EANS/UEMS European examination in neurosurgery

Variants of questions with answers (compilation - Vyacheslav S. Botev, Department of Neurosurgery, M.Gorky Donetsk National Medical University)

BRAIN DEATH

Questions

I. Basic concepts

1. What is the definition of brain death?
2. What are the three most common causes of brain death in adults (in descending order)?
3. What are the three most common causes of brain death in children (in descending order)?
4. What is a common transitory appearance of the pupil in brain death?

II. Testing for brain death

5. What is the procedure for testing oculovestibular (OV) responses?
6. What is the pathologic oculovestibular (OV) response in a comatose patient with an intact brainstem?
7. What does an inability to adduct the ipsilateral eye during OV testing indicate?
8. What is the anticipated response of a normal awake patient who receives OV testing?
9. When would one strongly suspect brain death?
10. What are the prerequisites for the apnea test?
11. Describe the apnea test procedure.
12. In whom should an apnea test be terminated prematurely?
13. What confirmatory testing exists for the diagnosis of brain death?
14. What findings of cerebral angiography are consistent with brain death?
15. What is the characteristic finding on electroencephalography (EEG) to confirm brain death?
16. What findings of transcranial Doppler (TCD) are consistent with brain death?
17. What is the typical finding in a brain dead patient with cerebral radionuclide angiogram (CRAG)?

18. What finding on somatosensory evoked potentials (SSEPs) is consistent with brain death?

III. Certification of brain death

19. What cardinal clinical findings must be documented for the diagnosis of brain death?
20. What conditions can complicate the diagnosis of brain death? What additional step(s) can be taken in these circumstances?
21. Why should brain death remain a presumptive diagnosis in the ER?

IV. Organ donation

22. Before a patient is removed from the ventilator, what step is mandatory for procurement in the U.S.?
23. How long is cardiovascular support required when an individual's organs have been committed for donation?

V. Ethical and legal issues in brain death

24. What is the ethical obligation of the physician in terms of organ donation?
25. What consolation do many families find by participating in organ donation?
26. What is the potential conflict of interest that could arise when a full-code patient nearing death has decided on organ donation?
27. What steps can a physician take to appease a family's natural reservations about organ donation?
28. What is the significance of the Uniform Determination of Brain Death Act?

BRAIN DEATH MCQs

1. Which of the following statements best describes EEG evaluation of suspected brain death?
A. The recommended term for "flat line EEG" is electrocerebral silence
B. In all patients over 1 year of age, a minimum of 2 EEGs 24 hours apart should be obtained for confirmation
C. Integrity of the recording system should be checked by touching each electrode with a cotton swab to produce an artifact potential
D. EEG reactivity to noxious somatosensory stimuli need not be checked as long as there is no discernible electrical activity at 2 μV/mm sensitivity for 30 minutes

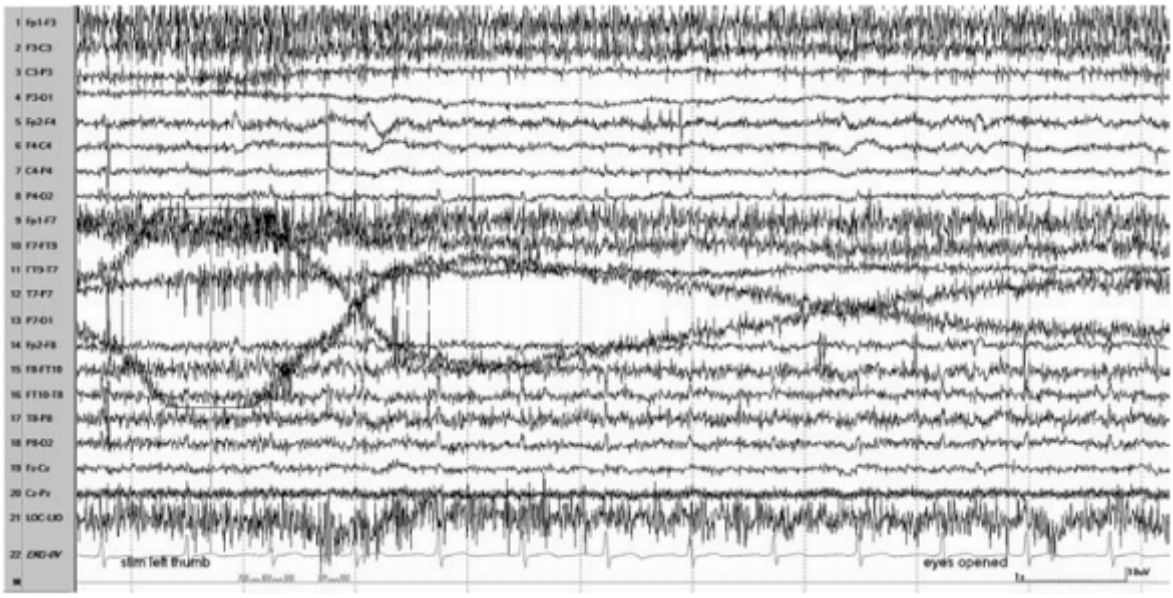
2. According to the American Clinical Neurophysiology Society (ACNS) guidelines, criteria for recording EEG in suspected brain death evaluation include all of the following *except*
A. Recording at a sensitivity of 2 μV/mm for a minimum of 30 minutes
B. Electrode impedance greater than 10 and less than 10000 Ohms
C. Interelectrode distance should be at least 10 cm
D. Low-frequency filter should be at least 1 Hz and high-frequency filter should be at least 30 Hz

3. Reliable predictors of death or persistent vegetative state after cardiac arrest include all of the following *except*
A. Absent N20 responses
B. Electrographic status epilepticus
C. Burst-suppression pattern
D. Spindle coma pattern

4. The following physical findings are consistent with brain death except:
A. Lack of oculocephalic or Doll's eye movements
B. Lack of oculovestibular or cold-water caloric testing
C. Triple flexion
D. Decerebrate posturing

5. A 36-year-old male was admitted to the surgical intensive care unit (SICU) after cardiac arrest in the emergency department (ED). The EEG below was done a month after initial insult (filter: 1–70 Hz). At this time, the patient had minimal brainstem reflxes and no withdrawal to painful

stimuli in any of the extremities. What is the likely diagnosis based on the clinical and EEG findings?



A. Vegetative state
B. Locked-in syndrome
C. Minimally responsive state
D. Brain death

6. What should be the duration of an EEG in order to qualify for an electrocerebral inactivity (ECI) recording according to the American Clinical Neurophysiology Society (ACNS) guidelines?
A. At least 15 minutes
B. At least 30 minutes
C. At least 60 minutes
D. At least 24 hours

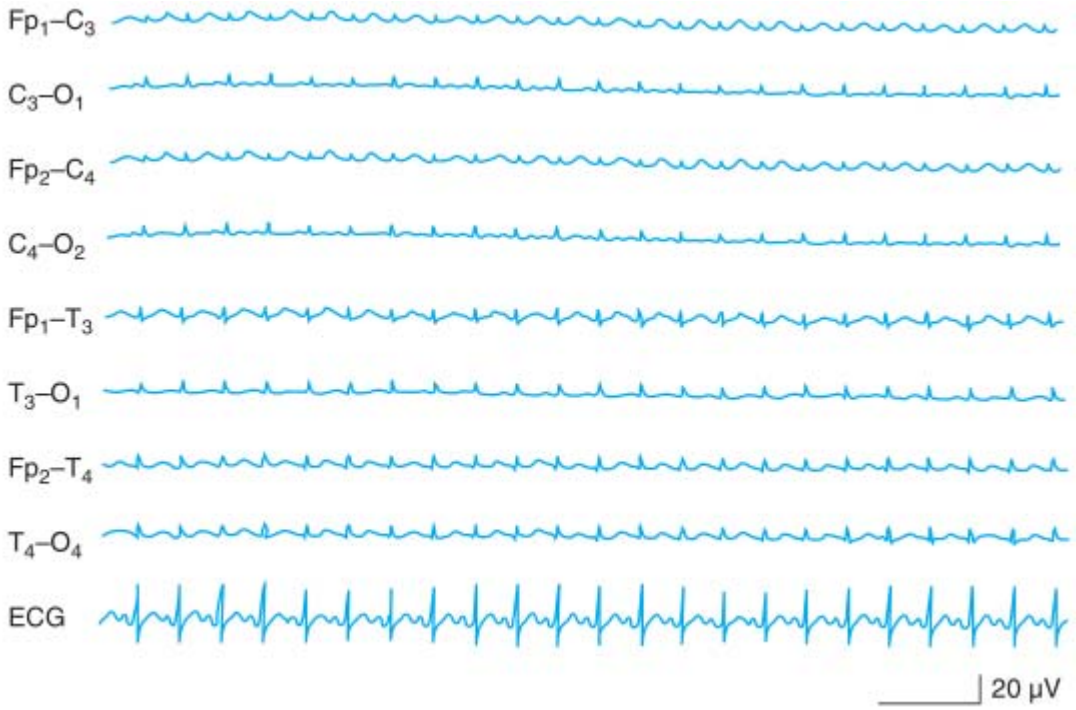
7. You have just performed brainstem death tests on a patient with a poor grade subarachnoid hemorrhage. You have discussed organ donation with the family and the transplant coordinator is on their way. The nurse reports that she is having to increase the patient's nordrenaline infusion in order to maintain a MAP of 70 mmHg. What is your next action?

A. Insert an esophageal Doppler for cardiac output monitoring
B. Do not increase the current ICU support since it is not in the patient's best interests
C. Start vasopressin
D. Start tri-iodothyronine
E. Give methylpredisolone 15mg/kg IV

8. A 20-year-old male patient intubated and ventilated on ICU following a head injury requires brainstem death testing for potential organ donation. Which of the following statements is true?

A. The pupils must be fixed and dilated
B. Lack of limb movement is essential
C. Two consultants must perform the tests
D. Caloric tests must be performed bilaterally
E. There must be no EEG activity

9. The EEG below is most consistent with?



A. Alcohol intoxication
B. Left frontal lobe mass
C. A lethal closed head injury
D. Hepatic encephalopathy
E. Delta rhythm

10. In the UK, the diagnosis of brainstem death is made following several tests, to be completed by two doctors, of at least 5 years GMC registration, on two separate occasions. Which of the following actions does not form part of the UK Code for the diagnosis of brainstem death?

A. Exclusion of severe electrolyte derangement
B. Measurement of body temperature
C. Testing of motor or sensory function for each cranial nerve
D. Removal of mechanical ventilation for at least 5 minutes for apnea testing
E. Time of death recorded as that at the first set of testing

11. Regarding current religious rulings and cultural attitudes to brainstem death in the UK, which of the following statements is true?

A. It Is considered haraam (forbidden) for Muslims to become heart-beating organ donors
B. Orthodox Jewish law, Halacha, accepts brainstem death as comparable to cardiorespiratory death
C. Shariah (Islamic) law representatives in the UK consider brain stem death to be a true definition of death
D. Buddhist doctrine does not accept brainstem death to be a true definition of death
E. Brainstem death is still considered legal in the UK even if the patient's family reject the diagnosis on religious grounds

BRAIN DEATH

Answers

I. Basic concepts

1. Irreversible cessation of function of the brain, including the brainstem.
2.
1. Traumatic brain injury (TBI) and subarachnoid hemorrhage (SAH)
2. Hypoxic-ischemic brain damage
3. Fulminant hepatic failure.

3.
1. Abuse
2. Motor vehicle accidents
3. Asphyxia.

4. An oval shape.

II. Testing for brain death

5. Cold water calorics, aka the caloric reflex test: irrigate a single ear canal with 50 mL of ice water with the head elevated to 30 degrees. Wait about 1 minute for a response and 5 minutes before testing the opposite ear canal. (Be sure to rule out tympanic membrane perforation before beginning!)

6. Tonic conjugate eye deviation toward the irrigated ear without nystagmus.

7. An ipsilateral brainstem lesion of the medial longitudinal fasciculus (MLF). Internuclear ophthalmoplegia (INO), seen unilaterally in elderly comatose patients with brainstem infarcts and bilaterally in multiple sclerosis, produces this response with this procedure.

8. Slow eye deviation toward the side of cold stimulus (usually the irrigated ear), followed by nystagmus beating to the opposite direction. Remember the mnemonic COWS: Cold-Opposite; Warm-Same, describing the normal direction in which the nystagmus will beat.

9. When all brainstem reflexes are absent in a comatose patient and the cause of coma is known and irreversible.

Criteria for the clinical determination of brain death

Coma
Absence of reversible medical conditions: Hypothermia <32°C Drug overdose (barbiturate, narcotics) Electrolyte anomalies (metabolic acidosis)
Absent pupillary light reflex
Absent corneal reflex
Absent caloric response
Absent gag reflex
Absent cough in response to tracheal suctioning
Absent sucking and rooting reflex
Absent respiratory drive at $PaCO_2$ that is 60 mm Hg or 20 mm Hg above normal baseline values
Interval between two evaluations is age dependent: Term to 2 months old, 48 hr >2 months to 1 year old, 24 hr >1 year to < 18 years old, 12 hr >18 years old interval is optional, usually 6 hr

10. Prerequisites are:
1. Core temperature ≥32.2°C
2. Systolic BP ≥90 mm Hg
3. Normovolemia
4. Normocapnia
5. Normoxemia.

11.
1. Connect a pulse oximeter to the patient's finger.
2. Disconnect the ventilator.
3. Supply 100% oxygen at 6 L/min for approximately 15 minutes. (The oxygen cannula should be near the level of the carina.)
4. Examine patient closely for respiratory movements. Respiration is defined as chest or abdominal excursions that result in adequate tidal volumes.
5. Measure arterial PO_2, PCO_2, and pH via ABG after about 8 minutes and reconnect the ventilator.
6. If there are no spontaneous respirations and arterial PCO_2 is ≥60 mm Hg or there is an increase of 20 mm Hg in the PCO_2 above base-line after at least 2 minutes, then the apnea test is interpreted as positive (supporting a diagnosis of "brain death").

7. If spontaneous respirations are observed, the apnea test is interpreted as negative (warranting premature termination of the exam).
8. If hypotension, desaturation, or dysrhythmias occurs, the apnea test is interpreted as an occurrence of cardiovascular or pulmonary instability (requiring a confirmatory test).
9. If there are no spontaneous respirations and the posttest arterial PCO_2 is <60 mm Hg without cardiovascular instability, the apnea test is interpreted as inconclusive (warranting repetition with 10 minute of apnea).

12.
1. A breathing patient
2. A hypotensive patient
3. A patient with a SpO_2 <80% via pulse oximeter
4. A patient experiencing a cardiac dysrhythmias.

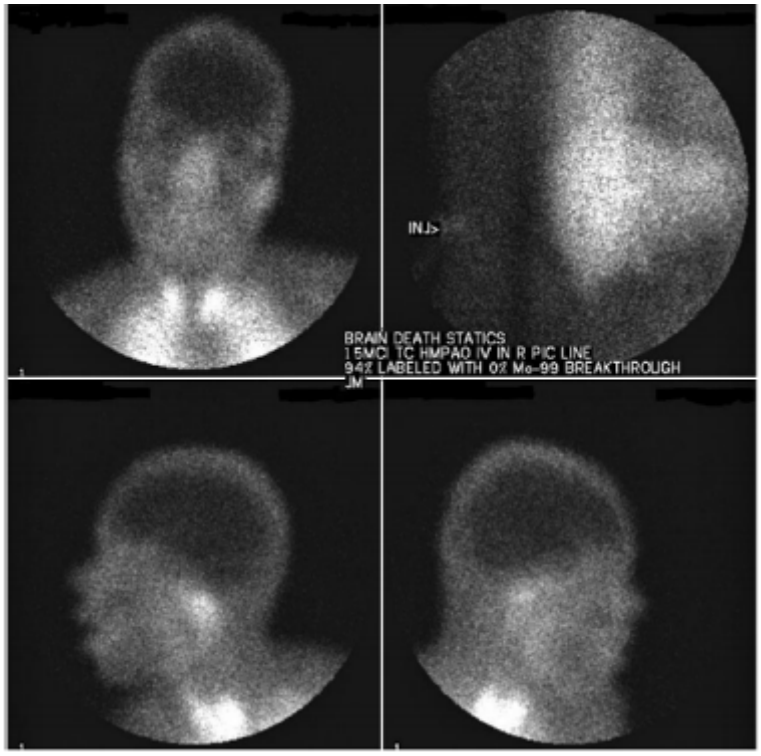
13.
1. Conventional cerebral angiography
2. Electroencephalography (EEG)
3. Transcranial Doppler (TCD)
4. Cerebral radionuclide angiogram (CRAG)
5. Somatosensory evoked potentials (SSEPs).

14. Absent intracerebral filling at the level of the carotid bifurcation or circle of Willis. External carotid circulation is patent; however, filling of the superior sagittal sinus may be delayed. This method is not routinely used to diagnose brain death.

15. Loss of cerebral electrical activity, also known as electrocerebral silence (ECS). However, transient persistence of electrical activity can occur for as long as 170 hours after the clinical diagnosis of brain death has been made.

16. (1) Small systolic spikes in early systole, followed by (2) a bidirectional systolic flow pattern with retrograde diastolic flow, and finally (3) an absence of diastolic flow or reverberating flow altogether, indicative of markedly elevated intracranial pressure (ICP) (above MAP) and arrest of cerebral circulation.

17. Lack of uptake of radionuclide in brain parenchyma, called the “hollow skull phenomenon”.



Technitium-99 nuclear scan reveals a “hollow skull” with no isotope uptake in brain.

Confirmatory tests that can be used to help confirm the clinical diagnosis of brain death

Confirmatory test	Results
Cerebral angiography	No circulation at level of carotid bifurcation and circle of Willis, patent external circulation
EEG	Electrocerebral silence for 30 min
Transcranial Doppler ultrasonography	Brief systolic flow and reverse diastolic flow, Brief systolic flow and no reverse diastolic flow, No flow in patients with previously documented flow
Somatosensory and auditory evoked potential	No response
Technetium 99 scan	No radionuclide uptake by brain parenchyma
Xenon computed tomography	Average global flow of less than 5mL/100mL/min
Brain tissue oxygenation	Persistent zero value for more than 30min
Blood pressure and heart rate variability	Absent variability

18. Bilateral absence of N20-P22 response with median nerve stimulation.

III. Certification of brain death

19.

1. Presence of coma (complete loss of consciousness, verbalization, and spontaneous motor activity)
2. Absence of brainstem reflexes:
a. Light reflex
b. Corneal reflex
c. Oculovestibular reflex
d. Oculocephalic reflex
e. Gag and cough reflex
3. No response to deep central pain
4. Presence of apnea
5. Absence of confounding factors that could simulate brain death on exam (such as hypotension, hypothermia, systemic drugs, or pharmacologically induced coma).

20.

1. Severe facial or cervical spine trauma
2. Emergence from barbiturate coma (levels must be ≤10 μm/mL)
3. Pupillary abnormalities (fixed and dilated pupils as with atropine or previous cataract surgery)
4. Hypothermia
5. Hypovolemic shock
6. Anoxia/hypoxia
7. Toxic drug or metabolic levels
8. Sleep apnea or severe pulmonary disease with chronic retention of carbon dioxide (i.e., congestive heart failure [CHF] and chronic obstructive pulmonary disease [COPD]). Confirmatory testing is recommended in the above circumstances.

21. The diagnosis should remain presumptive and organ donation should not occur from the ER because adequate time and consideration should be paid to consider confounding causes of coma and to find reversible causes if present.

IV. Organ donation

22. Brain dead patients must be reported to local organ procurement organizations before they can be removed from the ventilator.

23. This will continue either until the organs are safely procured from the deceased individual or immediately following extubation of an individual who is no longer suitable for donation or whose family later withdraws donation.

V. Ethical and legal issues in brain death

Note to the reader: Some of the information contained in this chapter is a matter of the authors' opinion and should not be regarded as absolute fact.

24. To approach the family of an individual who meets the criteria for brain death to discuss the possibility of organ donation; to discuss all suitable organs specified for donation; to facilitate organ procurement in such a way as to avoid disfigurement and honor the family's wishes to hold an open-casket funeral; and to provide information detailing the ultimate use of the recovered organs.

25. They may find solace in the fact that, although posthumously, their loved one will give the gift of life to someone who stands to benefit greatly from their generosity.

26. A conflict of interest potentially exists between a medical team's apparent duty to perform "heroic measures" on a patient who is expected to fully succumb to his or her disease, potentially losing organs currently suitable for donation, and the team's ulterior desire for another patient to obtain desperately needed organs that offer a cure only if promptly donated.

27.
1. Avoid heavy involvement by other medical teams (e.g., transplant surgery) when deciding to diagnosis brain death in the patient.
2. When scheduling a family meeting to discuss organ and tissue donation, involve physicians who are both empathetic and experienced with discussing uncomfortable topics and breaking bad news.

28. In the U.S., this act acknowledges the principle that death can be diagnosed when neurological criteria for brain death are fulfilled.

The patient who is brain dead is *DEAD*. The physician does not require any permission of the family or other individuals to remove a dead patient from mechanical ventilation or other life support maneuvers.

BRAIN DEATH MCQs

Answers

1. C. Integrity of the recording system should be checked by touching each electrode with a cotton swab to produce an artifact potential.

In brain death evaluations, it is important to check the integrity of the recording system by touching each electrode with a cotton swab to produce an artifact. The recommended term for “flat line EEG” is electrocerebral inactivity (ECI). In infants 2–12 months old, 2 EEGs 24 hours apart need to be obtained. In infants less than 2 months, 2 EEGs 48 hours apart need to be obtained. In adults, 1 EEG is enough as long it is properly acquired and interpretable. Reactivity should always be checked and presence of any reactivity argues against brain death.

2. B. Electrode impedance greater than 10 and less than 10000 Ohms.

According to the ACNS guidelines (Guideline 3: Minimum Technical Standards for EEG Recording in Suspected Cerebral Death), impedance should be between 100 and 10K Ohms so the potentials are not attenuated. Other criteria are correct.

3. D. Spindle coma pattern.

Reliable predictors of death or persistent vegetative state after cardiac arrest includes absence of early cortical somatosensory evoked potentials, electrographic seizures, suppressed EEG (less than 5 μV amplitude), and burst-suppression pattern. Spindle coma pattern indicates relative integrity of the cerebral hemispheres; its prognostic significance depends on the underlying etiology with best outcomes reported when the coma is due to drugs, encephalopathy, or seizures. With posttraumatic coma, normal-looking sleep spindles carry a good prognosis. The absence of spindles after anoxia is associated with poor outcome, whereas its presence does not necessarily indicate a favorable prognosis.

4. D. Decerebrate posturing.

The clinical diagnosis of brain death refers to irreversible loss of all brainstem function, lack of consciousness, and no motor response to noxious stimuli. Examinations documented by two different examiners and the failure of spontaneous breathing off the ventilator (concomitant rise of

pCO_2 = 60 mmHg [≤ 8 kPa] with the apnea test) are required for the determination of brain death. Use of neuromuscular blocking agents has to be excluded as prolonged muscle weakness may mimic lack of motor response with brain death. Cardinal features in the clinical determination of brain death include: fixed, unreactive pupils, lack of aversive eye movements on Doll's head maneuver (absent oculocephalic reflex), or tonic deviation of the eyes directed to the cold caloric stimulus (absent oculovestibular reflex); absent gag, cough, or evidence of corneal reflexes; motor unresponsiveness to deep noxious stimuli; and no spontaneous breathing above the ventilator set rate. Reflexes mediated solely by the spinal cord, deep tendon reflexes or triple flexion are compatible with brain death. The presence of brainstem mediated decorticate or decerebrate posturing is not compatible with brain death. Other exclusion criteria for brain death include severe hypothermia (below 32ºC) or electrolyte or acid-base abnormalities, intoxicating or sedative drugs, or endocrine crisis.

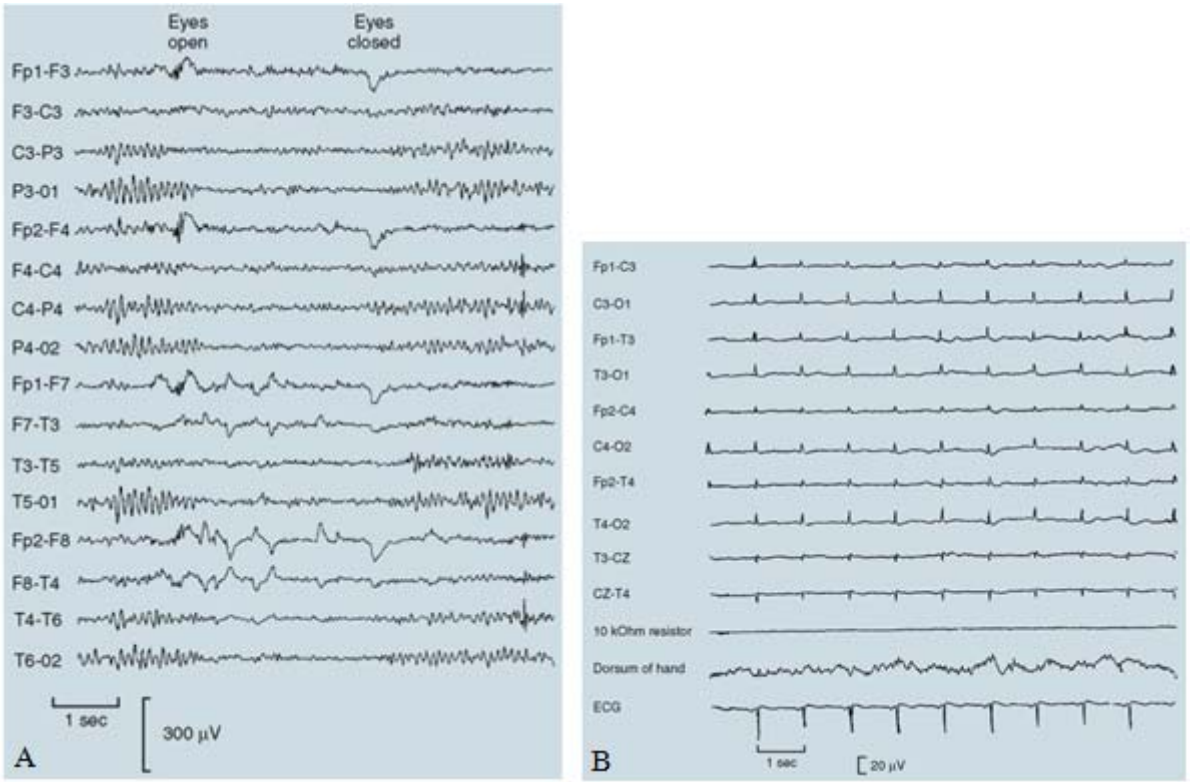
5. A. Vegetative state.

This slow, low-voltage (5–10 μV), minimally (if any) reactive EEG in the setting of some brainstem reflxes with no clear purposeful movements is consistent with a vegetative state. Note that in the vegetative state, the patients can open their eyelids occasionally and demonstrate sleep–wake cycles but completely lack cognitive function. A technically adequate electrocerebral inactivity (ECI) recording with no activity and no brainstem reflxes present would be consistent with (not diagnostic of) brain death. ECI with brainstem reflxes is consistent with cortical death. Minimally responsive slow EEG with some purposeful behavior and intelligible verbalization is consistent with a minimally conscious state. Clearly reactive, normal or mildly slow EEG with limited preserved brainstem reflxes is consistent with locked-in syndrome.

6. B. At least 30 minutes.

ECI recordings need to be at least 30 minutes long to be in accordance with the ACNS guidelines (Guideline 3: Minimum Technical Standards for EEG Recording in Suspected Cerebral Death). Other guidelines include the use of a full set of conventional 10–20 scalp electrodes since the study may or may not be ECI; interelectrode impedances should be between 100 and 10K Ohms; the integrity of the entire recording system should be tested (ie, touching each electrode to create an artifact potential on the recording); interelectrode distances should be at least 10 cm; sensitivity must be

increased to at least 2 µV/mm for at least 30 minutes of the recording with inclusion of appropriate calibrations (ie, use a 2 or 5 µV calibration signal instead of a 50 µV signal); filter settings should be set such that the low-frequency filter is no higher than 1 Hz and the high frequency filter is no lower than 30 Hz; additional signals can be monitored (eg, EKG); if muscle artifact is significant, then the use of a short-acting neuromuscular blockade may be necessary; no reactivity to intense stimulation (eg, auditory, visual, tactile); recordings should be done by a qualified technologist (of note, not mandated to be R.EEG.T. certified) working under the supervision of a qualified electroencephalographer; and repeat EEG should be done if there is any doubt of ECI.



A. A posteriorly predominant 9-Hz alpha rhythm is present when the eyes are closed and is attenuated by eye opening in the electroencephalogram of this normal subject. Electrode placements in both Figures are as follows: A, earlobe; C, central; F, frontal; Fp, frontopolar; O, occipital; P, parietal; Sp, sphenoid; T, temporal. Right-sided placements are indicated by even numbers and left-sided placements by odd numbers.

B. Electrocerebral silence in the electroencephalogram of a brain-dead patient following attempted resuscitation after cardiopulmonary arrest.

7. A. Insert an esophageal Doppler for cardiac output monitoring.

Physiological changes occurring during the development of brainstem death may lead, if untreated, to rapid deterioration and cardiac arrest. The management of the brainstem dead donor is directed at restoring stability and to maintain or

improve organ function in order to enhance the likelihood of successful transplantation.

Around the time of brainstem death, there can be a ‘Cushing response’ with dramatic cardiovascular changes. Following this, there can be a variable intensity and duration of ‘sympathetic storm’ with tachycardia, vasoconstriction and blood pressure instability. A later consequence is marked vasodilation and relative hypovolemia; this is often due to fluid losses caused by the development of diabetes insipidus. Appropriate cardiovascular goals such as HR 60–100 bpm, CVP <12mmHg, MAP 60–80mmHg, cardiac index >2.4l/min per m^2, mixed venous oxygen saturation >60% should be aimed for.

In terms of management, the first priority is to restore an effective circulating volume with either colloid or crystalloid. Failure to promptly respond to appropriate fluid administration should mandate the use of more advanced cardiac output monitoring. The most effective vasopressor in this case is vasopressin and this may also treat diabetes insipidus if it has developed. If inotropic support is also required, then tri-iodothyronine (T3) or a catecholamine infusion should be considered.

A dose of 15 mg/kg of intravenous methyprednisolone is recommended once brainstem death is confirmed. Methylprednisolone use is associated with reduced lung water and therefore renders the lungs more suitable for transplant. Steroids may also ameliorate the process by which brainstem death itself increases the immunogenicity of solid organs increasing the risk of acute rejection in the recipient.

8. D. Caloric tests must be performed bilaterally.

The UK code for the diagnosis of brainstem death has three essential components:
1. Fulfilment of essential preconditions
2. Exclusion of potentially reversible contributions to an apneic state
3. The formal demonstration of coma, apnea, and the absence of brainstem reflex activity.
The tests should be carried out by two doctors competent with the procedure. One must be a consultant and the other registered with the GMC for at least 5 years. The tests must be performed by the doctors together and two sets of tests must be completed.
The preconditions are:
1. Apneic coma requiring ventilation

2. Irreversible brain damage of known etiology, e.g. subarachnoid hemorrhage, ischemic stroke, trauma.

It must be ensured that the apneic coma is not due to reversible influences, such as hypothermia, metabolic disturbance, endocrine disturbance, sedative drugs or cardiovascular instability.
Pupil size is not important, but direct and consensual reflexes should be absent. Spinal reflexes may be present so limb movement can occur in a brainstem dead patient, but not within the cranial distribution. Caloric testing should occur bilaterally, but inability to perform the test on one side does not invalidate the test. The apnea test should only be performed once the total absence of brainstem activity has been demonstrated.
An EEG can be used as an ancillary test under certain circumstances, such as when a comprehensive neurological examination cannot be performed, for example due to facial trauma, but it is not required to make the diagnosis of brainstem death.

9. C. A lethal closed head injury.

Electrocerebral inactivity is consistent with brain death in the setting of a detailed brain death exam. It is defined as no cerebral electrical potentials greater than 2μV. It is not required to pronounce brain death and is used as an ancillary test when the diagnosis is not clear. Drug intoxication (e.g., phenobarbital) and hypothermia may result in reversible electrocerebral inactivity.

10. C. Testing of motor or sensory function for each cranial nerve.

Diagnosis of brainstem death has three major components: meeting preconditions for brainstem death, excluding those conditions which may be mistaken for brainstem death and confirming lack of activity within the brainstem. Preconditions are a deeply unconscious, apneic patient, with pathology known to be consistent with brainstem death.

Clinicians must exclude any reversible causes of apneic coma: severe disturbances in electrolytes, temperature (over 34°C), blood-gas parameters or hemodynamic status. Consideration must be given to the prolonged effects of sedative medication, by allowing sufficient time for metabolism and excretion, or by administering specific antagonists.

The specific brainstem death tests of cranial nerves involve:

II Direct/consensual pupillary reflexes (sensory)
III Direct/consensual pupillary reflexes (motor) Caloric test (vestibulocochlear reflex) (motor)
IV Caloric test (vestibulocochlear reflex) (motor)
V Corneal brushing (sensory), supraorbital pressure (sensory)
VI Caloric test (vestibulocochlear reflex) (motor)
VII Corneal brushing (motor), supraorbital pressure (motor)
VIII Caloric test (vestibulocochlear reflex) (sensory)
IX Gag reflex (sensory)
X Gag reflex (motor), cough reflex (sensory and motor)
Cranial nerves I, XI and XII are not tested.

The apnea test involves disconnecting the patient from mechanical ventilation for five minutes, and allowing the CO_2 to rise, to assess whether ventilation is stimulated. $PaCO_2$ must rise above 6.0 kPa. 100% O_2 is insufflated into the lungs during apnea to preserve hemodynamic stability.

11. C. Shariah (Islamic) law representatives in the UK consider brain stem death to be a true definition of death.

Short Explanation

There is no specific legislation for a medical declaration of death to be rejected in UK law. Brainstem death is controversial in Jewish law and is not currently accepted by Orthodox Jews in the UK. Buddhism accepts brainstem death as cessation of vitality that will lead to ‘heart death’. The UK Muslim Law Council accepted brainstem death as a true definition of death in 1996, and decreed that Muslims could become heart-beating organ donors.

Long Explanation

Brainstem death occurs after neurological injury when the brainstem has been irreversibly damaged but the heart is still beating and the body is kept alive by a ventilator.
International variations in brainstem death criteria, together with traditional and religious influences, evoke opposing and controversial views on how ‘acceptable’ brainstem death is within different cultures. Altruism is highly regarded in Judaism, Islam and Buddhism, and organ donation is considered to be a final selfless act, but opinions are divided within these

communities as to whether it is acceptable to donate body parts after death, howsoever it is deemed to occur medically.

In some Islamic societies, organ donation is not acceptable: violation of the human body, either living or dead, is forbidden (haraam). Islamic governing law, Shariah, in the UK currently accepts brainstem death as an acceptable definition of cessation of life: the UK Muslim Council in 1996 agreed that ‘current medical knowledge considers brain-stem death to be a proper definition of death ... constituting the end of life for the purpose of organ transplantation. ’It legitimized UK Muslims to carry donor cards, and to become heart-beating organ donors should they so wish.

Orthodox Jews internationally are currently intensely debating the validity of brainstem death. The collective body of Jewish law, Halacha, in the UK has rejected the definition of brain stem death, it not being compatible with cardiorespiratory death, which constitutes a traditional halachic death (January 2011).

Buddhist scripture implies that death only occurs when vitality, heart and consciousness have all left the body. By embracing the concept that brainstem death will inevitably lead to the cessation of all bodily functions, together with the importance of consciousness for moral standing, Buddhists have accepted brainstem death. Organ donation, however, is less widely accepted. Tampering with a corpse in the critical days after death is believed by some to interfere with the rebirth of the soul. However, other Buddhist scholars suggest that organ donation is a final compassionate act as a means to acquire merit for a better rebirth.

In the state of New Jersey, USA, there is a specific provision for religious objection to insist on asystole before death has occurred. No such legislation exists in UK law.