

DETERMINING BRAIN DEATH

Notify Tennessee Donor Services (TDS): 615-322-2247

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 $<10 \mu\text{g/mL}$)
- ☐ No evidence of residual paralytics (electrical stimulation if paralytics used)
- ☐ Absence of severe acid-base, electrolyte, endocrine abnormality
- ☐ pH is below 7.45
- ☐ Normothermia or mild hypothermia (core temperature $>36^\circ \text{C}$)
- ☐ Systolic blood pressure $\geq 100\text{mmHg}$
- ☐ No spontaneous respirations

Examination (ALL must be checked)

- ☐ Pupils non-reactive 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)

*****If patient is under 18 years of age, two brain death tests must be preformed 12 hours apart by two different ICU attending physicians*****

****Attending MUST BE PRESENT thru Apnea Testing***

- ☐ Patient is hemodynamically stable
- ☐ Ventilator is adjusted to provide normocarbica (PaCO_2 34- 45mmHg)
- ☐ Patient pre-oxygenated with 100% FiO_2 for >10 minutes to $\text{PaO}_2 > 200 \text{ mmHg}$
- ☐ Patient well oxygenated with a PEEP of 5cmH₂O
- ☐ Provide oxygen via a suction catheter to the level of the carina at 6 L/min or attach T-piece with CPAP at 5cm mmHg
- ☐ Disconnect ventilator
- ☐ Spontaneous respirations absent
- ☐ Arterial blood gas drawn at 10 minutes
- ☐ Patient reconnected to ventilator

(Hemodynamic instability or Oxygen Desaturation)

Apnea Test Aborted

Only one of below tests required for confirmation, with exception of TCD

- ☐ Cerebral angiogram
- ☐ HMPAO SPECT
- ☐ EEG
- ☐ TCD (times two)

$\text{pCO}_2 \geq 60\text{mmHg}$, or 20 mmHg rise from normal baseline value

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Complete Brain Death Note in StarForm:

PREREQUISITES: (Do Not proceed to exam if answer is YES):

◆ Diagnosis compatible with brain death:	<input type="text"/>
◆ Is the core temperature less than or equal to 34.3 degrees C (94 degrees F)?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Is the systolic blood pressure less than or equal to 90 torr (or age appropriate blood pressure in pediatric patients)?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Is the PaO2 less than 50 torr?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Presence of significant sedative or neuromuscular blocking drugs?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Are confounding conditions present? (e.g. C-spine trauma, facial trauma, locked instate, severe obesity, severe COPD, severe metabolic or endocrine derangement)?	<input checked="" type="radio"/> Yes <input type="radio"/> No

EXAMINATION CRITERIA:

(Do Not proceed to apnea test if any answer is YES):

◆ Is the patient GCS greater than 3? Verbal: <input type="text"/> /5 Motor: <input type="text"/> /6 Eye: <input type="text"/> /4	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Spontaneous movement present?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Any response to painful stimulation, nail bed pressure - bilaterally?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Any response to painful stimulation, supraorbital pressure?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Any pupil reflexes present?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Any Corneal reflexes present?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Cold caloric-induced eye movements (5 minutes between sides) present (or lateral neck rotations-induced eye movements)?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Cough present?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Apnea test (begin with PCO2 40 +/- 5 torr):	
◆ ABG pre-test: pH: <input type="text"/> PCO2: <input type="text"/> PO2: <input type="text"/>	
◆ ABG at end of test: pH: <input type="text"/> PCO2: <input type="text"/> PO2: <input type="text"/>	
◆ Was there spontaneous respiratory effort with PCO2 rise > 20 torr?, OR	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ Was there spontaneous respiratory effort with PCO2 > 60 torr?	<input checked="" type="radio"/> Yes <input type="radio"/> No
◆ If apnea test is indeterminate, or there are other clinical circumstances that prompt confirmatory testing, (such as transcranial Doppler, nuclear medicine scan) indicate reason and tests ordered	
<input type="radio"/> Confirmatory testing WAS NOT ordered	
<input type="radio"/> Confirmatory testing WAS ordered	

TRAUMA TEAM DUTIES:

1. Notify attending on call
2. Tennessee Donor Services (TDS): 615-322-2247
TDS is to be called on all deaths and all pending deaths
3. Complete Brain Death Note in StarPanel (StarForm)
4. Medical Examiner Office: 615-743-1800
Medical Examiner office is to be called on trauma service deaths
5. Decedent Affairs: 615-835-1497 (pager)
6. Complete StarPanel Report of Death and Death Summary

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ANCILLARY TESTS:

- Cerebral Angiogram: Formal arteriography gold-standard, CTA and MRA with less data (WIZ Order)
- HMPAO SPECT: Tc 99mHexametazime Nuclear medicine scan (Synergy)
- EEG: Electroencephalogram, Requires neurology consult
- TCD: Transcranial Doppler (x2); Contact Vanderbilt Neurosonologist Nina N. Mitsky, RDMS (Mon-Fri 8am-5pm)

REFERENCES:

- Wijdicks et al. Evidence-based guideline update: determining brain death in adults: report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* (2010) vol. 74 (23) pp. 1911-8
- Wijdicks. 10 questions about the clinical determination of brain death. *Neurologist* (2007) vol. 13 (6) pp. 380-1
- Hills. Determining brain death: a review of evidence-based guidelines. *Nursing* (2010) vol. 40 (12) pp. 34-40; quiz 40-1
- Nakagawa et al. Clinical Report – Guidelines for the Determination of Brain Death in Infants and Children: An updated of the 1987 task force recommendations. *American Academy of Pediatrics* (2011)

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