

## **BRAIN DEATH**

### Criteria

- 1) Cause of coma must be a permanent condition
- 2) Exclusions: Drugs, electrolyte abnormalities, Acidosis, Hypothermia, Endocrine (Myxedema coma), Liver/renal failure
- 3) Absence of medications: toxicology, wait 4-7 times  $\frac{1}{2}$  life of medications, TOF testing
- 4) Temperature  $> 36^{\circ}$
- 5) SBP  $> 100$
- 6) Brain stem reflexes exam
- 7) Apnea testing
- 8) Ancillary testing if unable to perform all the above.

### Exam

- 1) Unresponsiveness
- 2) Cerebrally modulated motor responses are absent.
  - a. Spinal cord reflexes (triple flexion) may be present.
  - b. Seizures or decorticate/decerebrate posturing rule out brain death.
- 3) Absence of the following brainstem reflexes:
  - a. Pupillary
  - b. Corneal
  - c. Cough to deep endotracheal suctioning
  - d. Oculovestibular (Caloric Ice Water Test)
    - i. Ensure TMs intact
    - ii. 50 ml ice cold water, allow 1 minute after injection and at least 5 minutes between testing on each side.
  - e. Respiratory reflex (see apnea testing below)

### Apnea testing

1. Prior to apnea testing the patient must meet the prerequisites and exam criteria for brain death.

- a. systolic blood pressure greater than or equal to 100 mmHg.
- b. FIO<sub>2</sub> 100% for at least 10 minutes prior to Apnea Test
- c. The ventilator settings should be adjusted for a PaCO<sub>2</sub> of 35- 40mmHG
- d. Obtain baseline ABG.

2. The Apnea Test begins when mechanical ventilation is removed. Oxygen at 100% should be delivered via t-piece.

a. Monitor blood pressure and heart rate continuously. If the patient becomes unstable during the period, terminate the test. Alternative confirmatory test must be utilized.

b. Observe and/or feel for any respiratory effort. If respiratory effort is noted, stop the test and resume mechanical ventilation.

- c. Obtain ABG at 8 and 10 minutes off ventilator

d. No evidence of respiratory effort AND the PaCO<sub>2</sub>  $> 60$ mmHg OR  $> 20$  mmHg above baseline, THEN the apnea test, supports the diagnosis of brain death.

### 3. Confirmatory tests

These tests are not required. They are recommended in any case where the etiology of coma is unclear or the patient is too unstable to perform apnea test.

- a. Cerebral Arteriography
- b. Radionuclide Scanning
- c. Electroencephalogram (EEG)
- d. Transcranial Doppler Ultrasonography (TCD)

### 4. Additional Supportive Information

Intracranial Pressure Monitoring: A diagnosis of brain death is supported when patient's intracranial pressure (ICP) is equal to or greater than the patient's mean arterial pressure (MAP).

### 5. Documentation by the Physician

- a. Etiology and irreversibility of condition
- b. Clinical observations including prerequisite criteria and apnea testing
- c. Date and time of death (time that PaCO<sub>2</sub> result is done)
- d. Confirmatory testing methodology and results (time of death is time test result is done)

**University of Colorado Hospital**  
**BRAIN DEATH DETERMINATION DOCUMENTATION**

**NOTE:** The patient must be examined in this hospital during treatment of potentially correctable abnormalities. The examining physician will initiate each component of the exam and where appropriate, document supporting laboratory or examination data. If a component of the exam is not or cannot be done, please document.

**THE EXAMINING PHYSICIAN MUST DOCUMENT THE DATE AND TIME OF THE EXAMINATION. RESULTS OF EXAM MUST BE DOCUMENTED FOR ALL OF SECTIONS A, B, AND C AND ACCORDING TO GUIDELINES FOR SECTION D.**

EXAM Date : \_\_\_\_\_ EXAM Time: \_\_\_\_\_

Have reasonable efforts been made to notify patients' family or decision maker that a determination of death based on cessation of brain function will be completed?

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**A. No Evidence of/Cause of Reversible CNS Depression**

1. Core temperature must be greater than 36 <sup>0</sup> Celsius. Record temperature	Temp _____
2. Record no evidence of severe metabolic perturbations that could potentiate central nervous system depression. Consider glucose, Na, creatinine, PaCO <sub>2</sub> , SaO <sub>2</sub> .	No evidence <input type="checkbox"/>
3. No CNS depressant drugs or paralytic agents given a minimum of 2-hours prior to exam. Record no evidence of pharmacological perturbations within 2-hours.	No evidence <input type="checkbox"/>
4. Absence of hypotension (SBP greater than 90 mm Hg or MAP greater than 60 mm Hg). Record blood pressure.	B/P _____

**B. Absence of Cortical Function**

1. No motor response to any stimuli (excluding spinal reflex)	No response <input type="checkbox"/>
2. No eye opening to any stimuli.	No response <input type="checkbox"/>
3. No verbal response to any stimuli.	No response <input type="checkbox"/>

**C. Absence of Brain Stem Reflexes and Responses**

**\*\*Physician must perform all 4 of the tests listed below. \*\***

1. Pupils non-reactive to strong light.	Reflex absent <input type="checkbox"/>
2. Absent corneal reflexes	Reflex absent <input type="checkbox"/>
3. Absent response to upper and lower airway stimulation, such as pharyngeal and endotracheal suctioning.	Reflex absent <input type="checkbox"/>
4. Absent ocular response to irrigation of the ears with 50 mL of ice water (no ocular cephalic reflexes)	Reflex absent <input type="checkbox"/>

**D. Document Confirmatory Test Utilized (minimum of 1)**

PaCO <sub>2</sub> at start of test	_____
1. Apnea Test: (with physician present) PaCO <sub>2</sub> at end of test	_____
pH at end of test	_____

**Other confirmatory tests are not required if a clinical exam including an apnea test is done. If an apnea test is not done as part of the clinical exam, one of the following confirmatory tests is required:**

2. Other Test(s):	<input type="checkbox"/> Cerebral arteriography <input type="checkbox"/> EEG <input type="checkbox"/> Radionuclide CBF <input type="checkbox"/> Transcranial Doppler or ICP is equal to MAP
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Having considered the above findings, I hereby certify brain death pronounced by:

Attending Physician Signature \_\_\_\_\_

Name Printed \_\_\_\_\_ UPI# \_\_\_\_\_