stage (brain stem syndromes), full stage
- Additional examinations
  EEG obligatory, TCD facultative,
- Additional examinations in the initial phase
  cCT, cMRI, etc.
- Prerequisites (protocol of stepwise examinations)
- Independent medical team

Diagnosis of Brain Death
European Preposition – Recent status

1 Symptoms
- Coma
- No response to sensory-sensitive stimuli
- No spontaneous motor actions
- No brainstem reflexes
- Total vegetative dysregulation (hypothermia-poikilothermia), systemic blood circulation (drug assisted)
- Autonomous cardiac function
- Spinal cord autonomous reflexes (positive in 60 %)

2 Additional examinations
- EEG: isoelectric line
- TCD: zero flow (facultative)

3 Waiting period: 6 hours

Clinical course of Brain death syndrome

European Preposition

- Initial stage, brain stem dysfunction
  - Midbrain – Upper Pons Stage (Plum & Posner)
  - Acute midbrain syndrome, 5 phases (Gerstenbrand & Lücking)
  - Medullary stage (Plum & Posner)
  - Acute bulbar brain syndrome, 2 phases (Gerstenbrand & Lücking)
- Full stage of brain death syndrome, clinically identical with acute bulbar brain syndrome phase 2/medullary stage
  - Exceptions:
    - systemic hypotension (drug assistance necessary),
    - isoelectric EEG
    - absence of cerebral blood flow
    - autonomous cardiac function
    - spinal reflexes

Brain Death - Team

- Neurologist - clinical monitoring
- Anaesthesiologist – responsible for ICU
- EEG-Specialist – responsible for EEG monitoring

- Exclusion of transplantation team members

Brain death diagnosis
Problems in developing countries

- Diagnosis of brain death needs highly qualified neurological service and modern equipment.
- In developing countries
  - more interest to organize ICU, emergency rooms, intermediate care units (saving lives).
  - Home respirator
  - Neurosurgery departments are available, replacing neurology.
  - Internal ICUs are organised without neurologist
  - Neurological diseases are treated without neurologist
- For brain death diagnosis without neurologist minimal standards are necessary
- Obligation of WFN and regional neurological organisations

Minimal standards for brain death diagnosis

- Brain death diagnosis is only required for patients, which are in an ICU or receiving life support in facilities with artificial respiration support system such as in emergency rooms, intermediate care units or with home respirator.
- Without this backup, patients in severe acute brain damage state with respiratory insufficiency have no possibility to survive (medullary stage/acute bulbar brain syndrome, etc.).

Brain death diagnosis without neurologist
Minimal standards - Basics for guidelines

- Clinical course: initial phase of brain stem dysfunction (midbrain upper pons stage/acute midbrain syndrome, medullary stage/acute bulbar brain syndrome)
- Classification of primary pathological process and the brain process
- Continuing control of the clinical course to the breakdown of whole brain functions (protocol)
- Use of the local existing diagnostic equipment and technical assistance
- Cooperation with anaesthesiologist, neuro-surgeon, internist, general practitioner
- Waiting period of 12 hours

Minimal standards of brain death
without neurologist
Diagnostic program

1. History of patient
2. Diagnoses of the based acute primary disease (neurological, internal, intoxication, others)
3. Clarification of pathological brain process (haematoma, encephalitis, traumatic, etc.)
4. Clinical course of the brain and the brain stem dysfunction
5. Symptoms of brain death, full stage
6. Use of the local existing diagnostic abilities and equipment
   - EEG, recorded by trained technical assistant
   - TCD, served by trained anaesthetist
   - If available: evoked potentials, served by trained anaesthetist
7. Waiting period 12 hours in any case

Minimal standards for brain death in developing countries

- Legal authorities
  - Inheritance
  - Legal proceedings
  - Judicial inquiring
  - Forensic process
- Religious demands
- Political purpose

Management of brain death diagnosis in future

- Training of sufficient number of neurologists in developing countries
- Special training in brain death syndrome
  pre-grade, post-grade
- Harmonization in brain death diagnosis (brain stem death)
- Organisation of neurological equipment (EEG, TCD, evoked potentials, MRI)
- Training of neighbour specialities (neurosurgery, anaesthesiology)
- Training courses in brain death diagnosis (neurologists, anaesthetists, general practitioners)
- Brain death diagnosis without neurologist last but not least will not be acceptable in the future by ethical reason