

# Updated Brain Death Guidelines

Jenn Laws

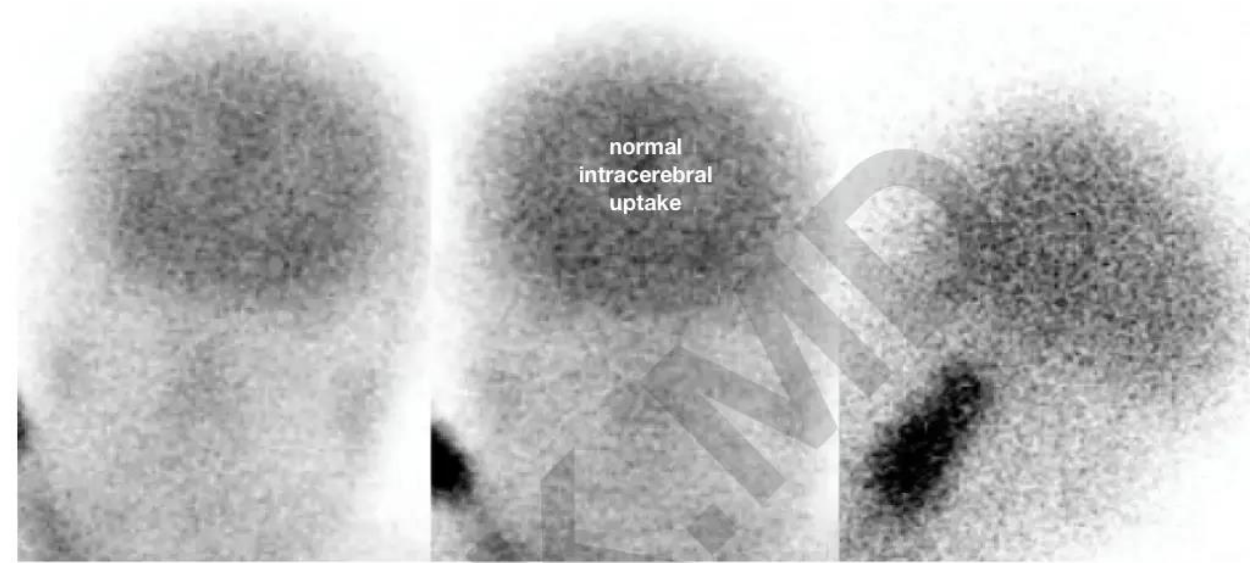
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Michael Wolf

March 27, 2024

## CEREBRAL PERFUSION SCAN

suggests normal perfusion

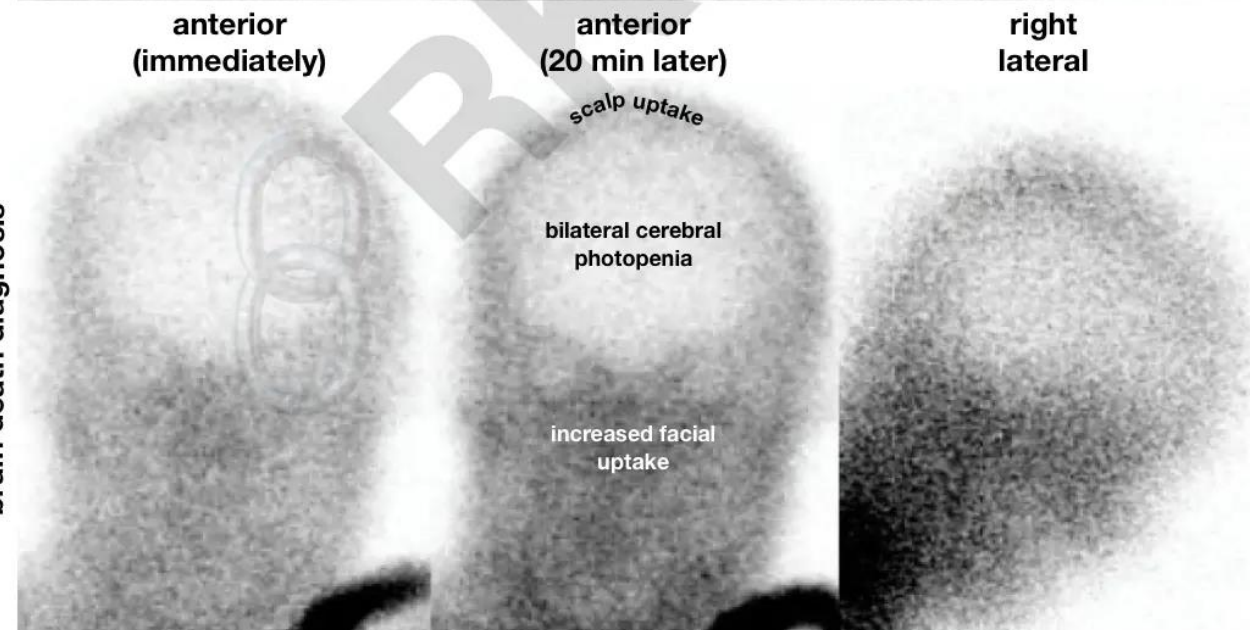


anterior (immediately)

anterior (20 min later)

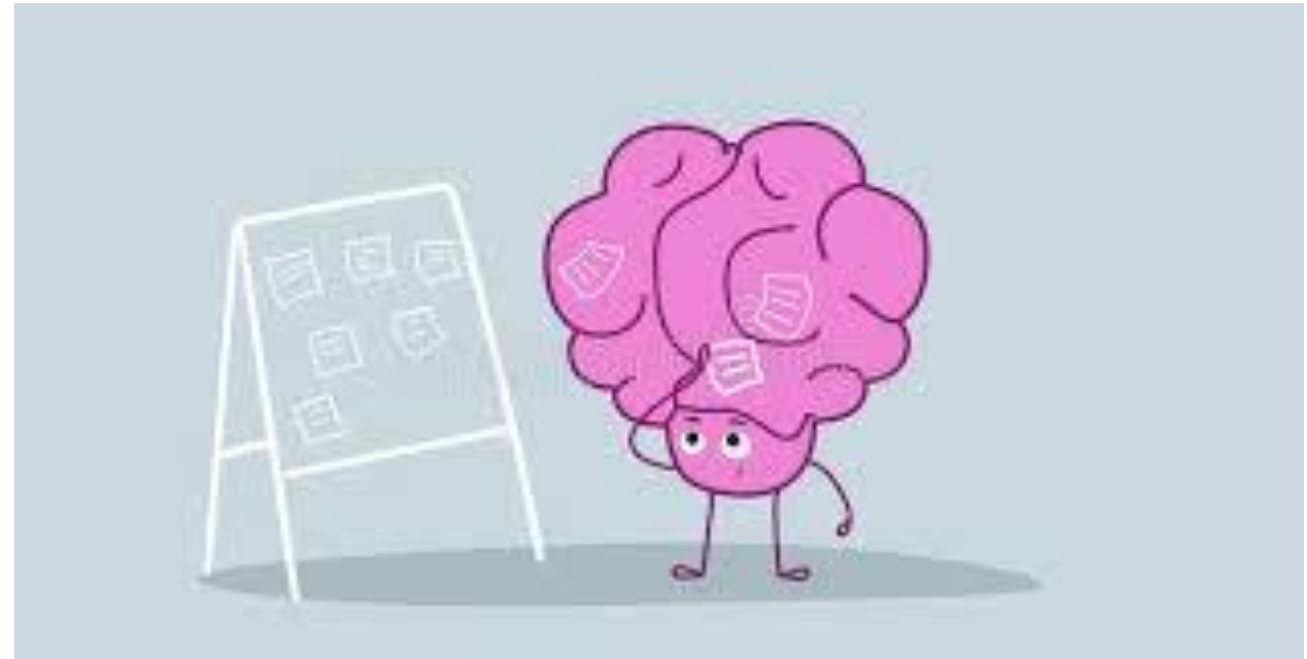
right lateral

no cerebral flow - supports brain death diagnosis



# Objectives

- Review criteria for a patient to undergo brain death testing.
- Discuss barriers in performing brain death testing and apnea testing.
- Understand when to obtain ancillary testing and the timing of ancillary testing.
- Review ethical dilemmas with brain death testing.
- Present new workflow of documenting brain death testing.





P

9moF previously healthy admitted after being found down in the bathtub. She required >50 minutes of CPR prior to achieving ROSC.

- Initial Head CT: diffuse cerebral edema with effacement of sulci and crowding of basilar cisterns.
- She is warmed to 37C and maintained on a low dose epinephrine infusion with improvement in her hemodynamics.
- Her exam is concerning for absent pupillary, cough, and gag reflexes.

You are concerned that this patient has progressed to brain death due to her severe anoxic injury.

- Does this patient qualify for brain death testing?
- When are you able to perform the first brain death test in this patient?

## Prerequisite Conditions

Age  $\geq$  37 wk corrected gestational age

Etiology of brain injury must be known

- Neuroimaging should be consistent with the mechanism and severity of brain injury
- Primary posterior fossa injury: ensure concurrent catastrophic supratentorial injury

Observe for sufficient time to determine the severity and permanency of the brain injury

- $<$  24 mo old: wait  $>$  48 hr independent of brain injury etiology
- $\geq$  24 mo old: wait  $>$  24 hr after hypoxic-ischemic brain injury
- After medical or surgical interventions to treat intracranial hypertension, wait sufficient time to ensure no recovery of brain function

Core body temperature

- $\geq 36^{\circ}\text{C}$
- If temperature  $\leq 35.5^{\circ}\text{C}$ , wait  $>$ 24 hr after rewarming to  $\geq 36^{\circ}\text{C}$

Blood pressure

- Adults: SBP  $\geq$  100 mm Hg and MAP  $\geq$  75 mm Hg
- Children: SBP and MAP greater than or equal to fifth percentile for age
- VV ECMO: same as for non-ECMO
- VA ECMO: MAP  $\geq$  75 mm Hg (adults) or  $\geq$  fifth percentile for age (children)

## Toxicology

- Ensure toxicology (urine and blood) screening, if clinically indicated, is negative
- Alcohol blood level  $\leq 80$  mg/dL

## Medications

- Confirm medication levels (when available) are in therapeutic or subtherapeutic range
- Allow at least five half-lives to pass
- Consider age-dependent metabolism
- Consider a longer elimination period if the patient has renal or hepatic dysfunction
- Consider a longer elimination period if the patient is obese or is hypothermic

## Exclude severe metabolic, acid-base, and endocrine derangements

- Sodium:  $< 130$  mmol/L or  $> 160$  mmol/L
- Glucose:  $< 70$  mg/dL or  $> 300$  mg/dL
- Blood urea nitrogen:  $> 75$  mg/dL
- Calcium (iCa):  $< 7$  mg/dL or  $> 11$  mg/dL ( $< 1$  mmol/L or  $> 1.3$  mmol/L)
- Magnesium:  $< 1.5$  mg/dL or  $> 4$  mg/dL
- pH:  $< 7.3$  or  $> 7.5$
- Total T4<sup>a</sup>:  $< 3$  mg/dL or  $> 30$  mg/dL; free T4<sup>a</sup>:  $\leq 0.4$  ng/dL or  $> 5$  ng/dL
- Ammonia<sup>a</sup>:  $> 75$   $\mu$ mol/L

# Back to our Case

During the patient's initial brain death testing, the patient has flexion of the thigh, leg, and foot during noxious stimuli of the right lower extremity.

- What is this movement?
- Does this patient need ancillary testing?
  - No she does not

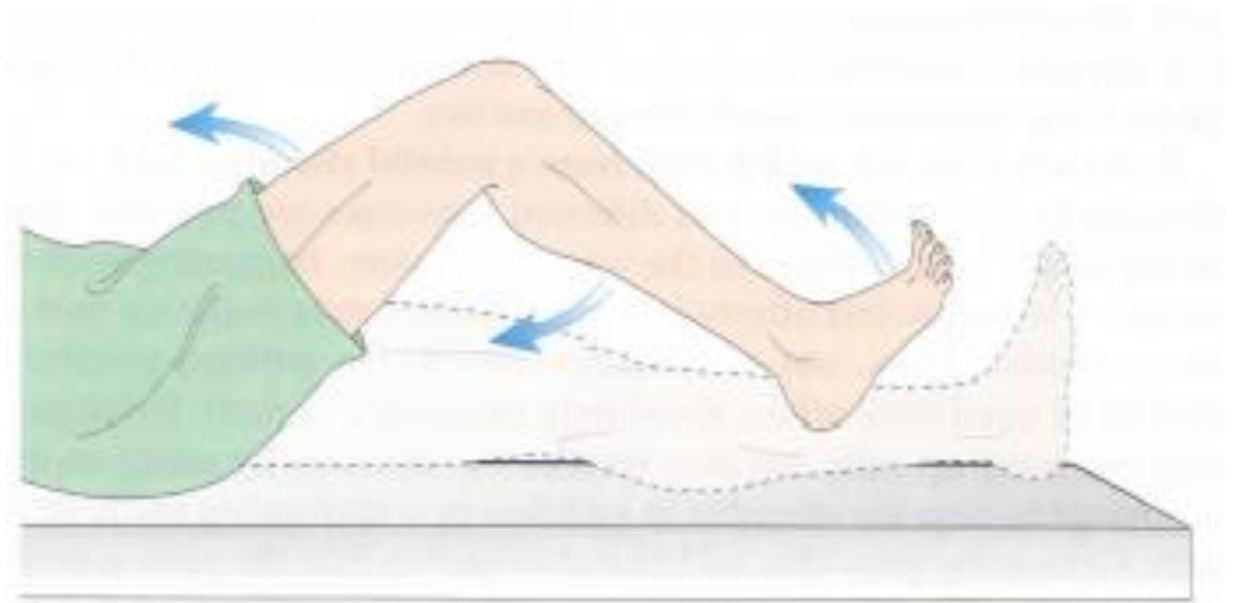


# 2023 BRAIN DEATH GUIDELINE

**eTABLE 4. DESCRIBED SPINAL REFLEXES IN BD/DNC\***

<b>Reflex</b>	<b>Description</b>
Decerebrate-type movements <sup>27</sup>	Spontaneous extension of the extremities
Extensor-like posturing <sup>27</sup>	Back arching to the left or right
Eyelid opening <sup>27</sup>	Opening of the eyelids after nipple stimulation
Fasciculation <sup>e89</sup>	Twitching of contiguous groups of muscle fibers
Head turning <sup>27, e90- e92</sup>	Intermittent head turning from side to side every 10-30 seconds with or without extension of the upper extremities
Hugging <sup>27</sup>	Flexion of the trunk and movement of the arms in a hugging-like manner
Lazarus sign <sup>27, e89, e93- e98</sup>	Bilateral arm flexion, shoulder adduction, and hand raising to chest, face, or endotracheal tube with dystonic posturing of the fingers
Limb elevation <sup>27</sup>	Raising of limbs off the bed
Myoclonus <sup>e89</sup>	Twitching or contraction of a muscle or group of muscles
Plantar response <sup>e89</sup>	Plantar flexion
Pronator-extension <sup>e89</sup>	Pronation and extension of the upper extremity
Respiratory-like movements <sup>27</sup>	Adduction of both shoulders followed by a slow cough-like movement
Repetitive leg movements <sup>e99</sup>	Slight flexion of the leg and foot
Thumbs Up sign <sup>e100</sup>	Isolated thumb extension
Triple flexion <sup>e89</sup>	Flexion of the thigh, leg, and foot
Undulating toe <sup>27</sup>	Slow flexion then extension of the toes

# Spinal reflex versus purposeful withdrawal?

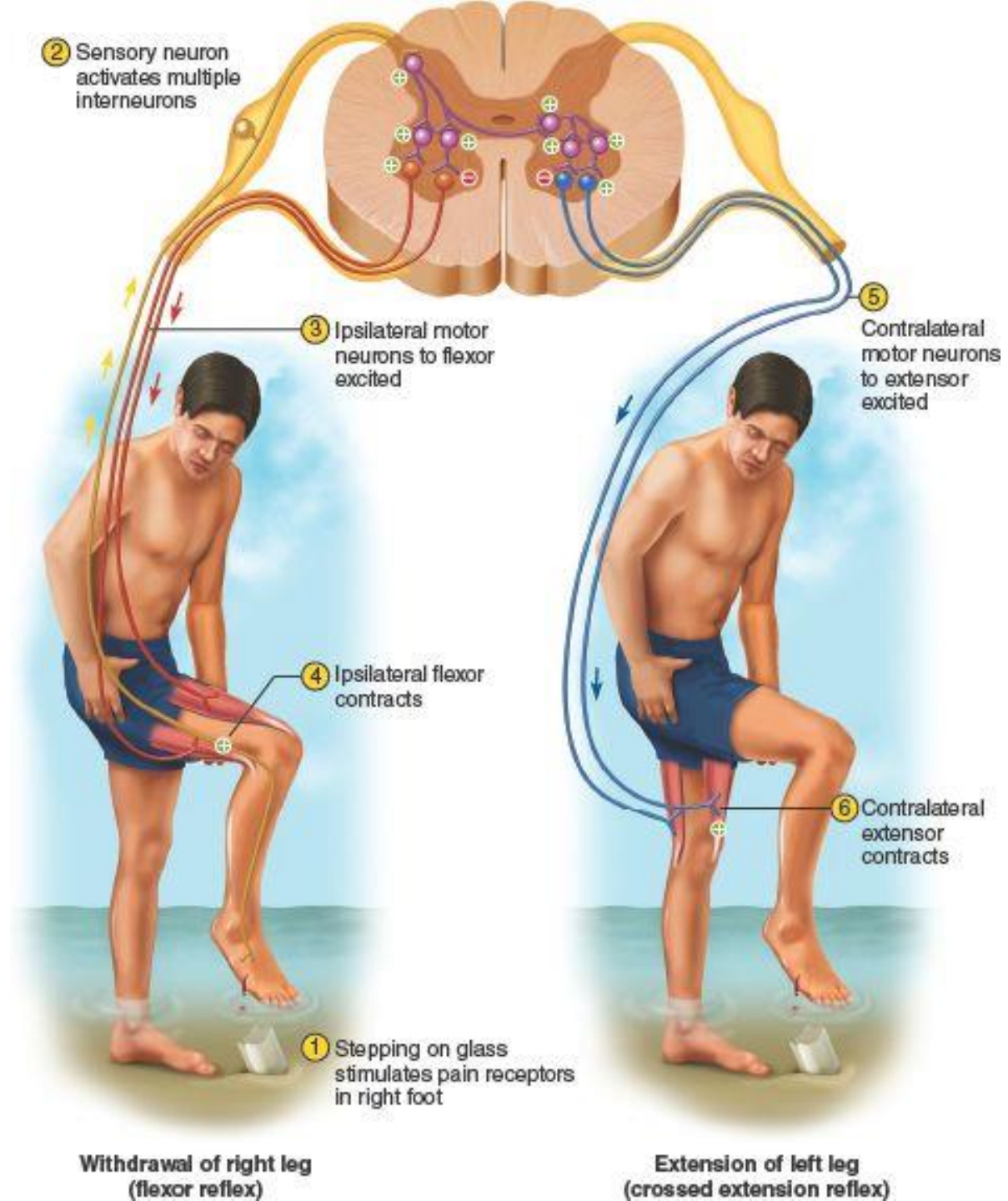


- Pinch the skin on the extensor and flexor sides of the limb and noting the direction of movement.
- Purposeful withdrawal should be **away from painful stimulus**.
- In flexor posturing the arm flexes even when the flexor side of the arm is pinched.
- **Reflexes can cross midline**

If it is unclear whether observed limb movements are spinally mediated, determination of BD/DNC should include an ancillary test.



Reflexes can cross midline





## Back to Case 1

You have completed the initial portion of your patient's brain death testing and will now proceed to the apnea test.

- What are your steps in performing the apnea test in this patient?

## eTABLE 5. CLINICAL GUIDANCE FOR PERFORMANCE OF THE APNEA TEST

### Prerequisites

1. Ensure the patient is not hypercarbia, hypotensive, hypovolemic, or hypothermic
2. Determine if the patient has baseline CO<sub>2</sub> retention due to pre-existing disease and whether the baseline Paco<sub>2</sub> is known
  - a. In a patient without known baseline CO<sub>2</sub> retention, adjust the ventilator to achieve a normal Paco<sub>2</sub> (35–45 mm Hg) and pH (7.35–7.45)

### Prior to procedure

1. Preoxygenate for at least 10 minutes with 100% F<sub>IO<sub>2</sub></sub>, aiming for Pao<sub>2</sub> > 200 mm Hg
2. Check ABG to establish baseline pH, Pao<sub>2</sub>, Paco<sub>2</sub> within above parameters

Disconnect the patient from intermittent mandatory ventilation and provide apneic oxygenation

### Techniques for providing apneic oxygenation

1. Tracheal insufflation for patients ≥18 years old
  - a. Place a catheter inside the endotracheal or tracheostomy tube such that it approximately terminates just above the level of the carina.

### The apnea test is consistent with BD/DNC if these conditions are met

1. No respirations or effort occurs, and
2. The arterial pH level is <7.30, and
  - 3a. In patients who are known NOT TO HAVE chronic CO<sub>2</sub> retention, the Paco<sub>2</sub> level is ≥60 mm Hg AND ≥20 mm Hg above the patient's pre-apnea test baseline level.
    - i. Disable default backup rescue ventilation
    - ii. Disable apnea alarm or lengthen to maximum allowable limit and assign provider to manually silence alarm
    - iii. Remove all condensation from the inspiratory and expiratory limbs of ventilator circuit
    - iv. Position the ventilator circuit away from the patient's body to allow for close examination of the chest and abdomen
    - v. Adjust the trigger sensitivity to a level that avoids auto-triggering but is sensitive enough to detect a true spontaneous respiratory effort. Auto-triggering may falsely indicate a patient is initiating respiratory effort.
- d. T-piece resuscitator (e.g., Neopuff ventilator for infants)

These techniques may need modification in patients with communicable respiratory illness<sup>e101,e102</sup>



# Case 2

15yoM admitted with a TBI after GSW to the head. He has significant facial trauma (including ocular) and refractory elevated ICPs requiring sedation, paralysis, and eventual pentobarbital infusions. Pentobarbital is discontinued for planned brain death testing.

- What are your considerations for brain death testing in this patient?

## Toxicology

- Ensure toxicology (urine and blood) screening, if clinically indicated, is negative
- Alcohol blood level  $\leq 80$  mg/dL

## Medications

- Confirm medication levels (when available) are in therapeutic or subtherapeutic range
- Allow at least five half-lives to pass
- Consider age-dependent metabolism
- Consider a longer elimination period if the patient has renal or hepatic dysfunction
- Consider a longer elimination period if the patient is obese or is hypothermic

Pentobarbital's half life is  $26 \pm 12$  hours...  
Confirm level ( $<5$ ) or wait 3-8 days to pass

Have to consider other sedation and neuromuscular blockade.

[PDF with half lives](#)

## Exclude severe metabolic, acid-base, and endocrine derangements

- Sodium:  $< 130$  mmol/L or  $> 160$  mmol/L
- Glucose:  $< 70$  mg/dL or  $> 300$  mg/dL
- Blood urea nitrogen:  $> 75$  mg/dL
- Calcium (iCa):  $< 7$  mg/dL or  $> 11$  mg/dL ( $< 1$  mmol/L or  $> 1.3$  mmol/L)
- Magnesium:  $< 1.5$  mg/dL or  $> 4$  mg/dL
- pH:  $< 7.3$  or  $> 7.5$
- Total T4<sup>a</sup>:  $< 3$  mg/dL or  $> 30$  mg/dL; free T4<sup>a</sup>:  $\leq 0.4$  ng/dL or  $> 5$  ng/dL
- Ammonia<sup>a</sup>:  $> 75$   $\mu$ mol/L

# 2023 BRAIN DEATH GUIDELINE

**eTABLE 2. COMMON MEDICATIONS ADMINISTERED TO CRITICALLY ILL PATIENTS AND ESTIMATED HALF-LIVES<sup>a</sup>**

Drug	Pharmacokinetics		Comments
<b>Intravenous sedatives</b>			
Dexmedetomidine <sup>e32</sup>	$t_{1/2}$	Infant $\leq 28d$	3.2 hours
		Pediatric	<2 years: 2.3 hours 2–11 years: 1.6 hours
		Adult	~3 hours
	Metabolism		Hepatic
	Excretion		Urine (95%)
Etomidate <sup>e34</sup>	$t_{1/2}$	Infant $\leq 28d$	2.6–3.5 hours
		Pediatric	
		Adult	
	Metabolism		Hepatic; plasma esterases
	Excretion		Urine (~75%), bile (10%)
Ketamine <sup>e37, e38</sup>	$t_{1/2}$	Infant $\leq 28d$	~2.5 hours
		Pediatric <sup>e39</sup>	
		Adult	
	Metabolism		Hepatic
	Excretion		Urine (91%)
Midazolam <sup>e40, b</sup>	$t_{1/2}$	Infant $\leq 28d$	4–12 hours
		Pediatric	2.9–4.5 hours
		Adult	~3 hours
	Metabolism		Hepatic
			<p><b>Hepatic impairment</b> Compared to a baseline half-life of 2.5 hours in healthy adult patients, clearance in mild, moderate, and severe hepatic impairment was 3.9, 5.4, and 7.4 hours, respectively.<sup>e33</sup></p> <p>Consider tapering rather than abrupt cessation for patients on &gt;24 hours of therapy to avoid hemodynamic changes.</p>
			<p><b>Continuous infusion:</b> Plasma terminal half-life was found to be ~5.5 hours when administered as a continuous infusion.<sup>e35</sup></p> <p><b>Hepatic impairment:</b> In patients with cirrhosis, the terminal half-life of continuous infusion can be prolonged up to 2-fold (~9 hours).<sup>e36</sup></p>
			<p><b>Renal impairment:</b> With continuous infusions, half-life of the parent compound can increase up to 2-fold. Half-life of the active metabolite can increase significantly compared to control group.<sup>e41</sup></p> <p><b>Special populations with prolonged half-lives:</b></p> <ul style="list-style-type: none"> <li>• Elderly: Increased 2-fold</li> <li>• Heart failure: Increased 2-fold</li> <li>• Hepatic impairment: Increased 2.5-fold</li> </ul>

# Due to this patient's facial injuries...

## Indications for Ancillary Testing

Ancillary testing should be used in the following situations

Injuries or abnormalities preclude accurate assessment of any component of the neurologic examination (with the notable exception of the oculoccephalic reflex in the setting of cervical spine instability, provided the oculovestibular reflex can still be tested)

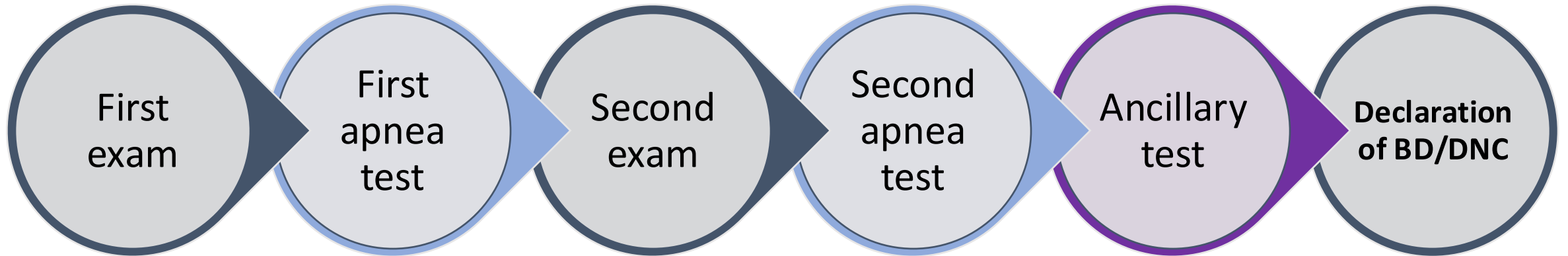
Inability to perform or complete the apnea test safely because of the patient's risk of cardiac or pulmonary decompensation

Inability to interpret  $\text{Paco}_2$  levels in a patient with chronic hypercarbia for whom the chronic baseline  $\text{Paco}_2$  level is unknown

Findings on neurologic examination that may be difficult to interpret, such as limb movements that may or may not be spinally mediated

Metabolic derangements unable to be adequately corrected

# Ancillary testing... New timeline!







## Case 3

9yoM presented as a level 1 trauma after a sledding accident. His initial head CT demonstrated bilateral atlanto-occipital dissociation, subarachnoid hemorrhage in basilar cisterns and 4th ventricle, and likely cerebral edema. On HD 2, he lost his pupillary reflex and EEG demonstrated no activity.

- A portion of the clinical exam other than the oculoccephalic reflex could not be assessed safely or it was unclear whether observed limb movements were spinally mediated (note that even if a person does not have all limbs, painful stimulation can still be provided to the torso as close to the termination of the limb as possible, so this does not necessitate ancillary testing); however, the remainder of the test was performed to the fullest extent possible and responses were consistent with BD/DNC. (*Ancillary testing is required.*) (14a) Reason(s) for incomplete testing (check all that apply):
  - Anophthalmia;  Corneal trauma or transplantation;  Fracture of the base of the skull or petrous temporal bone;  High cervical cord injury
  - Ophthalmic surgery that influences pupillary reactivity;  Severe facial trauma;  Severe pre-existing neuromuscular disorder
  - Severe orbital or scleral edema or chemosis;  Limb movements that may be spinally mediated;  Other (specify):

# Oculocephalic versus Oculovestibular reflex:

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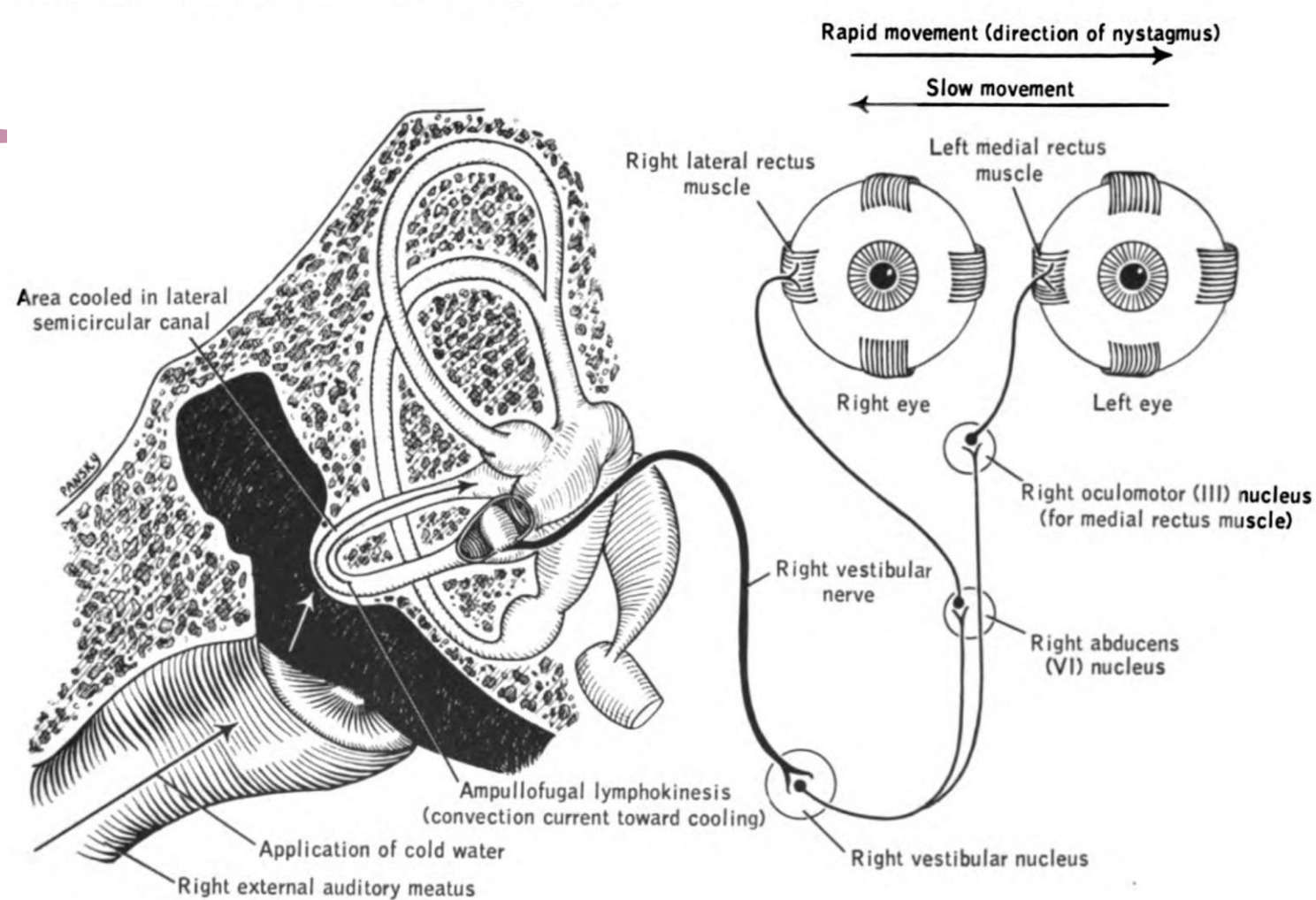
# Recommendations: Oculocephalic Reflex (OCR) vs Oculovestibular Reflex (OVR)

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- Clinicians must determine that there is no OCR
  - Unless there is concern for cervical spine or skull base integrity.
- If the OCR is absent bilaterally or if the OCR cannot be tested, **OVR must be performed bilaterally.**
  - So that means we should always be testing both OCR and OVR if possible.
- If the OCR cannot be tested:
  - Clinicians may diagnose BD/DNC without ancillary testing provided that the OVR can be tested and is absent bilaterally and all other BD/DNC criteria are satisfied.

# OCR and OVR Test the Same Cranial Nerves

- OCR can be harmful with C-spine injury or absence of skull base integrity
- OVR provides a stronger vestibular stimulus
  - May be a more sensitive test
- OVR – can be done incorrectly:
  - Examine auditory canals for patency and intact TMs
  - Elevate head to 30° to place horizontal semicircular canals in optimal orientation
  - Using a catheter attached to a syringe placed inside one of the auditory canals
    - Irrigate 50–60mL of ice water
    - For at least 60 seconds
    - Observe for extraocular movements
  - There should be a >5-min interval before testing opposite side to allow endolymph temperature to equilibrate





Back to our  
case!

The first brain death test is performed and is consistent with brain death.

Father refuses second brain death exam.

- How do you proceed?
- Do you need consent to perform the second brain death test?
  - No.

# Death by BD/DNC criteria is equivalent medicolegally to death by cardiopulmonary criteria

- Clinicians **do not need to obtain consent** before an evaluation for BD/DNC
  - Unless otherwise stipulated by the institution's policy or state laws or regulations.
- Clinicians should make a reasonable attempt to inform the patient's family of the plan to perform a BD/DNC examination.
- Clinicians should provide the option for the family to observe the clinical evaluation, including apnea testing.
  - Clinicians should inform families that patients may have reflexive movements originating from:
    - The spinal cord
    - Muscles
    - Nerves
  - These movements do not preclude determination of BD/DNC.



# Case 4

5yoF presents after an MVC. She had multiple cardiac arrests prior to arrival and required an ex-lap due to abdominal trauma with significant bleeding requiring MTP. She developed TRALI with need for the oscillator and has had continued hemodynamic instability with 3 vasoactive infusions.

- She develops bilateral fixed and dilated pupils
- CT head reveals loss of grey/white differentiation, effacement of all ventricles, and concern for tonsillar herniation.
- Her vasoactive support includes epinephrine 0.3 mcg/kg/min, norepinephrine 0.2 mcg/kg/min, and vasopressin of 0.02 units/kg/hr.
- Family has opted to proceed with brain death testing of their child.
  - What are your considerations for brain death testing in this patient?

## Indications for Ancillary Testing

Ancillary testing should be used in the following situations

Injuries or abnormalities preclude accurate assessment of any component of the neurologic examination (with the notable exception of the oculoccephalic reflex in the setting of cervical spine instability, provided the oculovestibular reflex can still be tested)

Inability to perform or complete the apnea test safely because of the patient's risk of cardiac or pulmonary decompensation

Inability to interpret  $Paco_2$  levels in a patient with chronic hypercarbia for whom the chronic baseline  $Paco_2$  level is unknown

Findings on neurologic examination that may be difficult to interpret, such as limb movements that may or may not be spinally mediated

Metabolic derangements unable to be adequately corrected

But the guidelines state that both apnea tests should still be attempted.



Ensure the patient is not hypercarbic (PaCO<sub>2</sub> 35-45 mmHg), acidotic (pH 7.35-7.45), hypotensive, hypovolemic, or hypothermic

**Disconnect from mechanical ventilation**  
**Provide apneic oxygenation**

- 1) 100% FiO<sub>2</sub> at 4-6 L/min through a catheter placed inside the ETT/tracheostomy
- 2) 100% FiO<sub>2</sub> via CPAP on the ventilator\*\*
- 3) 100% FiO<sub>2</sub> via a flow-inflating resuscitation bag with PEEP valve\*

**Observe the chest and abdomen for evidence of respiratory effort**

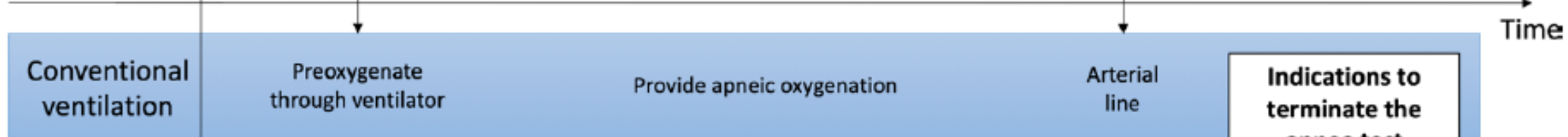
**ABG criteria consistent with BD/DNC**

1. pH <7.30 AND
2. PaCO<sub>2</sub> ≥60 mmHg AND ≥20 mmHg above pre-apnea test baseline

**Preoxygenate >10 mins**  
to achieve PaO<sub>2</sub> >200 mmHg

Sample ABG after 8-10 mins and then q2 mins

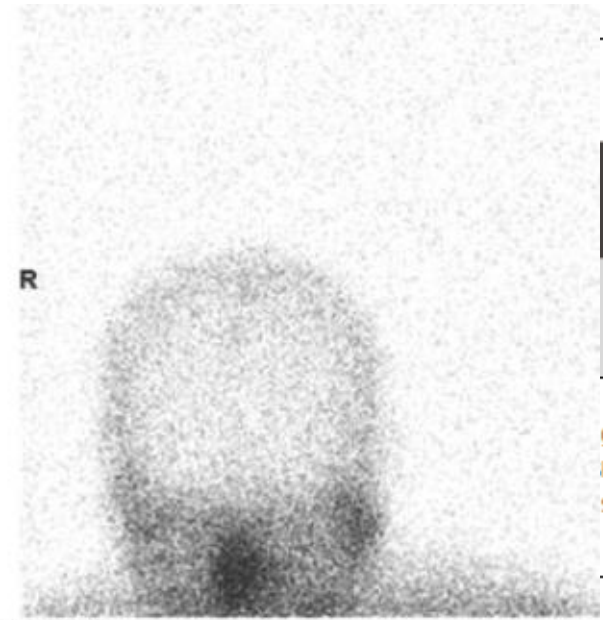
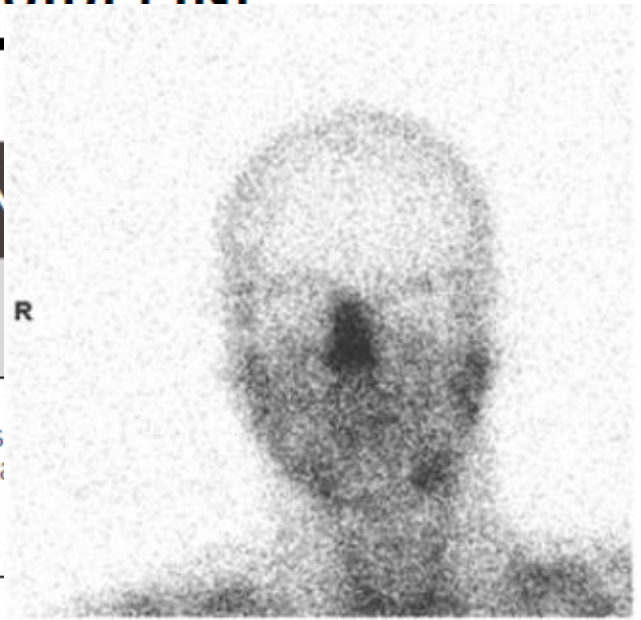
8-10 mins



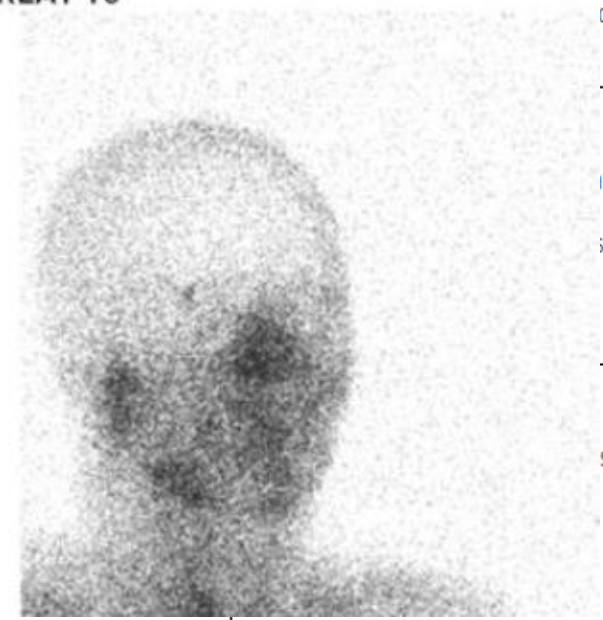
# 2023 BRAIN DEATH GUIDELINE

**eTABLE 6. ANCILLARY TESTING**

Test	
Digital subtraction angiography /conventional 4-vessel angiography	Abs intr
Radionuclide angiography	Abs ima LAT TO
Radionuclide perfusion scintigraphy	Abs indi ima
This is the test we use!	Rec spik dias intra or p sign



UT = 20  
RLAT TO



	Sensitivity/specificity
g suite KILLS) St	100%/ 100% <sup>a, e103, e104</sup>
em	98.5%/56% <sup>e105</sup>
chnique	
lin-stem	Planar: 77.8%/100%
sport to	SPECT: 88.4%/100% <sup>a, e106</sup>
stic windows	90%/98% <sup>59</sup>



# Case 5

5yoF with history of VP shunt, seizures, chronic respiratory insufficiency with nighttime BiPAP develops progressive lethargy and abnormal breathing that leads to cardiac arrest requiring CPR enroute to the ED.

- Upon arrival to the ED, she has fixed and dilated pupils with no corneal, cough, or gag reflexes.
- CT head performed which was concerning for shunt malfunction with brainstem compression and was taken to the OR for shunt revision.
- Unfortunately, despite revision, she continues to have loss of brainstem reflexes.
- She is also visiting from out of town, and you do not have access to her baseline pCO<sub>2</sub> levels (known to be high).
  - What are your considerations with regards to the apnea testing for this patient?

## Indications for Ancillary Testing

Ancillary testing should be used in the following situations

Injuries or abnormalities preclude accurate assessment of any component of the neurologic examination (with the notable exception of the oculoccephalic reflex in the setting of cervical spine instability, provided the oculovestibular reflex can still be tested)

Inability to perform or complete the apnea test safely because of the patient's risk of cardiac or pulmonary decompensation

Inability to interpret  $Paco_2$  levels in a patient with chronic hypercarbia for whom the chronic baseline  $Paco_2$  level is unknown

Findings on neurologic examination that may be difficult to interpret, such as limb movements that may or may not be spinally mediated

Metabolic derangements unable to be adequately corrected

# CO<sub>2</sub> Goals for Apnea Testing

Patient does NOT have chronic CO<sub>2</sub> retention

- PaCO<sub>2</sub> level is ≥60 mmHg
- AND ≥20 mmHg above the patient's pre-apnea test baseline level

In patients who are KNOWN TO HAVE chronic CO<sub>2</sub> retention, and the baseline PaCO<sub>2</sub> is KNOWN

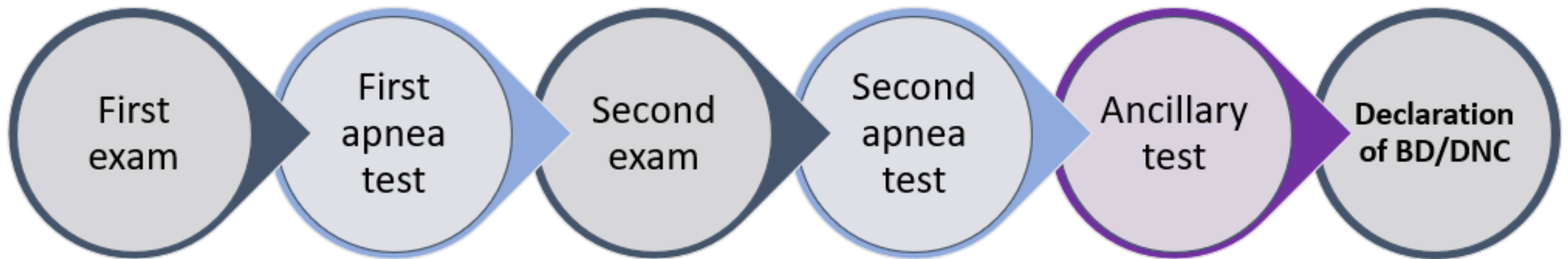
- PaCO<sub>2</sub> level is ≥60 mmHg
- AND ≥20 mmHg **above the patient's known chronic elevated preorbital baseline level.**

In patients who are SUSPECTED TO HAVE chronic CO<sub>2</sub> retention, but the baseline PaCO<sub>2</sub> is UNKNOWN

- PaCO<sub>2</sub> level is ≥60 mmHg
- AND ≥20 mmHg above the patient's pre-apnea test level
- **AND an ancillary test is required.**

# Other Ancillary Testing Recommendations:

- Do not use ancillary testing in setting of:
  - Hypothermia
  - High-levels of sedation
  - To avoid performing otherwise testable elements of BD/DNC assessment
- If ancillary testing is needed, both examinations and apnea tests need to be as fully performed as possible prior to ancillary testing.
- In patients who meet clinical criteria for BD/DNC, clinicians should **not** perform ancillary testing.





4wkM 38wk gestation HLHS s/p Norwood/Sano 3 days ago. Came out of the OR on VA-ECMO due to difficulty separating from bypass. Overnight last night, right pupil became dilated and nonreactive. 3% is pushed and code stroke is called.

- CT head demonstrates a large interventricular and intraparenchymal bleed, effacement of the ventricles and sulci, and transtentorial and uncal herniation.
- Upon return to the unit, the second pupil is nonreactive and patient has lost cough, gag, and corneal reflexes.
- All sedative drips are stopped. Patient remains without any brainstem reflexes on exam.
- Parents ask about organ donation.
  - Can he undergo brain death testing on VA ECMO?
  - What are your considerations with regards to the apnea testing for this patient?
  - Why did we mention gestational age?



# Brain death testing on ECMO

It's possible!



# Apnea testing on ECMO in general

1. Preoxygenate
  - Using 100% FiO<sub>2</sub> on the ventilator
  - And through 100% FiO<sub>2</sub> with the membrane lung
2. To achieve an adequate increase in PaCO<sub>2</sub> level:
  - Titrate exogenous CO<sub>2</sub> into the ECMO circuit
  - Or adjust the sweep gas flow rate down
3. VA-ECMO: obtain ABG measurements from **both** the patient's A-line and the ECMO circuit post-oxygenator
4. Avoid hypotension during apnea testing on ECMO by increasing ECMO flows, IV fluid administration, or vasopressor/ionotropic support

Ensure the patient is not hypercarbic (PaCO<sub>2</sub> 35-45 mmHg), acidotic (pH 7.35-7.45), hypotensive, hypovolemic, or hypothermic

Preoxygenate >10 mins to achieve PaO<sub>2</sub> >200 mmHg

**Disconnect from mechanical ventilation**  
**Provide apneic oxygenation**

- 1) 100% FiO<sub>2</sub> at 4-6 L/min through a catheter placed inside the ETT/tracheostomy
- 2) 100% FiO<sub>2</sub> via CPAP on the ventilator\*<sup>+</sup>
- 3) 100% FiO<sub>2</sub> via a flow-inflating resuscitation bag with PEEP valve\*

**Observe the chest and abdomen for evidence of respiratory effort**

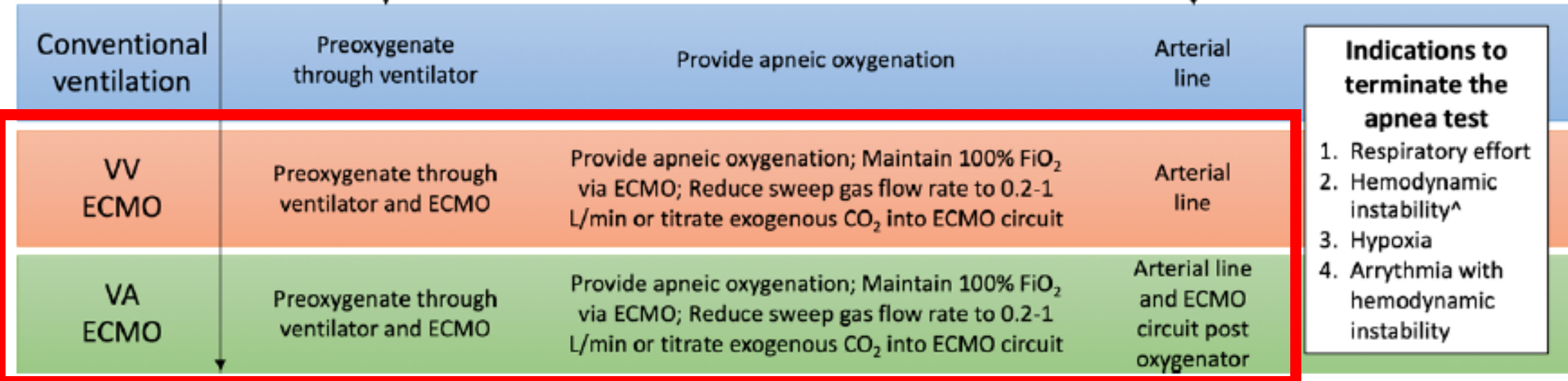
**ABG criteria consistent with BD/DNC**

1. pH <7.30 AND
2. PaCO<sub>2</sub> ≥60 mmHg AND ≥20 mmHg above pre-apnea test baseline

Sample ABG after 8-10 mins and then q2 mins

8-10 mins

Time



**Indications to terminate the apnea test**

1. Respiratory effort
2. Hemodynamic instability<sup>^</sup>
3. Hypoxia
4. Arrhythmia with hemodynamic instability

# So we have completed one test.... How long do we wait between tests?

## Pediatrics

- Two clinicians must each perform a separate and independent examination for BD/DNC.
- A **minimum interval of 12 hours** should separate the two examinations in pediatrics.

## Adults

- Clinicians must perform a **minimum of 1 examination** for BD/DNC
- Second clinician may perform a separate and independent examination for BD/DNC
  - Performance of 2 independent BD/DNC examinations may decrease the risk of a false-positive determination due to diagnostic error.

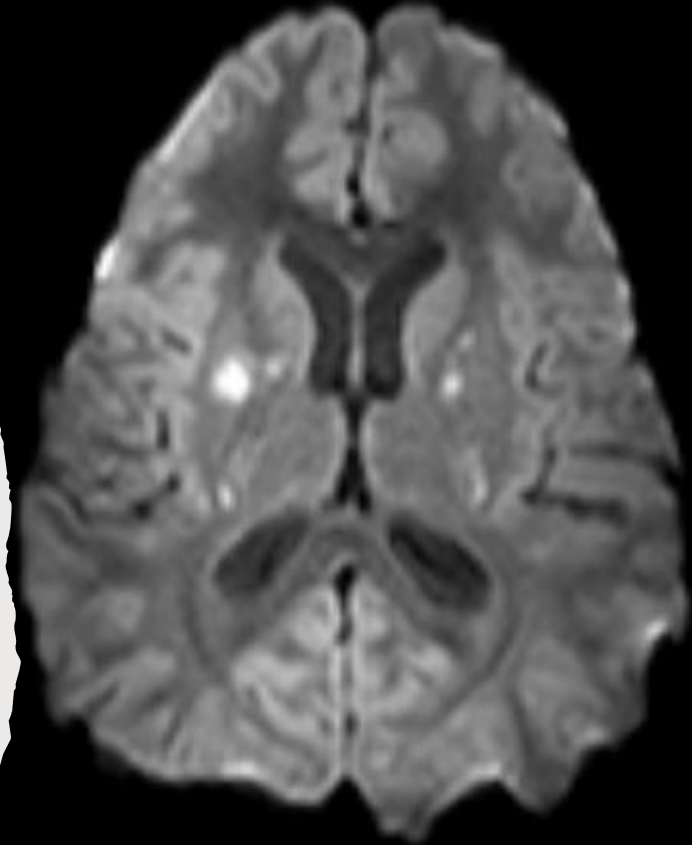
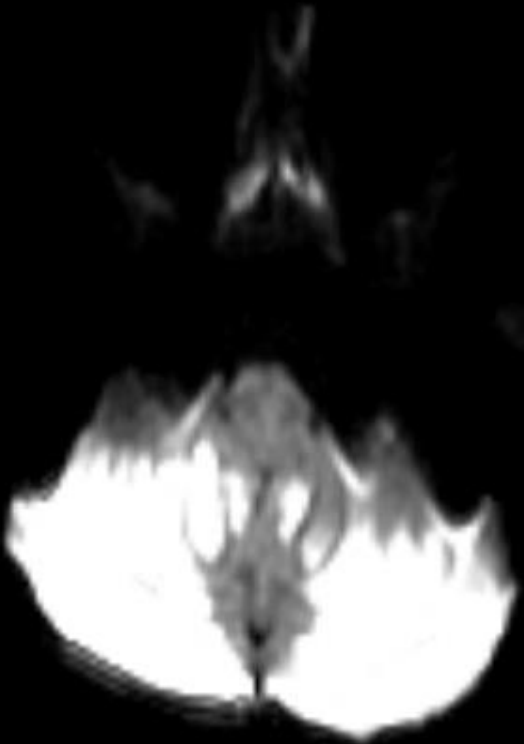


5yoM who couldn't be woken up after a nap. Intubated in the ED for concern for depressed mental status and seizure-like activity.

- Head CT demonstrates markedly abnormal and edematous appearing cerebellar hemispheres
- Repeat head CT 9 hours later shows worsening obstructive hydrocephalus.
- HD2: Goes for decompressive craniectomy and EVD. ICPs are exceedingly difficult to control. Later that day, pupils become nonreactive.
- Soon corneal, cough, and gag reflexes are also lost.
  - Can this patient undergo brain death testing?
  - When can this patient undergo brain death testing?

# Primary Posterior Fossa Process

- Patients may appear clinically comatose:
  - Brainstem areflexia
  - Apnea
  - **However, they may retain some cortical function**
- Clinicians should ensure that the posterior fossa process ***has also led to catastrophic supratentorial injury***
  - Injury should be demonstrated on a conventional neuroimaging study before initiating the BD/DNC evaluation



# Time of Death?

- Typical pediatric testing:
  - Time of death = timing of last ABG during apnea test
- With ancillary testing:
  - Time of death = the time an attending clinician documents in the EMR that the ancillary test results are consistent with BD/DNC



# Check the Checklist for Specifics!

- Available in appendix
- Contains many of the special considerations we discussed.

After this talk, we will share a file folder that has this presentation, all the literature, and all the appendices.

## eAppendix 5. Brain Death/Death by Neurologic Criteria Checklist

Last Name	First name	DOB	MRN
<b>PREREQUISITES FOR CLINICAL EXAMINATION</b>			
1. Ascertainment that the patient has sustained a catastrophic, permanent brain injury caused by an identified mechanism that is known to lead to brain death/death by neurologic criteria (BD/DNC) (7a and 13a)			<input type="checkbox"/> Yes <input type="checkbox"/> No Etiology:
2. Neuroimaging consistent with mechanism and severity of brain injury (in patients with primary posterior fossa injury, neuroimaging should demonstrate catastrophic supratentorial injury) (7c and 40)			<input type="checkbox"/> Yes <input type="checkbox"/> No
3. Observation for permanency a) ≥48 hours after acute brain injury (particularly hypoxic ischemic brain injury) for patients ≤2-years-old (8) b) ≥24 hours after hypoxic ischemic brain injury for patients ≥2-years-old (9b) c) A sufficient amount of time after brain injury to ensure there is no potential for recovery of brain function as determined by the evaluator based on the pathophysiology of the brain injury (9a)			<input type="checkbox"/> Yes <input type="checkbox"/> No Observation period (hours):
4. Core body temperature ≥ 36°C (for ≥24 hours for patients whose core body temperature has been ≤35.5°C [10a and b])			<input type="checkbox"/> Yes <input type="checkbox"/> No Value:
5. Systolic blood pressure (SBP) ≥ 100 mm Hg and mean arterial pressure (MAP) ≥ 75 mm Hg for adults/SBP and MAP ≥ 5 <sup>th</sup> percentile for age in children (for patients on venoarterial ECMO: MAP ≥ 75 mm Hg for adults/MAP ≥ 5 <sup>th</sup> percentile for age in children) (11b and 11c)			<input type="checkbox"/> Yes <input type="checkbox"/> No Value:
6. Exclusion of pharmacologic paralysis (if administered or suspected) through use of train-of-four stimulator or demonstration of deep tendon reflexes (12a)			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
7. Drug levels for medications that may suppress central nervous system function are therapeutic/subtherapeutic (if available), pentobarbital level is <5 mcg/mL (if the patient received phenobarbital) and at least five half-lives for all other such drugs have passed (longer if there is renal/hepatic dysfunction or if the patient is obese or was hypothermic); (12a)			<input type="checkbox"/> Yes <input type="checkbox"/> No
8. Alcohol blood level ≤ 80 mg/dL (if clinically indicated) (12a)			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
9. Toxicology screen (urine and blood) is negative (if clinically indicated) (12a)			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
10. Exclusion of severe metabolic, acid-base, and endocrine derangements; (12a)			<input type="checkbox"/> Yes <input type="checkbox"/> No
11. A reasonable attempt has been made to inform the patient's family of the plan to perform a BD/DNC examination (35a)			<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Prerequisite Summary (check one):</b>			
<input type="checkbox"/> All prerequisites were met			
<input type="checkbox"/> Unable to adequately correct metabolic derangements, but all other prerequisites were met, so will complete the neurologic examinations and apnea test(s) and if they are consistent with BD/DNC, will perform ancillary testing (12b)			

# Citations

- Triple Flexion: <https://telegra.ph/Oglyad-pac%D1%96yenta-v-kom%D1%96-05-25>
- Hot nose sign: <https://radiopaedia.org/articles/cerebral-oedema-summary?lang=us>
- OVR Diagram: [https://en.wikipedia.org/wiki/Caloric\\_reflex\\_test](https://en.wikipedia.org/wiki/Caloric_reflex_test)





# BRAIN DEATH DOCUMENTATION 2024 GUIDELINES

*NEW NOTE GOES LIVE APRIL 3RD*

# THIS UPDATE...

## DOES

- Give the providers a uniform documentation tool
- Save time and reduce confusion

## DOES NOT

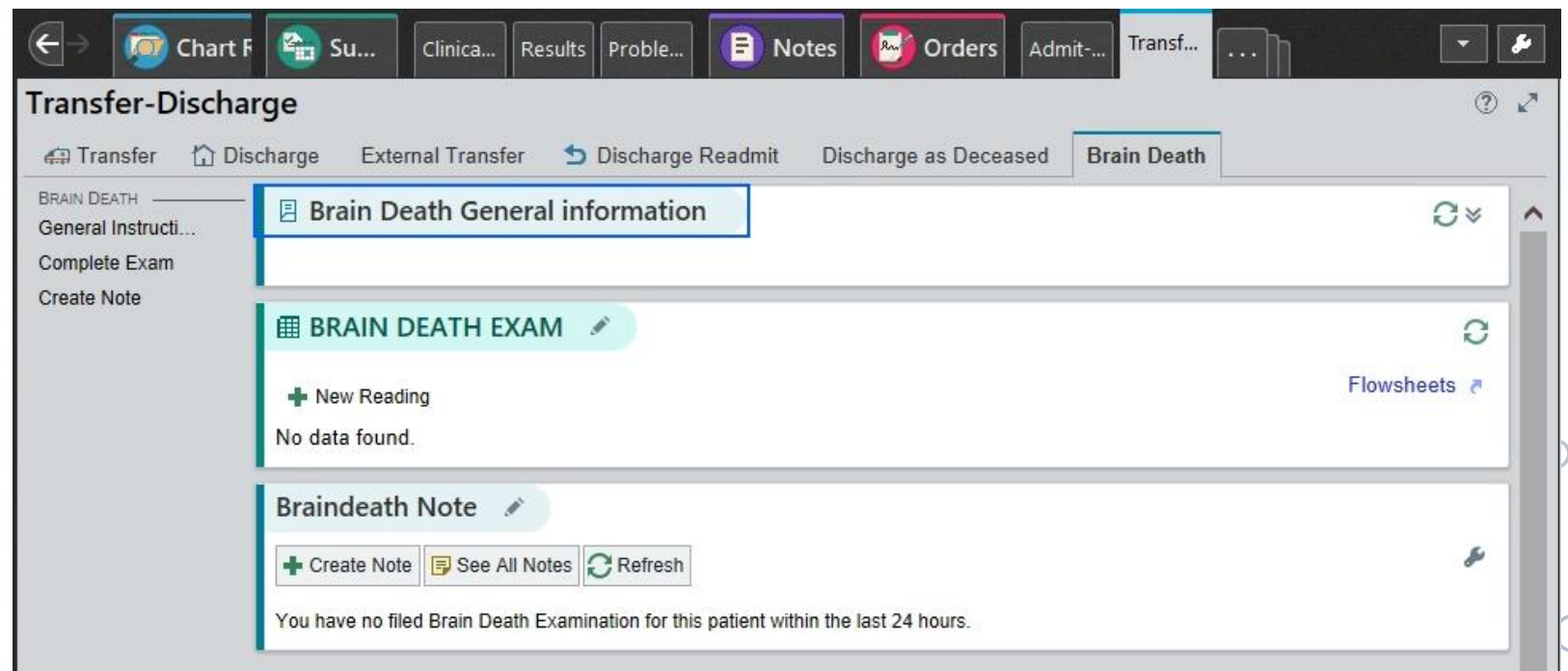
- Teach a brain death exam
- Substitute for clinical judgement
- Relinquish legal responsibility for the individual provider on performance or changes

# GETTING STARTED

- Documentation tool remains in the “Transfer-Discharge” navigator
- Security to access is based on the department and specialty of the individual user (critical care, anesthesia, neurology, neurosurgery, trauma surgery)

- **Three-part navigator**

- General instructions
- Complete Exam
- Create Note



# GETTING STARTED – NAVIGATOR FUNCTION

- At the top of all navigators, there are options to “**Show Row Information**” and “**Show All Choices**”
- Make sure both of these boxes are checked
- Provides you with critical information, reminders, and all available documentation options

The screenshot displays the 'Transfer-Discharge' application interface. At the top, there is a navigation bar with tabs for 'Transfer', 'Discharge', 'External Transfer', 'Discharge Readmit', 'Discharge as Deceased', and 'Brain Death'. The 'Brain Death' tab is currently selected. Below the navigation bar, there is a sidebar on the left with a 'BRAIN DEATH' section containing 'General Instructi...', 'Complete Exam', and 'Create Note'. The main content area shows 'Brain Death General information' and 'BRAIN DEATH EXAM'. The 'BRAIN DEATH EXAM' section includes a 'Time taken:' field with a date '2/26/2024' and a time '0819'. At the bottom right of the interface, there are three checkboxes: 'Show Row Info' (checked), 'Show Details' (unchecked), and 'Show All Choices' (checked). Two large red arrows point to the 'Show Row Info' and 'Show All Choices' checkboxes.

# PART 1 - GENERAL INFORMATION

- 2-page instructions including **links** to the 2024 AAN guidelines and Vanderbilt policies
- Basic reminders for pre-requisites and inclusion criteria with **reference locations** to the AAN guidelines
- Recommendations for **Ancillary studies**

The screenshot shows a software interface titled "Transfer-Discharge" with a navigation menu on the left and a main content area on the right. The navigation menu includes "Transfer", "Discharge", "External Transfer", "Discharge Readmit", "Discharge as Deceased", and "Brain Death". The "Brain Death" tab is selected. The main content area is titled "Determination of Clinical Brain Death" and contains the following text:

**Determination of Clinical Brain Death**

[American Academy of Neurology - Pediatric and adult Brain Death/Death By Neurologic Criteria Consensus Guidelines Oct, 2023](#)

- **Hospital Policies**
  - [Organ and Tissue Donation after Death](#)
  - [Organ Donation after Circulatory Death \(DCD\)](#)
  - [Determination and Pronouncement of Death - Adult](#)
  - [Determination and Pronouncement of Death Pediatrics \(age less than 18 years\)](#)
- **Prerequisites:**
  - Must have a history of catastrophic, permanent brain injury caused by an identifiable mechanism known to lead to brain death (7a and 13a)
  - Neuroimaging, if obtained, consistent with severe global brain injury (7c and 40)
  - Observation for permanency of a sufficient time to ensure there is no potential to recover brain function as determined by the examiner. ≥24 hours for patients 2 and older of ≥48 hours for patients less than 2 years of age
  - Core temp Core temp ≥ 36°C for more than 24 hours (10a and 10b)
  - Systolic BP ≥100 mmHg and MAP ≥75mmHg for adults and MAP ≥ 5th percentile for age (11b and 11c)
  - Exclusion of pharmacologic paralysis (train of four testing or deep tendon reflexes present)
  - Exclusion of pharmacology intoxication including toxicology screen with alcohol ≤80 mg/dL *if clinically indicated* (12a). Drug levels that suppress CNS function are therapeutic or lower (if available and indicated). Pentobarb <5 mcg/mL. Other substances, more than 5 half lives for administration/absorption (longer for obese patients or patients renal/liver dysfunction).
- **Physiologic Criteria**
  - **Temperature:** Patient temperature must be greater than or equal to 36°C (96.8°F) at the onset of the exam and remain at or above 36°C (96.8°F) throughout all phases of the exam
  - **Toxicology/Pharmacology:** The patient should not have residual effects of topical pupil dilating medications, neuromuscular blockade agents, atropine, anesthesia or other intoxicants/sedatives (high dose AED's or pharmacologic burst suppression) during the test (see final point of "prerequisites" above)
  - **Metabolic:** The patient should not have severe hypercarbia or electrolyte/metabolic derangement
  - **Hemodynamics:** Shock or ongoing hypotension should be corrected and the patient have an established age appropriate blood pressure throughout the examination.
  - **Irreversibility:** The patient's clinical condition and history are consistent with an irreversible condition as the cause of the coma.
- **Ancillary studies/Corroborative Tests**
  - Injuries/abnormalities (e.g. C-spine fractures/high spinal cord injury, complex facial trauma, locked-in state, severe obesity, severe COPD, inability to correct severe metabolic derangement) preclude accurate assessment of any component(s) of the neurologic examination

# PART 2 – COMPLETE EXAM

- There are two parts to the complete exam: - inclusion data with inclusion criteria and exam components
- Exam components will appear after you select inclusion criteria
- Note: Addition – “**Duration of observation**”

## BRAIN DEATH EXAM

Time taken: 2/26/2024 0819 More  Show Row Info  Show Details  Show All Choices

### Brain Death Inclusion Criteria

Diagnosis compatible with brain death

*Diagnosis should be consistent with an irreversible cause of cerebral function*

Duration of observation of permanency after initial injury (hours)

*Duration of time, in hours, after the initial injury that the patient has displayed an exam suspicious for cessation of neurologic function. Brain death cannot be determined in infants under 37 weeks corrected gestational age. "For infants and children younger than 24 months, clinicians should wait at least 48 hours after the acute brain injury before initiating the BD/DNC evaluation". "In patients older than 2 years with HIBI (hypoxic ischemic brain injury), an observation period of at least 24 hours is reasonable. There is no evidence to support a specific observation period between brain injury of other etiologies and performance of the BD/DNC evaluation."*

Brain Death inclusion criteria

Core temp greater than or equal to 36C  Age appropriate blood pressure

Absence of pharmacologic intoxication  Absence of pharmacologic paralysis

Absence of severe metabolic derangement

*Inclusion criteria for BD/DNC should include all the following data points*

[Create Note](#)

Restore Close Cancel Previous Next

# PART 2 – EXAM COMPONENTS

- All brain death exam components are listed with information for each per the AAN consensus statement.
- Note: Terminology change – responses of “Not assessed” are removed and replaced with **“Unable to complete”**.
- Note: Addition of **“Absence of sucking and rooting reflexes (<6 months of age)”**. For older patients, the component does not require a response.

Transfer-Discharge

Transfer Discharge External Transfer Discharge Readmit Discharge as Deceased **Brain Death**

BRAIN DEATH  
General Instructi...  
**Complete Exam**  
Create Note

Unresponsive, comatose, GCS = 3T  
**Consistent with braindeath** **Unable to complete**

*The presence of coma with no response to noxious stimulation is a key component of the BD/DNC neurologic examination.*

Absent motor reflexes (excluding spinal reflexes) to central stimulation and 4 extremities  
**Consistent with brain death** **Unable to complete**

*Clinicians performing the BD/DNC neurologic examination must ensure that the patient has no motor responses, other than spinally mediated reflexes, of the head/face, neck, and extremities after application of noxious stimuli to the head/face, trunk, and limbs. If it is unclear whether observed limb movements are spinally mediated, determination of BD/DNC should include an ancillary test*

Absence of pupillary responses  
**Consistent with braindeath** **Unable to complete**

*The pupillary light reflex is a brainstem reflex and part of the BD/DNC neurologic examination*

Absent occulocephalix reflexes (Doll's eyes)  
**Consistent with brain death** **Unable to complete**

*Clinicians performing the BD/DNC neurologic examinations must determine that there is no OCR unless there is concern for cervical spine or skull base integrity (in which an ancillary test should be performed)*

Absent oculovestibular reflex (cold caloric)  
**Consistent with brain death** **Unable to complete**

*If the OCR is absent bilaterally or if the OCR cannot be tested because of concern for cervical spine or skull base integrity, OVR must be performed bilaterally. If unable to do complete testing, an ancillary test should be performed*

Absence of corneal reflexes  
**Consistent with braindeath** **Unable to complete**

*Clinicians performing the BD/DNC neurologic examination must determine that there are no corneal reflexes bilaterally*

Absence of cough  
**Consistent with braindeath** **Unable to complete**

*Clinicians performing the BD/DNC neurologic examination must determine that both the gag and cough reflexes are absent*

Absent gag  
**Consistent with brain death** **Unable to complete**

*Clinicians performing the BD/DNC neurologic examination must determine that both the gag and cough reflexes are absent*

**Absence of sucking and rooting reflexes (<6 months of age)**  
**Consistent with brain death** **Unable to complete**

*The sucking reflex is a centrally mediated primitive reflex in infants that becomes a voluntary response at approximately 4 months of age. The rooting reflex is a centrally mediated primitive reflex in infants that disappears between 3 and 6 months of age. In infants younger than 6 months, clinicians performing the BD/DNC neurologic examination must determine that there is no sucking or rooting reflex*

# PART 2 – EXAM COMMENTS

- If an exam component is not able to be performed or is indeterminate, free text explanation should go here.

Absent oculovestibular reflex (cold caloric)

▼ 📄

*If the OCR is absent bilaterally or if the OCR cannot be tested because of concern for cervical spine or skull base integrity, OVR must be performed bilaterally. If unable to do complete testing, an ancillary test should be performed*

Absence of corneal reflexes

▼ 📄

*Clinicians performing the BD/DNC neurologic examination must determine that there are no corneal reflexes bilaterally*

Absence of cough

▼ 📄

*Clinicians performing the BD/DNC neurologic examination must determine that both the gag and cough reflexes are absent*

Absent gag

▼ 📄

*Clinicians performing the BD/DNC neurologic examination must determine that both the gag and cough reflexes are absent*

Absence of sucking and rooting reflexes (<6 months of age)

▼ 📄

*The sucking reflex is a mediated primitive reflex in infants that becomes a voluntary response at approximately 4 months of age. The rooting reflex is a mediated primitive reflex in infants that disappears between 3 and 6 months of age. In infants younger than 6 months, clinicians performing the BD/DNC neurologic examination must determine that there is no sucking or rooting reflex*

Exam Comments



# PART 2: APNEA TEST WITH INTERPRETATION AND ANCILLARY TESTING

- An apnea test with an interpretation is required for a complete brain death exam. For patients with two exam requirements (under 18 years of age) apnea tests are required with both examinations for a complete exam
- Indicate if apnea testing is ordered (if any component was indeterminate or marked as “Unable to complete”

Transfer-Discharge

Transfer Discharge External Transfer Discharge Readmit Discharge as Deceased **Brain Death**

BRAIN DEATH  
General Instructi...  
**Complete Exam**  
Create Note

Exam Comments

Apnea Testing

Pre-apnea test pH

Pre-Apnea testing PaCO2

Pre-apnea testing PaO2

Absence of respiratory effort with PaCO2 greater than 60?  
Yes Unable to complete

Absence of respiratory effort with PaCO2 rise greater than 20?  
Yes Unable to complete

Post-apnea testing pH?

Post-apnea testing PaCO2?

Post-apnea testing PaO2?

Ancillary testing

Ancillary testing ordered?  
Yes No

*If a complete brain death exam with apnea testing (or two complete brain death exams with two complete apnea tests by two different providers separated by 12 hours in patients under the age of 18) cannot be completed or if there are confounding conditions, an ancillary test should be requested and officially resulted in order to confirm the diagnosis BD/DNC.*

Create Note

Restore Close Cancel Previous Next

## PART 2 : CREATE NOTE – **DO NOT USE**

- Do not use the “**Create Note**” in the ancillary testing area. This will not give you the correct format, list the results in the approved verbiage, or store the note under the appropriate note type. Instead proceed to the “Braindeath Note” section and select the “**+ Create Note**”

The screenshot displays two panels from a medical software interface. The top panel, titled "Ancillary testing", contains a form with the question "Ancillary testing ordered?". Below the question are "Yes" and "No" buttons, along with a list icon and a document icon. A paragraph of text follows: "If a complete brain death exam with apnea testing (or two complete brain death exams with two complete apnea tests by two different providers separated by 12 hours in patients under the age of 18) cannot be completed or if there are confounding conditions, an ancillary test should be requested and officially resulted in order to confirm the diagnosis BD/DNC." Below this text is a pink "Create Note" button, which has a large red "X" drawn over it. At the bottom of this panel are buttons for "Restore", "Close", "Cancel", "Previous", and "Next". The bottom panel, titled "Braindeath Note", features a blue "+ Create Note" button with a large green arrow pointing to it, and a "Refresh" button. Below these buttons is the text: "You have no filed Brain Death Examination for this patient within the last 24 hours."

# PART 3 – BRAIN DEATH NOTE: CREATE YOUR NOTE

- Using this section will automatically create your note creating the correct universal format and give you the interpretation choices.

The screenshot displays a software interface for creating a brain death note. It is divided into two main sections:

- Ancillary testing:** This section is highlighted in light green. It contains a question "Ancillary testing ordered?" with two buttons: "Yes" and "No". The "No" button is currently selected. Below the buttons is a small icon menu and a document icon. A paragraph of text explains the purpose of ancillary testing: "If a complete brain death exam with apnea testing (or two complete brain death exams with two complete apnea tests by two different providers separated by 12 hours in patients under the age of 18) cannot be completed or if there are confounding conditions, an ancillary test should be requested and officially resulted in order to confirm the diagnosis BD/DNC." Below this text is a blue button labeled "Create Note".
- Braindeath Note:** This section is highlighted with a red box. It features a title "Braindeath Note" with an edit icon. Below the title are three buttons: "Create Note" (with a plus icon), "See All Notes" (with a document icon), and "Refresh" (with a circular arrow icon). Below these buttons, a message states: "You have no filed Brain Death Examination for this patient within the last 24 hours."

Navigation and control buttons are located at the bottom of the interface, including "Restore", "Close", "Cancel", "Previous", and "Next".

## Transfer-Discharge

Transfer Discharge External Transfer Discharge Readmit Discharge as Deceased **Brain Death**

BRAIN D  
Genera  
Comple  
Create

# PART 3 – CREATE YOUR NOTE

- Clicking on the correct tab will create a properly formatted note with the responses to YOUR last entries only.
- Charting cannot be done by two providers (provider A answering the questions and provider B creating the note).

My Note

Brain Death Examination

Sensitive  Tag

Service:  Date of Service:

Cosign Required

Summary:

### Brain Death Examination

#### Patient Demographics

**Name:** Stat-Sep Willow Vuh  
**MRN:** 070005991  
**DOB:** 1/1/1989

#### Brain death inclusion criteria

Diagnosis: traumatic head injury  
Observation of permanency (hours): 24 hours hours  
Inclusion criteria: Core temp greater than or equal to 36C, Absence of pharmacologic intoxication, Absence of severe metabolic derangement, Age appropriate blood pressure, Absence of pharmacologic paralysis

#### Examination criteria consistent with brain death?

Glascow Coma Scale: Consistent with braindeath  
Absence of motor reflexes: Consistent with brain death  
Absence of pupillary reflexes? Consistent with braindeath  
Absence of oculocephalic reflexes: Consistent with brain death  
Absence of oculovestibular reflexes: Consistent with brain death  
Absence of corneal reflexes: Consistent with braindeath  
Absence of cough: Consistent with braindeath  
Absence of gag: Consistent with brain death

#### Apnea Testing:

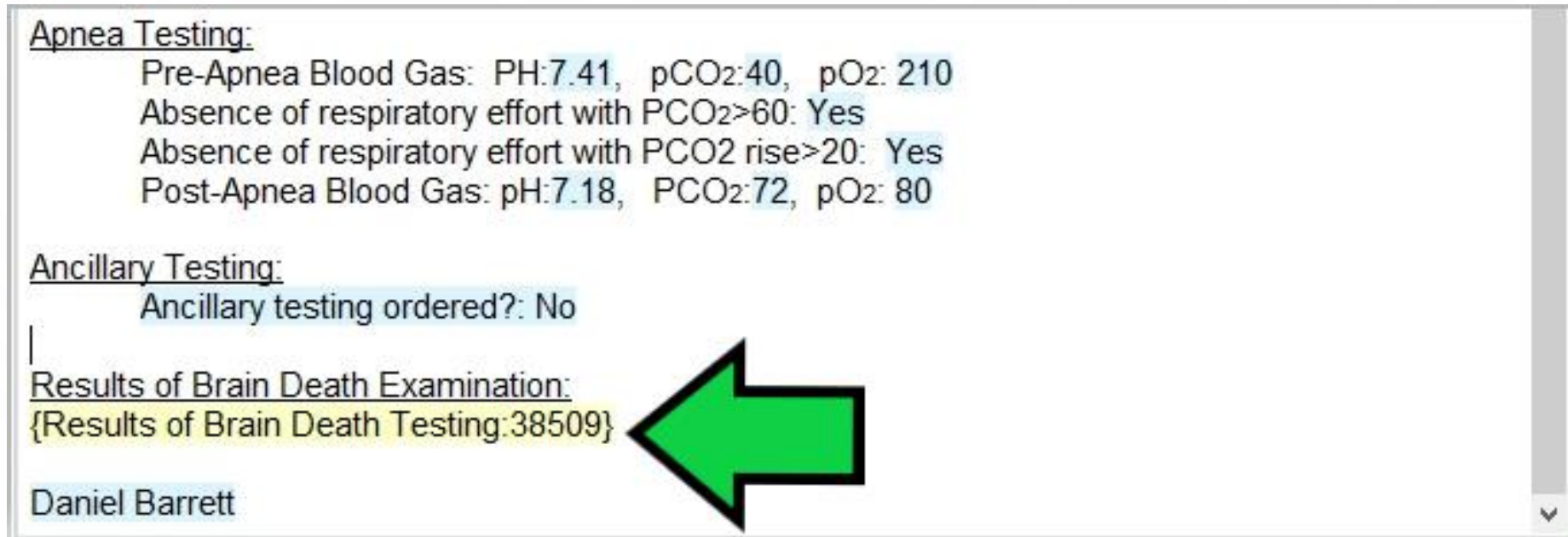
Pre-Apnea Blood Gas: PH:7.41, pCO<sub>2</sub>:40, pO<sub>2</sub>: 210  
Absence of respiratory effort with PCO<sub>2</sub>>60: Yes  
Absence of respiratory effort with PCO<sub>2</sub> rise>20: Yes  
Post-Apnea Blood Gas: pH:7.18, PCO<sub>2</sub>:72, pO<sub>2</sub>: 80

#### Ancillary Testing:

Ancillary testing ordered?: No

# PART 3 – CREATE YOUR NOTE: EVALUATION STATEMENTS

- At the bottom of the note, there are 5 evaluation statements. Press F2 to take you to those statements then hover over to see the complete statement before choosing.
- Generally, patients 18 years and older will use the top 3 statements, and patients under 18 will use the bottom three statements

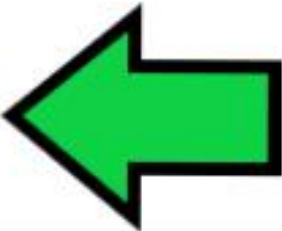


Apnea Testing:  
Pre-Apnea Blood Gas: PH:7.41, pCO<sub>2</sub>:40, pO<sub>2</sub>: 210  
Absence of respiratory effort with PCO<sub>2</sub>>60: Yes  
Absence of respiratory effort with PCO<sub>2</sub> rise>20: Yes  
Post-Apnea Blood Gas: pH:7.18, PCO<sub>2</sub>:72, pO<sub>2</sub>: 80

Ancillary Testing:  
Ancillary testing ordered?: No

Results of Brain Death Examination:  
{Results of Brain Death Testing:38509}

Daniel Barrett



## PART 3: INTERPRETATION OF BRAIN DEATH EXAM

- Press **F2** to see choices then hover over the choices to view the entire text before selecting.

### Apnea Testing:

Pre-Apnea Blood Gas: PH:7.41, pCO<sub>2</sub>:40, pO<sub>2</sub>: 210

Absence of respiratory effort with PCO<sub>2</sub>>60: Yes

Absence of respiratory effort with PCO<sub>2</sub> rise>20: Yes

Post-Apnea Blood Gas: pH:7.18, PCO<sub>2</sub>:72, pO<sub>2</sub>: 80

A complete brain death exam was performed and is consistent with brain death. Declaration of death  
An incomplete brain death exam was performed due to medical conditions described above. The exam  
Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the  
An initial brain death exam of a two exam series was performed and is consistent with brain death. A  
A second brain death exam of a two exam series was performed and is consistent with brain death.

[Results of Brain Death Testing:38509]

Daniel Barrett

Post-Apnea Blood Gas: pH:7.18. PCO<sub>2</sub>:72. pO<sub>2</sub>: 80

A complete brain death exam was performed and is consistent with brain death. Declaration of death

~~An incomplete brain death exam was performed due to medical conditions described above. The exam~~

A complete brain death exam was performed and is consistent with brain death. Declaration of death by neurologic criteria is the time this exam was completed: \*\*\*

A complete brain death exam was performed and is consistent with brain death. Declaration of death by neurologic criteria is the time this exam was completed : \*\*\*

Post-Apnea Blood Gas: pH:7.18, PCO<sub>2</sub>:72, pO<sub>2</sub>: 80

A complete brain death exam was performed and is consistent with brain death. Declaration of death

An incomplete brain death exam was performed due to medical conditions described above. The exam

Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the

An incomplete brain death exam was performed due to medical conditions described above. The exam points able to be tested are consistent with brain death. Corroborative ancillary testing is requested and disposition is pending the final interpretation of the ancillary test.

An incomplete brain death exam was performed due to medical conditions described above. The exam points able to be tested are consistent with brain death. Corroborative ancillary testing is requested and disposition is pending the final interpretation of the ancillary test.



A complete brain death exam was performed and is consistent with brain death. Declaration of death  
An incomplete brain death exam was performed due to medical conditions described above. The exam  
Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the

Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the previous brain death examination, the patient meets criteria and declaration of death by neurologic criteria is the time and date of the final ancillary testing result: \*\*\*

Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the previous brain death examination, the patient meets criteria and declaration of death by neurologic criteria is the time and date of the final ancillary testing results: \*\*\*.

A complete brain death exam was performed and is consistent with brain death. Declaration of death.  
An incomplete brain death exam was performed due to medical conditions described above. The exam  
Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the  
An initial brain death exam of a two exam series was performed and is consistent with brain death. A  
A second brain death exam of a two exam series was performed and is consistent with brain death.

An initial brain death exam of a two exam series was performed and is consistent with brain death. A second complete brain death examination will need to be performed to confirm the diagnosis of brain death.

An initial brain death exam of a two exam series was performed and is consistent with brain death. A second complete brain death examination will need to be performed to confirm the diagnosis of brain death.

POST-APNEA BLOOD GAS: PH 7.18, PCO2 72, PO2 80

A complete brain death exam was performed and is consistent with brain death. Declaration of death  
An incomplete brain death exam was performed due to medical conditions described above. The exam  
Corroborative ancillary testing has resulted and is consistent with brain death. In combination with the  
An initial brain death exam of a two exam series was performed and is consistent with brain death. A  
A second brain death exam of a two exam series was performed and is consistent with brain death.

[Results of Brain Death Testing: 38509]

A second brain death exam of a two exam series was performed and is consistent with brain death. Declaration of death by neurologic criteria is the time this second exam was completed: \*\*\*

A second brain death exam of a two exam series was performed and is consistent with brain death. Declaration of death by neurologic criteria is the time this second exam was completed: \*\*\*.

# OTHER DOCUMENTATION POINTS

- If a patient has an exam that does not meet brain death criteria (i.e. pupil reactivity, agonal respirations...), this process should NOT be used to document those findings. Please use a progress note, clinical update, acute event or other free text note entry options.
- If Ancillary testing does not corroborate a diagnosis of brain death, this process should NOT be used to document those findings. Please use a progress note, clinical update, acute event or other free text note entry options.

# QUESTIONS

- If you have any questions, please feel free to reach out to the content experts.  
Dr. Michael Wolf, Dr. Dennis Bradley, Dr. Christopher Hughes, Dr. Eddie Qian
- As a reminder, if there are questions regarding pronouncing a patient under the age of 18, the attendings on service in the Pediatric ICU are ALWAYS available (in house call 24/7) to discuss options or assist with the process.  
615-456-6828