



Neurocritical  
Care Society

# BRAIN DEATH

**Sample Brain  
Death Policy**  
for Adaptation at an  
Individual Hospital

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[YOUR HOSPITAL NAME]

## **SAMPLE BRAIN DEATH DETERMINATION POLICY**

### **I. PURPOSE:**

The purpose of this policy is to define standards for the determination of death by neurological criteria, also known as “brain death”, in adult patients (defined as those 18 years of age and older for purposes of this policy) in accordance with institutional, state and federal requirements. This document primarily reflects practice and standards in the United States, and variations exist in other countries.

- A. Policy: State and Federal law require that a declaration of death be made in accordance with usual and customary standards of medical practice. Death is defined in [INSERT SPECIFIC STATE STATUTE HERE] as the total and irreversible cessation of all brain function. This policy sets forth the [YOUR] Hospital's guidelines for the determination of death by neurological criteria.
- B. Definition: Death by neurological criteria is defined as the irreversible loss of the capacity for consciousness combined with the irreversible loss of all brain and brainstem functions, including the capacity to breathe. Death determined by neurological criteria is equivalent to the death of the individual, even though the heart continues to beat and spinal cord functions may persist.

### **II. PROCEDURE:**

- A. Procedure for the Declaration of Death based on Neurological Criteria:

ONE OR TWO [SPECIFIC FOR YOUR HOSPITAL/STATE] licensed attending Board eligible/certified physicians with appropriate expertise for determination of death by neurological criteria are required to determine and document that a patient has suffered a total and irreversible cessation of all brain function. [OPTIONAL: One of the attending physicians must be a neurologist or a neurosurgeon.] No declaring physician can be involved in the subsequent anatomical donation process or surgery. Only one apnea test needs to be performed; otherwise both examiners must perform all of the physical examination requirements, or the examination should be performed in full detail with both examiners present.

- B. Establishing Irreversibility:

Irreversibility is demonstrated by:

1. Establishing an etiology of coma capable of causing brain cell death to the degree that is compatible with brain death;
2. Demonstrating total loss of brainstem function, including spontaneous respirations in the setting of hypercarbia and acidosis; and
3. Excluding potentially reversible causes.

- C. Excluding Confounding Conditions:

It must be determined whether any conditions exist that may depress or otherwise limit the assessment of neurological function, even though they may not themselves directly affect brainstem function. Such conditions may include but are not limited to:

1. Hypothermia (temperature less than 36 degrees Celsius or its equivalent).
2. Hypotension, defined as a systolic blood pressure <100 mm Hg.
3. Severe electrolyte disturbance.
4. Treatable metabolic disorders (including acid-base disorders, hepatic or renal encephalopathy, endocrine dysfunction, hyperammonemia and severe hyperosmolar states).
5. Drug intoxication or effects (particularly narcotics, barbiturates, sedatives and hypnotics).
6. Presence of neuromuscular blocking agents.

If one of these conditions is present and cannot be corrected, an ancillary test should be performed in lieu of the clinical examination (see below).

D. Clinical Criteria:

1. The cause and irreversibility of the condition has been established.
2. There must be complete loss of life-sustaining brain function as evidenced by the presence of each and all of the criteria D.2.a., D.2.b. and D.2.c in order to establish a clinical diagnosis of brain death.

a. Coma:

The patient should be observed for spontaneous movement and response to noxious stimuli applied cranially and peripherally. There must be no brain-mediated responses, (including decorticate or decerebrate posturing, dyskinesias, myoclonus or seizures) spontaneously or in response to noxious stimuli.

Since the spinal cord may be intact, some reflex responses may be present, including deep tendon reflexes, plantar reflexes, triple flexion of the legs, toe flexion or extension on plantar stimulation, superficial abdominal reflexes, and reaction of the blood pressure to noxious stimulation. Complex motor movements (“Lazarus sign”) may also be observed, and require clinical expertise and/or ancillary testing to exclude cerebral origin.

b. Absence of brainstem reflexes:

- The pupils must be mid-size or larger and non-reactive to bright light. Care should be taken that atropine or related drugs have not been given. Small pupils should also alert the clinician to the possibility of drug effect.
- If testing is not contraindicated (e.g. due to cervical spine injury), oculocephalic (“doll’s eye”) and oculovestibular (ice water caloric) responses must be absent.
- During caloric stimulation, the head should be at 30 degrees above the horizontal, and the integrity of the tympanic membrane and patency of the ear canal ensured. 60 seconds of constant exposure to ice water in each ear should be used. Both ears should be tested separately, with a 5-minute period before testing the contralateral ear.
- Corneal and pharyngeal (gag) reflexes must be absent.
- No cough response to deep bronchial suctioning.
- No movement of the head, face or eyes in response to painful stimulation.
- No spontaneous respirations.

c. Apnea:

An apnea test should be performed in the hemodynamically stable patient.

The apnea test is meant to test for lack of responsiveness to CO<sub>2</sub> challenge (PaCO<sub>2</sub> equal to or greater than 60 mm Hg, or a 20 mm Hg rise in PaCO<sub>2</sub> above baseline PaCO<sub>2</sub> in individuals who are known CO<sub>2</sub> retainers) and respiratory acidosis (pH equal to or less than 7.3). It is not a test of hypoxic stimulation.

Prior to the apnea test, the patient should be preoxygenated with 100% oxygen to a PaO<sub>2</sub> of >200 mm Hg, and the paCO<sub>2</sub> should be normalized to 40 mm Hg +/- 5 mm Hg (assuming the patient is not a known CO<sub>2</sub> retainer). Blood pressure should be supported with vasopressors as needed to maintain the systolic blood pressure greater than 100 mm Hg. If the patient is requiring a large dose of vasopressor medications to achieve this pressure, consideration should be given to obtaining an ancillary test in lieu of performing the apnea test to avoid cardiovascular collapse during testing.

The patient should then be disconnected from the ventilator, and a catheter attached to an oxygen source delivering at least 6 liters/min of 100% O<sub>2</sub> placed to the level of the carina. The patient should then be constantly observed for 8-10 minutes. The chest and abdominal wall should be observed for movements suggestive of respiratory effort, and the monitor observed for evidence of hypotension/hypoxia. If no spontaneous respiratory effort is observed, an arterial blood gas should be obtained at 8-10 minutes. If the arterial blood gas shows a pCO<sub>2</sub> greater than 60 mm Hg, or a rise greater than 20 mm Hg above baseline in a chronic CO<sub>2</sub> retainer, apnea has been established and the patient can be pronounced dead by brain criteria. If these blood gas criteria have not been met, but the patient was hemodynamically stable during the procedure, the apnea test can be repeated for a longer period of time, after again pre-oxygenating the patient and re-establishing normocarbina.

If instability prevents completion of the test, the test should be aborted, and an ancillary test performed. Indications to abort the apnea test are:

Oxygen saturation <85% for >30 seconds  
Systolic blood pressure <90 mm Hg

E. Ancillary Testing:

Any uncertainty in the completion or clinical interpretation of parts D.2.b. or D.2.c. should be resolved by an ancillary study. An ancillary test should not be used as a substitute for a clinical determination of brain death, except when a clinical determination cannot safely or accurately be performed. Acceptable ancillary tests include: nuclear medicine cerebral blood flow study (SPECT), catheter-based conventional cerebral angiography or transcranial Doppler to confirm the absence of blood flow to the brain parenchyma, or an electroencephalogram (EEG) to confirm the absence of electro-cerebral activity. All ancillary tests must be performed in accordance with national standards specific to brain death determination.

F. Declaration of Death by Neurological Criteria in Pediatric Patients:

This policy does not apply to patients under 18.

G. Communication With Family:

The patient's family is not asked to participate in or to make the decision that the patient has met neurological criteria for declaration of death. The family should be informed that evaluation for neurological death is taking place, and also when the determination has been made. The family is then informed that even though the patient has spontaneous cardiac activity, the patient is legally dead. Family permission is NOT required for the removal of the ventilator when a determination of death by neurological criteria has been made. However, a reasonable amount of time should be allowed for the family to visit the patient and come to terms with the diagnosis prior to the removal of the ventilator. Consideration should be given to patients and families with specific religious and cultural beliefs regarding brain death and end-of-life care, and the bioethics committee and/or religious ministries may be helpful in resolving any disagreements.



H. Documentation of Death by Neurological Criteria:

The official time of death is the time that the arterial blood gas is officially reported, or when the attending physician officially signs the ancillary test.

UNIT NO.:

NAME:

BIRTH DATE:

VISIT NUMBER:

(If handwritten, record name, unit no., birth date, and visit no.)

**If the clinical examination cannot be performed adequately and an ancillary test is necessary, two examinations are NOT required.**

<p><b>I. PREREQUISITES</b></p> <p>A. Clinical or neuroimaging evidence of acute CNS catastrophe that is compatible with irreversible loss of brain function</p> <p>B. Absence of complicating medical conditions</p> <p>1. Absence of severe electrolyte, acid base or endocrine disturbance or severe hyperammonemia</p> <p>2. Absence of drug intoxication, poisoning, sedatives or neuromuscular blocking agents</p> <p>3. Core temperature 96.8°F / 36°C or greater</p>	<p><b>I. FIRST EXAM</b></p> <p>A. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>3. Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><b>I. SECOND EXAM</b></p> <p>A. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>3. Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p><b>II. COMA or UNRESPONSIVENESS</b></p> <p>Absence of any cerebrally-mediated response to auditory and tactile noxious stimulation, peripherally and in the cranium</p>	<p><b>II. FIRST EXAM</b></p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><b>II. SECOND EXAM</b></p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p><b>III. ABSENCE of BRAINSTEM REFLEXES</b></p> <p>A. Absent pupillary responses</p> <p>1. Pupillary size midposition or dilated</p> <p>2. Pupils unresponsive to bright light</p> <p>B. Absent eye movement</p> <p>1. Absent oculocephalic reflex</p> <p>2. Absent oculovestibular reflex (caloric responses) (N.B. The oculovestibular reflex must always be tested. The oculocephalic test may be contraindicated when C-spine integrity questioned; otherwise it must be tested.)</p> <p>C. Absent corneal reflexes</p> <p>D. Absent pharyngeal and tracheal reflexes</p> <p>1. Absent response to posterior pharyngeal stimulation</p> <p>2. Absent cough to bronchial suctioning</p> <p>3. Absent spontaneous respirations</p>	<p><b>III. FIRST EXAM</b></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>C. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>3. Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><b>III. SECOND EXAM</b></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>C. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>1. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>2. Yes <input type="checkbox"/> No <input type="checkbox"/> Untestable <input type="checkbox"/></p> <p>3. Yes <input type="checkbox"/> No <input type="checkbox"/></p>



PT. NAME:

UNIT NO.:

VISIT NO:

IV. APNEA	IV. FIRST EXAM	IV. REPEAT APNEA TESTING IS NOT REQUIRED IF THE FIRST TEST CONFIRMS APNEA
A. Prerequisites		
1. Core temperature 96.8° F/ 36° C or greater	1. Yes <input type="checkbox"/> No <input type="checkbox"/>	
2. Systolic BP > 100 mmHg (with or without vasopressor agents)	2. Yes <input type="checkbox"/> No <input type="checkbox"/>	
3. Arterial pCO <sub>2</sub> 40 +/- 5 mm Hg (in known non-CO <sub>2</sub> retainer)	3. Yes <input type="checkbox"/> No <input type="checkbox"/>	
4. Arterial pO <sub>2</sub> greater than 90 mm Hg	4. Yes <input type="checkbox"/> No <input type="checkbox"/>	
B. Apnea testing checklist		
1. Preoxygenate to a PaO <sub>2</sub> >200 mm Hg and then administer 100% FIO <sub>2</sub> during the entire test period	1. Yes <input type="checkbox"/> No <input type="checkbox"/>	
2. Disconnect the ventilator; monitor with pulse oximeter throughout the test period	2. Yes <input type="checkbox"/> No <input type="checkbox"/>	
3. Deliver 100% FIO <sub>2</sub> into the trachea via a cannula at the level of the carina, maintaining oxygen saturation above 85%	3. Yes <input type="checkbox"/> No <input type="checkbox"/>	
4. Check arterial blood gases at 8-10 minutes and reconnect the ventilator when either a) pCO <sub>2</sub> is 60 mmHg or greater, or b) pCO <sub>2</sub> is greater than 20 mmHg above the patient's known baseline (in known CO <sub>2</sub> retainers)	4. Yes <input type="checkbox"/> No <input type="checkbox"/>	
5. Abort the apnea test and immediately reconnect the ventilator for any of the following reasons:		
a. Systolic BP falls below 90 mm Hg or there is cardiovascular collapse	a. Yes <input type="checkbox"/> No <input type="checkbox"/>	
b. Oxygen desaturation (<85% for >30 seconds)	b. Yes <input type="checkbox"/> No <input type="checkbox"/>	
c. Significant cardiac arrhythmia	c. Yes <input type="checkbox"/> No <input type="checkbox"/>	
d. Respiratory movements are observed	d. Yes <input type="checkbox"/> No <input type="checkbox"/>	
C. RESULTS of APNEA TESTING		
1. APNEA CONFIRMED	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	OR	
2. APNEA TESTING CONTRAINDICATED	Yes <input type="checkbox"/>	
	OR	
3. APNEA TEST ABORTED	Yes <input type="checkbox"/>	

PT. NAME: \_\_\_\_\_  
 UNIT NO.: \_\_\_\_\_  
 VISIT NO: \_\_\_\_\_

**I – IV MUST BE MET TO CONFIRM DEATH BY NEUROLOGICAL CRITERIA WITHOUT THE NEED FOR ANCILLARY TESTING**

**V. ANCILLARY TESTING IS REQUIRED WHEN ITEMS I AND II ARE MET BUT EITHER ITEM III (BRAINSTEM REFLEX TESTING) OR ITEM IV (APNEA TESTING) CANNOT BE COMPLETED OR CONFIDENTLY INTERPRETED**

**ANCILLARY Study Performed:**

- CONVENTIONAL CATHETER-BASED CEREBRAL ANGIOGRAPH
- NUCLEAR MEDICINE CEREBRAL BLOOD FLOW STUDY (TECHNETIUM 99M SPECT)
- TRANSCRANIAL DOPPLER
- ELECTROENCEPHALOGRAPHY

DEMONSTRATED ABSENCE OF CEREBRAL BLOOD FLOW OR CEREBRAL ELECTRICAL ACTIVITY: YES  NO

**SUMMARY OF FINDINGS**

	YES	NO	OTHER
<b>I. PREREQUISITES</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. COMA or UNRESPONSIVENESS</b>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III. ABSENCE of BRAINSTEM REFLEXES</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> (Untestable)
<b>IV. APNEA</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> (Apnea test aborted or contraindicated)
<b>V. BRAIN DEATH ESTABLISHED BY ANCILLARY TESTING</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> (Not indicated)

**CONFIRMED DEATH IN ADULTS BY Neurological CRITERIA** YES  NO

1st examiner signature: \_\_\_\_\_ / \_\_\_\_\_  
Printed Name

Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time: \_\_\_\_\_

2nd examiner signature: \_\_\_\_\_ / \_\_\_\_\_  
Printed Name

Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time: \_\_\_\_\_