

Declaration of Brain Death (Adults)

Brain death is declared when two different physicians who are licensed in California have each performed a separate clinical exam, following the criteria on this form. The cold caloric and the apnea test must be performed at least once, by either physician declaring brain death. If an apnea test cannot be performed, an ancillary test must be performed.

Document the date and time of the findings of each exam or test.

Criteria for clinical diagnosis of brain death (American Academy of Neurology)¹.

1st physician 2nd physician

Prerequisites (all must be checked)

- Coma, irreversible and cause known
- Neuroimaging explains coma
- CNS depressant drug effect absent (if indicated toxicology screen; if barbiturates given, serum level ≤ 10 μ g/mL)
- No evidence of residual paralytics (electrical stimulation if paralytics used).
- Absence of severe acid-base, electrolyte, endocrine abnormality
- Normothermia or mild hypothermia (core temperature $\geq 36^{\circ}\text{C}$)
- Systolic blood pressure ≥ 100 mm Hg
- No spontaneous respirations

Examination (all must be checked)

- Pupils nonreactive to bright light
- Corneal reflex absent
- Oculocephalic reflex absent (tested only if C-spine integrity ensured)
- Oculovestibular reflex absent
- No facial movement to noxious stimuli at supraorbital nerve, temporomandibular joint
- Gag reflex absent
- Cough reflex absent to tracheal suctioning
- Absence of motor response to noxious stimuli in all 4 limbs (spinally mediated reflexes are permissible)

Apnea testing (all must be checked)

- Patient is hemodynamically stable
- Ventilator adjusted to provide normocarbia (PaCO₂ 34–45 mm Hg)
- Patient preoxygenated with 100% FiO₂ for ≥ 10 minutes to PaO₂ ≥ 200 mm Hg
- Patient well-oxygenated with a PEEP of 5 cm of water
- Provide oxygen via a suction catheter to the level of the carina at 6 L/min or attach T-piece with CPAP at 10 cm H₂O
- Disconnect ventilator
- Spontaneous respirations absent
- Arterial blood gas drawn at 8–10 minutes, patient reconnected to ventilator
- PCO₂ ≥ 60 mm Hg, or 20 mm Hg rise from normal baseline value

OR

- Apnea test aborted
- Apnea test unable to be performed

Ancillary testing (only 1 needs to be performed; to be ordered only if clinical examination cannot be fully performed due to patient factors, or if apnea testing inconclusive or aborted)

- Cerebral angiogram
- HMPAO SPECT
- EEG
- TCD

The apnea test and confirmatory test results are included in a signed declaration. **The time of the declaration is the time the arterial PCO₂ reached the target value.**

First declaration of brain death:

- Clinical exam findings are consistent with brain death.
- Apnea test was completed by me.

Physician's signature and number Date Time

Second declaration of brain death:

- Clinical exam findings are consistent with brain death.
- Apnea test was completed by me.

Physician's signature and number Date Time

If an apnea test was aborted or not performed:

- Ancillary test _____ was performed. The results are consistent with brain death.

Physician's signature and number Date Time result was interpreted

The official time of death is the time of the second declaration of brain death. If the results of the ancillary test were documented after the second declaration, then the time that the ancillary test was interpreted is the official time of death.

1 Eelco F.M. Wijdicks, Panayiotis N. Varelas, Gary S. Gronseth and David M. Greer. Quality Standards Subcommittee of the American Academy of Neurology Evidence-based guideline update: Determining brain death in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology; *Neurology* 2010;74;1911-1918

HUNTINGTON MEMORIAL HOSPITAL CLINICAL POLICY & PROCEDURE

SUBJECT: BRAIN DEATH DIAGNOSTIC CRITERIA (ADULTS)	POLICY NO: 8740.197	PAGE 1 of 7
AUTHORIZED APPROVAL:	EFFECTIVE DATE:	SUPERCEDES/REPLACES 10/12

PURPOSE:

To give guidance to physicians and staff as they care for patients with irreversible and terminal brain injury or disease, and to provide support for the patients’ families and support system.

POLICY:

Death is the permanent cessation of the critical functions of an organism as a whole. A determination of death is made in accordance with one of two accepted medical standards:

- I. Cardiopulmonary Criteria
In the absence of cardiopulmonary support, death is determined by the prolonged absence of spontaneous circulatory and respiratory function. When cardiopulmonary criteria are used, a single physician may determine that death has occurred.
- II. Neurologic Criteria
In the presence of cardiopulmonary support, death is determined using neurologic criteria in accordance with accepted professional guidelines. A death diagnosed on neurologic grounds must be independently confirmed by a second California licensed independent practitioner, and neither licensed practitioner making such a determination shall participate in the procedures for removing or transplanting a body part from the deceased. WhenIf the patient is an infant or child, please refer to Pediatric Departmental Policy and Procedure #6051.306 Brain Death Diagnostic Criteria (Pediatrics). ~~at least one of the examinations shall be done by an appropriate specialist knowledgeable about the special criteria pertinent for the determination of death by neurologic criteria in infants and children.~~

DEFINITIONS:

Death Diagnosed by Neurologic Criteria –

The irreversible loss of clinical function of the entire brain, including the brain stem, and is characterized by (a) coma or unresponsiveness, (b) absence of brain stem reflexes, and (c) apnea; referred to as “brain death” or “cerebral death.”

Do Not Attempt Resuscitation (DNAR)/Allow Natural Death (AND) -

No resuscitative treatment will be initiated after the time of the physician order, including but not limited to cardiac compressions, ventilator support, defibrillation &/or intravenous medication to sustain cardiac function.

Irreversible Coma –

Used in the past to refer to states of prolonged unconsciousness; however, it has been replaced by the term “permanent vegetative state.”

Vegetative State –

A condition of wakefulness without awareness where breathing may be unassisted; specific criteria for making these distinctions are available.

Licensed Independent Practitioner –

A physician with a valid license, permitted by law to practice medicine in the State of California.

PROCEDURE:**I. Determination of death using neurologic criteria**

- A. The proximate cause of death must be known and must be demonstrably irreversible. All of the following criteria must be met (see Appendix A, I, A):
 1. Clinical or neuroimaging evidence of an acute central nervous system catastrophe that is compatible with the clinical diagnosis of death using neurologic criteria;
 2. Exclusion of medical conditions that may interfere with clinical assessment, e.g. severe electrolyte imbalance, acid-base imbalance, endocrine disturbance, hypotension or hypothermia;
 3. No drug interaction, intoxication or poisoning that might cause coma.
- B. Determination of death using neurologic criteria shall be in conformity with California Health and Safety Code 7180: “Determination of death - An individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards.”
- C. A clinical exam to determine brain death must be performed by two different California licensed independent practitioners. One of the practitioners must be an active member of the hospital’s medical staff.
- D. The California licensed independent practitioner making a determination of death using neurologic criteria will determine (1) the presence of coma or unresponsiveness, (2) the absence of brain stem reflexes, and (3) the presence of apnea, using accepted professional criteria. Each of these findings shall be documented in the medical record.

- E. In accordance with the current state of knowledge for the patient who, following appropriate diagnosis and therapeutic procedures, remains apneic and unresponsive with circulation maintained, the following attached conditions provide that the brain is dead (see Appendix A).
1. The cold caloric test and apnea test must be performed at least once by either physician declaring brain death.
 2. ~~no eye opening;~~
 3. ~~non-verbal;~~
 4. ~~no motor responses – spontaneous or secondary to stimuli (flaccid);~~
 5. ~~central reflexes absent;~~
 6. ~~pupils fixed, non-reactive;~~
 7. ~~all of the following clinical findings must be present:~~
 - a. ~~no dolls eyes;~~
 - b. ~~no cold calorics;~~
 - c. ~~no spontaneous Extra Ocular Movements (EOM);~~
 - d. ~~no cough or gag reflex;~~
 - e. ~~apneic for (5) minutes;~~
 - f. ~~normothermic (>32.2 degrees centigrade) with “acceptable levels” on toxicity screen.~~
- F. The following conditions may interfere with the determination of brain death on clinical grounds alone:
1. severe facial trauma;
 2. pre-existing pupillary abnormalities;
 3. drug intoxication;
 4. sleep apnea;
 5. pulmonary disease with chronic CO₂ retention or impaired oxygenation;
 6. hypothermia.
- G. In the event that a complete clinical examination cannot be performed, a diagnosis of brain death may be made only after:
1. An accepted ancillary test (see Appendix A) demonstrating absence of intracranial perfusion or absence of brain activity. The results of the study must be interpreted by an attending physician who holds privileges to interpret such testing and the results documented as “consistent with brain death.”
and
 2. Confirmation by a clinical examination as complete as circumstances allow, including adequate documentation to confirm that there is no contraindication to the determination of brain death.
- H. The following clinical observations may exist in the presence of brain death:
1. spontaneous “spinal” limb movements;
 2. shoulder elevation, back arching, intercostal expansion without significant tidal volume;
 3. sweating, blushing, tachycardia;

4. normal blood pressure without pressors;
5. normal tendon balance;
6. deep tendon reflexes;
7. Babinski response.

II. Documentation of death by neurologic criteria

- A. A declaration of brain death must be recorded on the Declaration of Brain Death (Adults) form (see Appendix B) by two different California licensed independent practitioners. One of the practitioners must be an active member of the hospital's medical staff.
- B. If confirmatory testing is performed because of the inability to complete one or more clinical exams and the finding "consistent with brain death" or "~~clinically brain dead~~" is documented, it is considered an official brain death declaration and should be documented on the Declaration of Brain Death (Adults) form.
- C. The time of the declaration is the time the arterial PCO₂ reached the target value. If no apnea test was performed, the time is the conclusion of the neurologic exam.
- D. A California licensed physician shall complete a death certificate unless the case is accepted by the Office of the Coroner, in which case the death certificate shall be completed by the Coroner. For legal and certification purposes, the official time of death is the time of the second declaration of brain death. If the results of the ancillary test were documented after the second declaration, then the time that the ancillary test was interpreted is the official time of death.

III. Interaction with next-of-kin/healthcare agent

- A. Following a declaration of brain death, the licensed physician shall notify the family/healthcare agent/support system.
- B. The concept of brain death is difficult for most individuals to understand. Prior to a declaration of brain death, the physicians involved should inform the family/healthcare agent/support system that the patient's condition suggests brain death, and indicates that specific diagnostic assessments be done in order to confirm the diagnosis.
- C. The acceptance of this diagnosis may require education and emotional and spiritual support. The nurse, social worker, chaplain and family/healthcare agent/support system's spiritual resources should be involved and utilized in providing these services. It may also be appropriate to offer another clinical opinion by a qualified physician that the family/healthcare agent has chosen.
- D. Per California law, the family will be given a written statement that they may request **up to four (4) additional hours** to gather family/friends prior to discontinuation of cardiopulmonary support (ventilator and medications, I.V., I.M., N.G.). If the family is not present, this statement will be read to them over the phone.

1. During this period, the following will apply:
 - a. no attempt at cardiopulmonary resuscitation shall be made in the event of cardiac arrest -- **a DNAR/AND Order is not required;**
 - b. no vasoactive medications shall be titrated;
 - c. all hemodynamic and neurologic monitoring shall be discontinued except the ECG monitor;
 - d. no increase in the level of artificial support shall be instituted.
2. If the family does not need any or all of this time, all artificial support shall be discontinued when the family is ready. **A DNAR/AND is not necessary. A physician's order is not required for discontinuing support.**
3. If family requests further extension of cardiopulmonary support beyond four (4) hours, it is at the discretion of the department manager, the Chair of the Organ & Tissue Donation Committee, the administrative supervisor or any one of their designees.
4. In the case of a family dispute with hospital staff regarding the withdrawal of artificial support:
 - a. The parameters in Section III, G, 1, a-d will be in place.
 - b. The following resources may be accessed to facilitate a conference and resolution as soon as possible: physician, social worker, chaplain, bioethicist, department manager, clinical director, risk manager, administrative supervisor and/or administrator on-call.
- E. If the next-of-kin/healthcare agent files a court challenge, artificial support shall be continued until the court has issued a ruling.

IV. Organ Donation

- A. When a patient meets the clinical triggers for referral and/or when possible brain death is considered, the Organ Procurement Organization (OPO) must be notified to determine if the patient is eligible for organ donation. (Refer to Clinical Policy and Procedure #8740.109 Organ and Tissue Donation.)
- B. After both declarations of brain death have been made, artificial support will be continued until there is a determination by the OPO of the patient's eligibility for and patient's/family's consent to organ donation. (Refer to Clinical Policy and Procedure #8740.109 Organ and Tissue Donation.)
- C. If the OPO has determined that the patient is eligible for organ donation, artificial support should be continued until a representative from the OPO has approached the next-of-kin/healthcare agent to offer organ donation. The decision of whether or not the next-of-kin/healthcare agent consents to organ and/or tissue donation should be obtained within four (4) hours of the OPO completing their approach.
- D. If there is no known next-of-kin/healthcare agent, refer to Clinical Policy and Procedure #8740.109 Organ and Tissue Donation, Attachment A, Diligent Search.

- E. If the OPO has determined that the deceased patient is not eligible for organ donation, or if the next-of-kin/healthcare agent declines organ donation, follow the procedure outlined in section III, C-D.

V. Determination of death using neurologic criteria in a woman known to be pregnant

- A. The pregnant woman who has been declared brain dead poses a unique situation in that her fetus may or may not have been affected by the condition that has caused the woman's brain injury and death. It is occasionally possible to continue artificial support for an extended period of time, thereby maintaining cardiopulmonary functioning in the mother and allowing the fetus to mature, increasing the potential for its survival.
- B. When a pregnant woman has been declared brain dead, the viability of the fetus should be ascertained by appropriate obstetrical and neonatal consultation prior to removal of artificial support. Consideration to salvage the fetus should be given only to fetuses \geq 23 weeks gestation.
1. Though the lowest gestation of potential viability may be approximately 23 weeks, the father of the fetus or appropriate decision-maker may determine that the risks of delivery and potential complications for the fetus are too great and may decline such intervention.
- C. A request may arise for continuation of artificial support in the mother in order to provide support to the fetus until viability. This request may be made by the father of the fetus or appropriate healthcare decision-maker for the mother.
- D. In assessing a request for continuation of artificial support in the mother, consideration should be given to the wishes and values of the patient as expressed through an advance directive or other written or oral communication, if applicable. In addition, the wishes and values of the father of the fetus and/or appropriate healthcare decision-maker(s) should be considered.
- E. If a decision is made to continue artificial support of the mother in an attempt to bring the fetus toward improved viability, the following measures and procedures shall be taken:
1. An appropriate decision-maker for the fetus shall be identified. This individual shall be involved in discussions and decisions about care of the fetus.
 2. Nursing staff involved in the care of the mother shall be involved in discussions regarding maintenance of cardiopulmonary function of the mother and care of the fetus.
 3. Goals for support will be established, setting the earliest date that attempts will be made to deliver the fetus if it is no longer feasible to maintain adequate artificial support and achieve the ideal delivery date for the fetus.

4. If cardiovascular collapse of the mother occurs prior to viability of the fetus (<23 weeks gestation), no further effort shall be made to continue artificial support of the mother or to deliver the fetus. Procedures for terminating artificial support are in order (see III, G-I).
5. If fetal death occurs at any time, the procedures for terminating artificial support are in order (see III, G-I).
6. Once the fetus is delivered, the procedures for terminating artificial support are in order (see III, G-I).
7. If there is no request for the continuation of artificial support, or if it is determined to be unlikely that fetal viability can be achieved, the procedures for terminating artificial support are in order (see III, G-I).

Reviewed by:

Marcia Penido and Luise Williams

SOURCE:

Critical Care Committee 3/13
Organ and Tissue Donation Committee 2/13

REFERENCES:

Eelco F.M. Wijdicks, Panayiotis N. Varelas, Gary S. Gronseth and David M. Greer. Quality Standards Subcommittee of the American Academy of Neurology Evidence-based guideline update: Determining brain death in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology; *Neurology* 2010;74;1911-1918
California Health and Safety Code Sections 7180-7182
Clinical Policy and Procedure #8740.109 Organ and Tissue Donation
Clinical Policy and Procedure #8740.050 Do Not Attempt Resuscitation (DNAR)/Allow Natural Death (AND) and Withholding and Withdrawing of Life-Sustaining Treatment
Departmental Policy and Procedure Brain Death Diagnostic Criteria (Pediatrics) 6051.306

APPROVALS:

Clinical Policy and Procedure Committee
Medicine Committee
Surgery Committee
Medical Executive Committee
Board of Directors

APPENDIX A

Criteria for clinical diagnosis of brain death (American Academy of Neurology)¹

The determination of brain death can be considered to consist of 4 steps.

The clinical evaluation (prerequisites)

A. Establish irreversible and proximate cause of coma

- The cause of coma can usually be established by history, examination, neuroimaging, and laboratory tests.
- Exclude the presence of a CNS-depressant drug effect by history, drug screen, calculation of clearance using 5 times the drug's half-life (assuming normal hepatic and renal function), or, if available, drug plasma levels below the therapeutic range.
- Prior use of hypothermia (e.g., after cardiopulmonary resuscitation for cardiac arrest) may delay drug metabolism.
- The legal alcohol limit for driving (blood alcohol content 0.08%) is a practical threshold below which an examination to determine brain death could reasonably proceed.
- There should be no recent administration or continued presence of neuromuscular blocking agents (this can be defined by the presence of a train of 4 twitches with maximal ulnar nerve stimulation).
- There should be no severe electrolyte, acidbase, or endocrine disturbance (defined by severe acidosis or laboratory values markedly deviated from the norm).

B. Achieve normal core temperature

- In most patients, a warming blanket is needed to raise the body temperature and maintain a normal or near-normal temperature (36°C).
- After the initial equilibration of arterial CO_2 with mixed central venous CO_2 , the PaCO_2 rises steeply, but then more slowly when the body metabolism raises PaCO_2 .
- To avoid delaying an increase in PaCO_2 , normal or near-normal core temperature is preferred during the apnea test.

C. Achieve normal systolic blood pressure

- Hypotension from loss of peripheral vascular tone or hypovolemia (diabetes insipidus) is common; vasopressors or vasopressin are often required. Neurologic examination is usually reliable with a systolic blood pressure 100 mmHg.

1 Eelco F.M. Wijdicks, Panayiotis N. Varelas, Gary S. Gronseth and David M. Greer. Quality Standards Subcommittee of the American Academy of Neurology Evidence-based guideline update: Determining brain death in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology; *Neurology* 2010;74:1911-1918

D. Perform 2 neurologic examinations

- California statute requires 2 examinations to determine brain death.

III. The clinical evaluation (neurologic assessment)

A. Coma

• Patients must lack all evidence of responsiveness.

- Eye opening or eye movement to noxious stimuli is absent.
- Noxious stimuli should not produce a motor response other than spinally mediated reflexes.
- The clinical differentiation of spinal responses from retained motor responses associated with brain activity requires expertise.

B. Absence of brainstem reflexes

• Absence of pupillary response to a bright light is documented in both eyes.

- Usually the pupils are fixed in a midsize or dilated position (4–9 mm).
- Constricted pupils suggest the possibility of drug intoxication.
- When uncertainty exists, a magnifying glass should be used.

• Absence of ocular movements using oculoccephalic testing and oculovestibular reflex testing.

- Once the integrity of the cervical spine is ensured, the head is briskly rotated horizontally and vertically.
- There should be no movement of the eyes relative to head movement. The oculovestibular reflex is tested by irrigating each ear with ice water (caloric testing) after the patency of the external auditory canal is confirmed. The head is elevated to 30 degrees.
- Each external auditory canal is irrigated (1 ear at a time) with approximately 50 mL of ice water.
- Movement of the eyes should be absent during 1 minute of observation. Both sides are tested, with an interval of several minutes.

• Absence of corneal reflex.

- Absent corneal reflex is demonstrated by touching the cornea with a piece of tissue paper, a cotton swab, or squirts of water.
- No eyelid movement should be seen.

• Absence of facial muscle movement to a noxious stimulus.

- Deep pressure on the condyles at the level of the temporomandibular joints and deep pressure at the supraorbital ridge should produce no grimacing or facial muscle movement.

• Absence of the pharyngeal and tracheal reflexes.

- The pharyngeal or gag reflex is tested after stimulation of the posterior pharynx with a tongue blade or suction device.
- The tracheal reflex is most reliably tested by examining the cough response to tracheal suctioning. The catheter should be inserted into the trachea and advanced to the level of the carina followed by 1 or 2 suctioning passes.

C. Apnea

• Absence of a breathing drive.

- Absence of a breathing drive is tested with a CO₂ challenge.
- Documentation of an increase in PaCO₂ above normal levels is typical practice. It requires preparation before the test.
 - Prerequisites:
 - 1) normotension
 - 2) normothermia,
 - 3) euvoemia
 - 4) eucapnia (PaCO₂ 35–45 mm Hg)
 - 5) absence of hypoxia
 - 6) no prior evidence of CO₂ retention (i.e., chronic obstructive pulmonary disease, severe obesity).

Procedure:

- Adjust vasopressors to a systolic blood pressure 100 mm Hg.
- Preoxygenate for at least 10 minutes with 100% oxygen to a PaO₂ 200mm Hg.
- Reduce ventilation frequency to 10 breaths per minute to eucapnia.
- Reduce positive end-expiratory pressure (PEEP) to 5 cm H₂O (oxygen desaturation with decreasing PEEP may suggest difficulty with apnea testing).
- If pulse oximetry oxygen saturation remains 95%, obtain a baseline blood gas (PaO₂, PaCO₂, pH, bicarbonate, base excess).
- Disconnect the patient from the ventilator.
- Preserve oxygenation with a T-Tube bypass (e.g., place an insufflations catheter through the endotracheal tube and close to the level of the carina and deliver 100% O₂ at 6 L/min).
- Look closely for respiratory movements for 8–10 minutes. Respiration is defined as abdominal or chest excursions and may include a brief gasp.
- Abort if systolic blood pressure decreases to less than 90 mm Hg.
- Abort if oxygen saturation measured by pulse oximetry is 85% for 30 seconds. Retry procedure with T-piece, CPAP 10 cm H₂O, and 100% O₂ 12 L/min.
- If no respiratory drive is observed, repeat blood gas (PaO₂, PaCO₂, pH, bicarbonate, base excess) after approximately 8 minutes.
- If respiratory movements are absent and arterial PCO₂ is 60 mm Hg (or 20 mm Hg increase in arterial PCO₂ over a baseline normal arterial PCO₂), the apnea test result is positive (i.e., supports the clinical diagnosis of brain death).

- If the test is inconclusive but the patient is hemodynamically stable during the procedure, it may be repeated for a longer period of time (10–15 minutes) after the patient is again adequately preoxygenated.

III. Ancillary tests

- In clinical practice, EEG, cerebral angiography, nuclear scan, TCD, CTA, and MRI/MRA are currently used ancillary tests in adults.
- An EEG, nuclear scan, or cerebral angiogram may be considered the preferred tests.
- Ancillary tests can be used when uncertainty exists about the reliability of parts of the neurologic examination or when the apnea test cannot be performed. In some protocols, ancillary tests are used to shorten the duration of the observation period.
- The interpretation of each of these tests requires expertise.
 - In adults, ancillary tests are not needed for the clinical diagnosis of brain death and cannot replace a neurologic examination.
- Physicians ordering ancillary tests should appreciate the disparities between tests and the potential for false-positives (i.e., the test suggests brain death, but the patient does not meet clinical criteria).
 - Rather than ordering ancillary tests, physicians may decide not to proceed with the declaration of brain death if clinical findings are unreliable.

IV. Documentation

- The time of brain death is documented in the medical record on the Declaration of Brain Death Progress Note (Appendix B).
- Time of death is the time the arterial PCO₂ reached the target value. In patients with an aborted apnea test, the time of death is when the ancillary test has been officially interpreted.
- A checklist is filled out, signed, and dated (Appendix B).
- Federal and state law requires the hospital to contact an organ procurement organization (OPO) following determination of brain death.
- Hospital policy requires this contact at the time the patient meets a clinical trigger for OPO referral (refer to Clinical Policy & Procedure Organ and Tissue Donation, #8740.109).

APPENDIX B

Declaration of Brain Death (Adults) Checklist

Brain death is declared when two different physicians who are licensed in California have each performed a separate clinical exam, following the criteria on this form. The cold caloric and the apnea test must be performed at least once, by either physician declaring brain death. If an apnea test cannot be performed, an ancillary test must be performed. Document the date and time of the findings of each exam or test.

Criteria for clinical diagnosis of brain death (American Academy of Neurology)¹.

1st physician 2nd physician

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- Coma, irreversible and cause known
- Neuroimaging explains coma
- CNS depressant drug effect absent (if indicated toxicology screen; if barbiturates given, serum level 10 g/mL)
- No evidence of residual paralytics (electrical stimulation if paralytics used).
- Absence of severe acid-base, electrolyte, endocrine abnormality
- Normothermia or mild hypothermia (core temperature 36°C)
- Systolic blood pressure 100 mm Hg
- No spontaneous respirations

Examination (all must be checked)

- Pupils nonreactive to bright light
- Corneal reflex absent
- Oculocephalic reflex absent (tested only if C-spine integrity ensured)
- Oculovestibular reflex absent
- No facial movement to noxious stimuli at supraorbital nerve, temporomandibular joint
- Gag reflex absent
- Cough reflex absent to tracheal suctioning
- Absence of motor response to noxious stimuli in all 4 limbs (spinally mediated reflexes are permissible)

Apnea testing (all must be checked)

- Patient is hemodynamically stable
- Ventilator adjusted to provide normocarbica (PaCO₂ 34–45 mm Hg)
- Patient preoxygenated with 100% FiO₂ for 10 minutes to PaO₂ of 200 mm Hg
- Patient well-oxygenated with a PEEP of 5 cm of H₂O
- Provide oxygen via a suction catheter to the level of the carina at 6 L/min or attach T-piece with CPAP at 10 cm H₂O
- Disconnect ventilator
- Spontaneous respirations absent
- Arterial blood gas drawn at 8–10 minutes, patient reconnected to ventilator
- PCO₂ 60 mm Hg, or 20 mm Hg rise from normal baseline value

OR

- Apnea test aborted
- Apnea test unable to be performed

Continued on other side

Ancillary testing (only 1 needs to be performed; to be ordered only if clinical examination cannot be fully performed due to patient factors, or if apnea testing inconclusive or aborted)

- Cerebral angiogram
- HMPAO SPECT
- EEG
- TCD

The apnea test and confirmatory test results are included in a signed declaration. **The time of the declaration is the time the arterial PCO₂ reached the target value.**

First declaration of brain death:

- Clinical exam findings are consistent with brain death.
- Apnea test was completed by me.

Physician's signature and number Date Time

Second declaration of brain death:

- Clinical exam findings are consistent with brain death.
- Apnea test was completed by me.

Physician's signature and number Date Time

If an apnea test was aborted or not performed:

- Ancillary test _____ was performed. The results are consistent with brain death.

Physician's signature and number Date Time result was interpreted

The official time of death is the time of the second declaration of brain death. If the results of the ancillary test were documented after the second declaration, then the time that the ancillary test was interpreted is the official time of death.

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