



Ontario

Trillium Gift of Life Network  
Réseau Trillium pour le don  
de vie

522 University Avenue, Suite 900  
Toronto ON M5G 1W7  
Tel: 416 363-4001  
Fax: 416 363-4002  
Website: [www.giftoflife.on.ca](http://www.giftoflife.on.ca)

## NEUROLOGICAL DETERMINATION OF DEATH

Trillium Gift of Life Network endorses recommendations from the 2003 Forum on Severe Brain Injury to Neurological Determination of Death, which was coordinated by the Canadian Council for Donation and Transplantation. These notes, based on the CCDT Forum, are valid for patients over 1 year of age.

Physicians performing neurological determination of death (NDD) must hold full and current licensure for independent medical practice in Ontario. This excludes physicians with (only) an educational license. NDD cannot be delegated. The physician must have skill and knowledge in the management of patients with severe brain injury, as well as NDD. For the purpose of donation for transplantation, a physician who has had any association with the proposed transplant recipient that might influence the physician's judgement must not take part in NDD.

**For post-mortem donation for transplantation, NDD must be confirmed by two physicians. Each physician should fill out a separate Confirmation of Neurological Determination of Death form.** If performed at different points in time, full clinical examinations, including the apnea test, must be performed for both physicians' assessments. The legal time of death is marked by the first confirmation of NDD.

Neurologic function must be absent due to a known proximate and irreversible cause. There must be definite clinical and/or neuroimaging evidence of an acute CNS event compatible with death via a neurologic mechanism (either intracranial hypertension or primary direct brainstem injury). NDD without ancillary testing is not recommended in the first 24 hours after hypoxic-ischemic brain injury, if no neurologic activity has been observed after the event.

Where feasible, the examination should be performed in the absence of confounding factors, which might prevent the observation of neurologic responses and/or mimic death. Potentially confounding factors include, but are not limited to, shock, hypothermia, drug intoxications, administration of cycloplegic or muscle relaxant drugs, neuromuscular pathology, and severe endocrine, metabolic or electrolyte disorders. Potentially, confounding factors must be reviewed in the context of the primary etiology and the clinical examination. Clinical judgement is required.

Motor activity must not be present, with the exception of spinal reflexes. Motor activity includes, but is not limited to, spontaneous or stimulated breathing, coughing, seizures, and posturing. Spinal reflexes are observed more frequently in the lower extremities, are reproducible on repeated stimulation in the same location on the extremity, and are not associated with movements in other extremities or above the clavicle. Where uncertainty exists regarding the nature of a movement, which may be a spinal reflex, ancillary testing is warranted.

Examination for eye movement on irrigation of the tympanic membranes should be done with the head elevated 30° above horizontal, with at least 50 mL of ice water, and with at least 5 minutes between stimulation of the first and second tympanic membranes.

Optimal performance of the apnea test requires a period of preoxygenation followed by 100% oxygen delivered via the trachea upon disconnection from mechanical ventilation. The physician(s) performing NDD must continuously observe the patient for respiratory effort. Arterial blood gas values of  $\text{PaCO}_2 \geq 60$  mmHg, increase of  $\text{PaCO}_2$  by  $\geq 20$  mmHg, and  $\text{pH} \leq 7.28$  must be observed at the time of completion of the test. Caution must be exercised in considering the validity of the test in cases of chronic respiratory insufficiency or dependence on hypoxic respiratory drive.

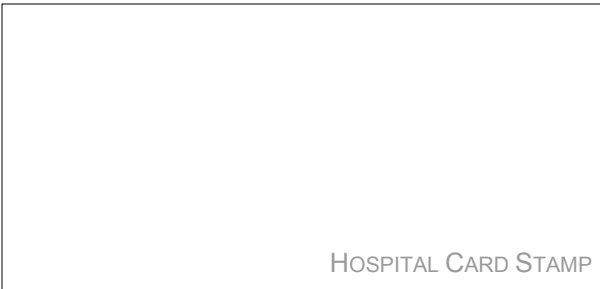
When minimum clinical criteria cannot be completed or confounding factors cannot be corrected, an ancillary test may be performed. In this context, if examination according to the minimum critical criteria (to the extent possible) is compatible with death, an ancillary test demonstrating the global absence of intracranial blood flow confirms death. The only acceptable ancillary tests at present are radionuclide cerebral blood flow imaging and 4-vessel cerebral angiography.



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## CONFIRMATION OF NEUROLOGICAL DETERMINATION OF DEATH (ADULT PATIENT)

Neurologic Diagnosis Leading to Death: \_\_\_\_\_

### MECHANISM OF DEATH (Choose One Only)

- Increased intracranial pressure
- Direct brainstem injury

TEMPERATURE \_\_\_\_\_ °C

Temperature must be  $\geq 34^{\circ}\text{C}$  for a valid clinical examination.

- Blood
- Rectal
- Esophageal

### CONFOUNDING FACTORS

- None
- Potentially present; ancillary testing performed

Examples of potentially confounding factors:

Shock, hypothermia, poisoning, cycloplegic drugs, muscle relaxant drugs (*check train of four and / or administer reversal agents*), neuromuscular pathology, severe endocrine, metabolic or electrolyte disorders.

### EXAMINATION

- No response to noxious stimulation above clavicles
- No response (excepting spinal reflex) to noxious stimulation in all extremities
- Pupils and mid-position or greater bilaterally
- Bilateral absence of pupillary constriction to light
- Bilateral absence of blink response to corneal stimulation
- Bilateral absence of eye movement after irrigation of tympanic membrane with cold water
- Absence of gag response to deep pharyngeal stimulation
- Absence of cough response to tracheal stimulation
- Absence of respiratory effort throughout apnea test

ABG at Start: \_\_\_\_\_ pH  
 \_\_\_\_\_ PaCO<sub>2</sub>  
 \_\_\_\_\_ PaO<sub>2</sub>

End: \_\_\_\_\_ pH  
 \_\_\_\_\_ PaCO<sub>2</sub>  
 \_\_\_\_\_ PaO<sub>2</sub>

Criteria: pH  $\leq 7.28$ , PaCO<sub>2</sub>  $\geq 60$  mmHg and increased by  $\geq 20$  mmHg from baseline.

### ANCILLARY TESTING (Where Required)

The following confounding factor(s) necessitated ancillary testing:

The following test was performed and interpreted as compatible with death:

- Radionuclide cerebral blood flow study Date of Test: \_\_\_\_\_
- 4-Vessel cerebral angiogram Time of Test: \_\_\_\_\_

**Based on the above neurological criteria, this patient is dead.  
I hold a current license for independent medical practice in Ontario.**

Name (Print): \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Time: \_\_\_\_\_