

## Brain Death and Organ Donation

### Brain Death

Diagnosis is to be made by the separate examination of 2 doctors:

1. One of the doctors must be a specialist recognized by the appropriate College as having demonstrated skill and knowledge in the performance of brain death certification. This should usually be an intensivist, critical care physician, neurologist or neurosurgeon
2. The other medical practitioner should preferably be of the same qualification as described in 1. but should be at least 6 years after registration and possess the skill and knowledge in the performance of brain death certification

Although you will not be expected to perform brain death certification, you will be involved in the patient's management during the ICU stay.

Before a patient can be certified brain dead, a certain set of preconditions must be met

- Irremediable structural brain damage must be demonstrated (CT brain)
- Absence of depressant drugs, poisons or muscle relaxants
- Absence of reversible causes contributing to a persistent comatose state

If an ICU patient is suspected to be brain dead and is pending brain death certification, the management of the patient should include

- avoid depressant drugs
- avoid neuromuscular agents
- keep normothermic ( $T > 35^{\circ}\text{C}$ )
- correct metabolic and endocrine disturbances  
(**importantly, treat diabetes insipidus** – correct the hypotension from massive diuresis with fluid boluses – you may have to give D5 fluids instead of those with high Na content, give DDAVP 1-2 mcg bolus IV, lower the Na with infusion of fluid with low Na content ie 1/5 solution, D5; correct major electrolyte disturbances eg. **hypernatraemia, hypokalaemia, hypophosphataemia**; treat hypoglycaemia; acid-base abnormalities ). Have a most updated electrolyte profile ready before brain death testing
- extracranial organ support – maintain BP, oxygenation as these patients may be potential organ donors

To certify brain death:

- Clinical testing  
Irreversibility of cessation of brain function must be established by a period of observation of absent brain function. The first examination should not take place until a period of at least 4 hours of such observation, and the second examination should not be performed until at

least 2 hours after the first examination. Following primary hypoxic brain injury, the first examination should not be performed until at least 12 hours observation has elapsed.

- All brain stem reflexes must be absent ie
  - Both pupils are fixed and unresponsive to light
  - Corneal reflex is absent in both eyes
  - Vestibular-ocular reflex is absent (cold caloric test)
  - No motor response in the cranial nerve distribution despite painful stimulation to any somatic area
  - No gag, no cough
  - Apnoea test – no respiratory movements after disconnection from the ventilator despite PCO<sub>2</sub> rise to > 8 kPa and arterial pH < 7.30

Brain death cannot be clinically diagnosed in several conditions including:

No clear cause for coma

Possible metabolic, endocrine, drug effect

Cranial nerves cannot be clinically tested

Cervical vertebral or cord injury

Cardiovascular or respiratory instability precluding the apnea test

In such circumstances, the absence of cerebral blood flow must be demonstrated. In our centre, the preferred imaging is the brainstem scintillation scan. Please arrange with nuclear medicine radiologist first thing in the morning so that the test can be performed on the same day.

If the patient meets the necessary criteria for the diagnosis of brain death, the patient will be declared dead after the 2<sup>nd</sup> set.

The PWH organ transplant coordinator should only be informed *after* completion of the 1<sup>st</sup> set.

*Reference:*

- Guidelines on Certification of Brain Death  
*The Hong Kong Society of Critical Care Medicine*

## Organ Donation

### Suitability

- Brain dead patient
- Not HIV positive
- Hepatitis B or Hepatitis C may be acceptable for HBV/C recipients
- IV drug abuse or practicing homosexual
- Untreated bacterial, fungal or viral infection (treated infection may be considered)
- Malignancies other than primary brain tumours and minor skin lesions
- Treatment with hormones of human pituitary origin

- Dementia or family history
- Disease of the donor organ (in view of the serious lack of donors in Hong Kong, marginal donor organs have been used – decision may depend on the transplant surgeon)

#### Procedure

- Work closely with the PWH organ transplant coordinator (page through the operator). Refer to the organ transplant coordinator only after the 1<sup>st</sup> set of brain death certification has been completed
- Organ donation should not be discussed with the family until brain death has been certified and the family informed
- Once the family agrees for organ donation, it is desirable to harvest the organs as early as possible to ensure the best graft function as the condition of the organ donor can deteriorate at any time. You can help by making sure that the following tests are available
  - Before the 1<sup>st</sup> brain death test – blood group, LFT/RFT, CBC (this is already routinely done in our ICU, and should not be a conflict of interest)
  - After consent – HIV, HbsAg, Anti-HCV, CMV, VDRL
  - Kidney donation – HAL typing (arranged by the transplant coordinator), USG kidney
  - Liver - +/- USG liver
  - Heart – 12 lead ECG, echocardiogram, if donor > 50 years old, coronary angiogram
  - Lung – CXR, ABG, bronchoscopy by lung transplant surgeons (Grantham Hospital)

#### Management of the organ donor

- Maintain normothermia, use warming devices prn
- Maintain MAP >70 mmH, use noradrenaline
- Adequate volume loading
- Diabetes insipidus should be treated with fluid replacement and DDAVP
- Adequate oxygenation and keep normocarbica
- Check biochemistry and maintain normal electrolytes