UC DAVIS HEALTH | CHILDREN'S HOSPITAL

Neonatal Hypoxic-Ischemic Encephalopathy (HIE) and Therapeutic Hypothermia

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BACKGROUND

Therapeutic hypothermia is a well-established neuroprotective treatment for term and near-term infants with moderate to severe neonatal encephalopathy. Large randomized controlled trials have demonstrated that initiating cooling within 6 hours of birth and maintaining a target temperature of 33.5–34.5°C for 72 hours reduces the risk of death or significant neurodevelopmental disability. While both whole-body and selective head cooling have shown benefit, cooling should only be offered to infants who meet strict eligibility criteria and should be provided in centers equipped to deliver comprehensive intensive care, neurologic monitoring, and long-term follow-up. Timely recognition and referral from birth hospitals are critical to ensuring that eligible infants receive this therapy.

INCLUSION CRITERIA

Eligibility for therapeutic whole-body hypothermia – Must fulfill **ALL THREE criteria** (1 + 2 + 3) anytime during the first 6 hours of life:

Category 1: Gestational Age

Must be **≥ 36 weeks** at birth.

Category 2: Evidence of hypoxia-ischemia

History of acute perinatal event? (e.g., shoulder dystocia; uterine rupture; cord prolapse; placental abruption; maternal cardiac arrest or profound hypotension/hypoxia)

YES	**NO**
Needs one or more:	*Needs one or more:*
1. 10-minute APGAR score ≤ 5	1. 10-minute APGAR score ≤ 5
2. Prolonged resuscitation at birth (e.g., chest compressions and/or PPV at 10 minutes)	2. Prolonged resuscitation at birth (e.g., chest compressions and/or PPV at 10 minutes)
3. **pH ≤ 7.1** from cord gas or patient blood gas within 60 minutes of birth	3. **pH ≤ 7.0** from cord gas or patient blood gas within 60 minutes of birth
4. **Base deficit ≥ 12** mmol/L from cord gas or patient blood gas within 60 minutes of birth	4. **Base deficit ≥ 16** mmol/L from cord gas or patient blood gas within 60 minutes of birth

Category 3: Moderate to severe encephalopathy (i.e., Modified Sarnat criteria)

Three or more findings in moderate or severe category (see table below)
OR
Seizure (or an event concerning for seizure)

Neuro exam should be performed within the first 1 hour of life, ideally confirmed by attending neonatologist. The exam should be performed in 2 phases: observation and active manipulation. Start with observation (activity, posture, HR, respiration) then proceed to the active portion. Do the least noxious maneuvers first and most noxious last (level of consciousness → tone → suck → Moro → pupils). *See Appendix 1 for further details/clarifications about the Sarnat exam.*

Sarnat Criteria table

		Normal (0)	Mild (1)	Moderate (2)	Severe (3)
1. Level of consciousness		Normal	Hyperalert/ irritable	Lethargic	Stupor/Coma
2. Spontaneous activity		Normal/ Active	*Slightly* decreased	Decreased	Absent
3. Muscle tone		Normal	Hypertonia	Hypotonia (focal or generalized)	Flaccid
4. Posture		Normal	Mild distal flexion	Strong distal flexion or complete extension	Decerebrate
5. Primitive reflexes	Suck	Normal	N/A	Weak/bites	Absent
	Moro	Normal/ Complete	Exaggerated or low threshold to elicit	Incomplete	Absent
6. Autonomic function	Pupils	Normal	Dilated and reactive	Constricted	Dilated/non-reactive or deviation
	Heart rate	Normal	Tachycardia	Bradycardia	Variable
	Respirations	Normal	Hyperventilation	Periodic/irregular breathing	Apnea or requiring invasive mechanical ventilation (with or without spontaneous respiration)

Note on scoring: *The Modified Sarnat exam has 6 categories and 9 signs. Each* ***category*** *contributes 1 point. For example, primitive reflexes and autonomic function have multiple signs, but these categories also contribute only 1 point, even if more than one sign codes as moderate/severe. If more than one sign is coded as moderate/severe, choose the most severe code for that category.*

RELATIVE EXCLUSION CRITERIA

- IUGR (birth weight less than 1800 grams)
- Structural brain malformations or congenital conditions incompatible with survival or

neurologic recovery
- Uncorrectable coagulopathy or uncontrollable bleeding (hypothermia can exacerbate coagulopathy and increase bleeding risk)
- High suspicion for alternative etiology for encephalopathy (e.g., inborn error of metabolism, confirmed cerebral venous sinus thrombosis, severe intracranial hemorrhage due to trauma)
- Refractory shock

Need for ECMO is not a contraindication for therapeutic hypothermia. Every effort should be made to continue therapeutic hypothermia while the patient is on the ECMO circuit. The Neonatology team might be asked to consult on cooling patients who are in the PICU.

INITIATION OF THERAPEUTIC HYPOTHERMIA

Identification of candidates for therapeutic hypothermia

Inborn infants

Inborn patients who may meet criteria for therapeutic hypothermia should be identified in L&D or at the time of admission to the NICU. If Category 1 and Category 2 criteria are met, the baby is a potential candidate for therapeutic hypothermia and should be transferred urgently to the NICU (ideally to the Zebra room, which has EEG connectivity) for evaluation and monitoring. Consider asking the OB team to send the placenta for pathology, if not already done so. Placenta pathology findings have been shown to be associated with severity of encephalopathy and outcomes. A full physical examination (including full neurological assessment and Sarnat staging) should be performed and documented for any infant who meets Category 1 and Category 2 criteria. If the patient is determined to also meet Category 3 criteria (encephalopathy), whole body hypothermia (33.5-34.5°C for 72h) should be offered/initiated. The infant's parent(s) should be informed of the diagnosis, its implications, and the potential benefits of cooling.

If Category 3 criteria are not met with the first examination, but the exam is concerning (e.g., 1 or 2 moderate or severe criteria or 3 or more mild criteria), the infant should remain in the NICU, and serial neurologic examinations should be performed every hour until 6 hours of age. Therapeutic hypothermia should be initiated promptly once Category 3 criteria are met within the therapeutic window.

Outborn infants

For outborn infants, the physician accepting transfer should try to complete the checklist (Category 1 and 2 criteria) with the referring provider. Infants meeting Category 1 and Category 2 criteria should be transferred to UCDMC further evaluation. For infants who qualify (or are likely to qualify) for therapeutic hypothermia based on neurologic findings, passive cooling (see below) at the referring hospital is recommended and should be initiated soon as possible to help the infant reach target temperature more quickly while awaiting active cooling. If Category 3

criteria are met before 6 hours of life, active cooling (33.5-34.5°C for 72h) is recommended and can begin when the UCDMC transport arrives with the TECOtherm® device.

When communicating with the family, it is recommended that providers and transport team members inform the parents that transport is being initiated for "*further evaluation*" not for "*cooling,*" as additional information might be required to confirm all eligibility criteria for therapeutic hypothermia are met.

Passive Cooling

Passive cooling is achieved by removing external heat sources (e.g., radiant warmer, blanket) and clothing (except for diaper). Target core temperature is 33.5°C (33.0-34.0°C). Rectal temperature should be checked at least every 15 minutes during passive cooling. If core temperature falls below 33°C, an external heat source should be started (i.e., radiant warmer at its lowest setting), and temperature should be checked at least every 5 minutes. The external heat source should be adjusted to maintain core temperature 33.0-34.0°C. Once the core temperature stabilizes, temperature checks can be spaced to every 15 minutes.

Active Cooling

For outborn infants, active cooling should be started upon the arrival of the UCDMC transport team, if possible. If Category 3 criteria have been met, active cooling should continue in the NICU. If Category 3 criteria are not met, cooling can be discontinued.

Protocol: The infant should be cared for wearing only a diaper to maximize contact with the cooling surface. A servo-controlled cooling blanket (e.g., TECOtherm® NEO) should be used to maintain core temperature at 33-34°C (33.5°C set point) for 72 h. Skin integrity should be checked and documented by the bedside RN every 2 hours while cooling. Rectal temperature should be monitored continuously during cooling and documented every hour. *See Ellucid for further details on nursing procedures during cooling and use of the TECOtherm® NEO and Blanketrol® cooling devices.*

Documentation

Use the **NICUCOOLINGDECISION** SmartPhrase in Epic to document eligibility criteria and rationale for recommending or not recommending therapeutic hypothermia.

The **NICUSARNAT** SmartPhrase can be used for documenting follow-up or serial Sarnat assessments.

Consideration for later cooling

Results of one clinical trial suggest a possible modest reduction in death or disability in patients with moderate to severe HIE when therapeutic hypothermia is initiated between 6 and 24 hours

after birth. Initiation of therapeutic hypothermia between 6 and 24 hours after birth can be considered for infants with evidence of moderate to severe HIE who did not initially meet criteria or were unable to have therapeutic hypothermia initiated in the first 6 hours after birth. Decision to offer later therapeutic hypothermia should be made in collaboration with the Child Neurology team. The team(s) should discuss the risks/benefits with the parent(s), and the details of this discussion should be clearly documented in the chart prior to initiation of cooling (use the **NICULATECOOLING** SmartPhrase to document this discussion). If therapeutic hypothermia is initiated between 6 and 24 hours after birth, target temperature of 33.5°C should be maintained for 96 hours prior to rewarming.

ADMISSION AND CARE OF NEWBORNS WITH HIE

First steps

1. Consult Child Neurology:
    - Weekdays (6a-6p): Page 5252
    - Nights (6p-6a) and weekends/holidays: Check the on-call website to identify who is on call for Child Neurology or ask the operator to page the resident on call for Child Neurology.
2. Order a routine EEG and continuous EEG monitoring in Epic (ideally the patient is admitted to Zebra room, as it is currently the only NICU room hard-wired for EEG monitoring).
3. Start empiric antibiotics if there is concern for infection and consider performing LP for CSF analysis when feasible.
4. Obtain a head ultrasound (HUS) as soon as possible to evaluate for etiologies of neonatal encephalopathy that would necessitate cessation of cooling (e.g., severe intracranial hemorrhage).
    - You do not need to delay EEG placement for HUS. HUS can be performed by simply removing 1-2 leads and replacing after the exam.
    - If there are barriers to obtaining a timely HUS, discuss with Child Neurology to determine urgency.

Neuromonitoring

- Continuous full-montage video EEG monitoring should be continued through the duration of therapeutic hypothermia.
- Discuss with the Child Neurology team whether continuous EEG through the duration of re-warming is warranted.
- Amplitude-integrate EEG (aEEG) is an additional bedside tool that can be utilized for neuromonitoring by the NICU team.
    - If there any concerns about the aEEG tracing, the NICU attending should be notified before any action is taken.
    - See Ellucid for more information about aEEG electrode selection and operation of the Brainz aEEG monitor.

Management goals for neuroprotection

While therapeutic hypothermia is the cornerstone of neuroprotection for term neonates with hypoxic-ischemic encephalopathy (HIE), optimal care requires a comprehensive, multidisciplinary approach. Neuroprotection extends beyond cooling and includes meticulous attention to physiologic stability. For infants with suspected hypoxic-ischemic encephalopathy who do not meet criteria for therapeutic hypothermia (e.g., due to gestational age or age at presentation), it is important to maintain *normothermia*, as elevated temperatures (pyrexia) were associated with worse outcomes in the control groups of major cooling trials. Maintaining normal ranges for electrolytes, glucose, and carbon dioxide is critical, as fluctuations in these parameters can exacerbate brain injury. Avoiding hypotension, hypoxia, and hyperoxia is equally important. Supportive care – such as promoting sleep and providing non-pharmacologic comfort – also plays a vital role in protecting the developing brain. Adherence to these strategies is essential for maximizing neurodevelopmental outcomes in affected infants.

- Achieve and maintain physiologic stability
    - Correct metabolic acidosis (avoid routine use of sodium bicarbonate, as it has been shown to exacerbate brain injury in animal models and has not been shown to improve outcomes in clinical studies)
    - Avoid hypoxia and hyperoxia
    - Avoid hypo- and hypercarbia
    - Avoid hypotension and hypertension
    - Maintain normal electrolyte levels (especially calcium, magnesium, sodium, and phosphate)
    - Avoid unnecessary fluid overload (restrict fluids as appropriate)
    - Anticipate and correct coagulopathy
    - Treat pulmonary hypertension, if present

- Minimize additional brain stress
    - Treat seizures promptly
    - Limit noxious stimulation
    - Promote comfort (utilize non-pharmacologic strategies as much as possible)

Laboratory Investigations

<u>Baseline/admission</u>:

- All infants:
    - Blood gas with electrolytes (including iCa) and lactate
    - POC glucose
    - BMP/Mg/PO_4
    - Hepatic function panel
    - CBC with differential
    - Coagulation panel
- If indicated:
    - Blood culture (if not already obtained)
    - Ammonia (if clinical suspicion for metabolic disorder)

During cooling:

- All infants:
  - Blood gas with electrolytes (including iCa) and lactate q6-q12 hours (recommend starting with q6h and can adjust frequency based on clinical picture)
  - POC glucose q6-q12h (might need more frequent monitoring if changing IVF)
  - Daily BMP/Mg/PO_4 (may require more frequent monitoring if electrolyte repletion is needed)
  - Daily serum bilirubin
- Based on clinical picture:
  - Daily hepatic function panel if there were abnormalities on admission
  - Daily CBC (+/- differential) if there is history of anemia/thrombocytopenia or if a blood transfusion was given since last labs
  - Send repeat coagulation panel if clinical concern for coagulopathy or needed transfusion with FFP, cryoprecipitate, or Factor VII since last labs

Re-warming labs:

- Blood gas with electrolytes (+/- lactate) and POC glucose at 1 hour and 3 hours after initiating rewarming

Management Guidelines by System

Fluids, Electrolytes, and Nutrition

- Start maintenance fluids at 60-70 ml/kg/day on the first day of life.
- Order oral care (buccal swabs) with colostrum/MBM.
- Trophic feedings of maternal breastmilk can be considered for infants who are hemodynamically stable with normal abdominal imaging.
- Glucose should be monitored closely. Target blood glucose range is 70-150 mg/dL. Episodes of hypoglycemia, hyperglycemia, and large variations in glycemia are associated with worse neurological outcomes.
- AKI is frequently associated with HIE. Electrolyte abnormalities can increase risk for seizures, especially in patients with low seizure threshold. Fluid status and electrolytes should be closely monitored throughout cooling and rewarming.
- Hypocalcemia, hypercalcemia, and hyperphosphatemia are also seen in infants with HIE. Adjustments should be made to IV fluids to correct these abnormalities.
- Goal serum magnesium for patients with HIE is in the high-normal range (2.0-2.4 mg/dL). Magnesium acts as a natural NMDA receptor antagonist; hypomagnesemia can exacerbate excitotoxicity, which is a key mechanism of secondary brain injury in HIE. Magnesium also stabilizes neuronal membranes, supports myocardial function, and is important for regulation of serum calcium and potassium levels.
- Hypothermia causes potassium to shift into the intracellular space; therefore, there is risk for hyperkalemia during rewarming due to potassium shifting back into the extracellular space.
- Newborns treated with therapeutic hypothermia are at increased risk for developing subcutaneous fat necrosis. Hypercalcemia is a major complication of subcutaneous fat necrosis, and it can occur well after rewarming. Ionized calcium levels should be closely monitored in patients with subcutaneous fat necrosis.

Respiratory

- Closely monitor CO_2 levels and target PCO_2 of 40-50 mmHg.
- *Strictly avoid hypocapnia*, even if pH is low, as it has been shown to contribute to brain injury. For ventilated patients, consider SIMV without pressure support to minimize hypocapnia.
- Ensure that blood gases results are corrected for actual temperature of the patient. Interpretation at 37°C may underestimate hypocapnia.
- FiO_2 should be weaned to the lowest level necessary to maintain oxygen saturations within the target range. Target PaO_2 of 50-80 mmHg.

Cardiovascular

- Birth asphyxia is associated with myocardial ischemia; myocardial dysfunction is common in moderate to severe HIE.
- The right ventricle is particularly vulnerable to injury following asphyxia.
- Therapeutic hypothermia is associated with lower cardiac output due to relative bradycardia with preserved stroke volume and an increase in systemic vascular resistance (SVR).
- Optimal targets for blood pressure, cardiac output, and cerebral blood flow during therapeutic hypothermia – whether before initiation, throughout cooling, or during rewarming – have not been clearly established.
- It is important to assess systolic blood pressure in addition to mean arterial pressure (MAP). During therapeutic hypothermia, diastolic blood pressure is often elevated and contributes disproportionately to MAP [$MAP = (1/3 \times SBP) + (2/3 \times DBP)$]. As a result, systolic hypotension may be overlooked if MAP alone is used to guide assessment.
- Comprehensive, quantitative echocardiography should be performed for all patients with cardiovascular instability to delineate pulmonary vascular and cardiac contributions.
- Avoid both under- and over-treatment of blood pressure. Target blood pressure appropriate for gestational age, but prioritize clinical signs of perfusion (e.g., urine output, capillary refill, lactate) over arbitrary MAP thresholds.

Hematologic

- There is no consensus on optimal levels of hemoglobin, platelets, or PT/PTT/INR in cooling patients.
- A meta-analysis of cooling trials found an increase in the incidence of thrombocytopenia (platelet count <150K/mm^3) in cooled neonates.
- Platelet transfusion threshold of 25,000/ml is reasonable, if there is no active bleeding.

Comfort/Sedation

- Non-pharmacologic comfort measures, such as oral care with MBM, non-nutritive

sucking, and facilitated tucking should be provided to infants undergoing therapeutic hypothermia.

- Parents should be encouraged to hold their infant during cooling, especially if clinically stable. When being held, the infant should stay on the cooling blanket, and the EEG camera should be adjusted to keep the infant on video.
- Follow N-PASS scores q1h until target temp at 33.5°C is achieved, then at least q4h.
- Shivering is a natural thermogenic response. It increases metabolic demand and can counteract the intended neuroprotective effects of therapeutic hypothermia.
- Opioids reduce shivering thresholds centrally and provide both analgesia and sedation. Among sedative agents, morphine has the strongest evidence for safety during therapeutic hypothermia.
- Use of benzodiazepines for sedation in infants with HIE should be reserved for situations where other sedation strategies are inadequate or contraindicated.
- Treatment of shivering and pain/agitation during cooling should proceed in a step-wise manner:
    - Start with morphine 0.05 mg/kg IV x 1 and assess response.
    - If no response within 15 minutes, can trial morphine 0.1 mg/kg IV x 1.
    - If an infant requires two or more PRN morphine doses within a 4-6 hour period, escalation to a low-dose (0.01 mg/kg/hr) continuous morphine infusion should be considered.
    - Uptitrate morphine drip to effect in increments of 0.0025-0.005 mg/kg/hr.
    - Low-dose dexmedetomidine (starting at 0.1 mcg/kg/hr) can also be considered; however, its use might be limited by bradycardia in infants undergoing therapeutic hypothermia. If necessary, uptitration of dexmedetomidine should occur in increments of 0.1 mcg/kg/hr every 60 minutes.
    - If the patient is started on a continuous infusion for sedation, discontinue the infusion when re-warming is initiated.

Post-cooling brain imaging

- Post-cooling brain MRI/MRS is ideally obtained on day 4-5 of life, prior to pseudo-normalization of the diffusion signal that occurs early in the second week. Because there is often a wait for MRI availability, the brain MRI should be ordered for day 4 to ensure the patient is placed in the queue.
- If unable to obtain brain MRI by day 6, discuss optimal timing of MRI with the Child Neurology team.
- Post-cooling brain MRI/MRS is ordered as:
    - MR BRAIN WITHOUT CONTRAST; Priority: Urgent; Comment: “S/P whole body hypothermia for neonatal encephalopathy, possible HIE. Request DWI and ADC mapping.”
    - MR SPECTROSCOPY BRAIN; Priority: Urgent; Comment: “S/P whole body hypothermia for neonatal encephalopathy, possible HIE. Request DWI and ADC mapping.”

Follow-up

All infants with neonatal encephalopathy are at risk for developmental delays. They should be referred to Regional Centers for Early Intervention evaluation/services and to the High-Risk Infant Follow-up Clinic (aka “Baby Steps” clinic at the MIND Institute) upon discharge. Plans for any outpatient follow-up with Neurology should be discussed with the Child Neurology team prior to discharge.

APPENDIX 1: Assessment of encephalopathy

Further details/clarifications for Sarnat exam

1. Level of consciousness (LOC)
    a. Code 0 (normal) if the patient is alert, opens eyes with repeated tactile stimulation, and maintains generalized movements in response to repeated tactile stimulation.
    b. Code 1 if hyperalert or irritable; responds to minimal stimulus.
    c. Code 2 if there is delayed or poor response; reduced eye-opening and movements in response to non-painful external stimuli.
    d. Code 3 if infant is not arousable, non-responsive to external stimuli, or responds only to noxious/painful stimuli.
    e. LOC is the deciding factor to assign HIE stage if the number of moderate and severe codes are equal.
    f. It is rare for LOC to be normal when the rest of the exam is consistent with moderate/severe encephalopathy.
2. Spontaneous activity
    a. Code 0 if the infant changes position when quiet and displays frequent/appropriate generalized movements.
    b. Code 1 if spontaneous activity is slightly decreased.
    c. Code 2 if there is decreased activity or if there are sporadic or short isolated movements only.
    d. Code 3 if there are no spontaneous movements.
    e. If infant is sedated, use clinical judgement to determine whether the exam is reliable.
    f. NMB will preclude meaningful exam.
3. Muscle tone (resistance to passive movement)
    a. Evaluate tone in extremities (flexor tone and recoil), trunk, and neck (e.g., head lag in pull-to-sit maneuver). Make clinical judgement of tone based on these areas.
    b. If responses differ in multiple areas, base the code on the most common/predominant.
4. Posture (resting or spontaneous positioning of the limbs)
    a. Normal newborns (Level 0) do not maintain one posture while awake and typically exhibit flexion of the lower extremity at hip and/or knees while at rest.
    b. Code 1 if there is thumb adduction *without* wrist flexion.
    c. Code 2 if there is distal (wrist) flexion, flexed arms with extended legs, or if both arms and legs are in extended posture at rest.
    d. Code 3 if there is intermittent or persistent decerebrate posturing with or without stimulation.
    e. Decerebrate posturing is characterized by arms and legs rigidly extended with forearms pronated (palms turned downward). There is often plantar flexion of the feet. Decerebrate posturing in neonates is rare.
    f. If posture is abnormal but does not clearly fit into either level 2 or 3, code as 2.
5. Primitive reflexes
    a. Suck
        i. Code 0 (normal) if the infant vigorously sucks the examiner's finger or ET

tube.
   ii. Code 2 if suck is weak or if infant bites.
   iii. Code 3 if suck is absent
b. Moro
   i. Complete Moro = startle phase (abduction and extension of arms with opening of hands) plus embrace phase (adduction and flexion of arms).
   ii. Incomplete Moro (Level 2) = one phase only (e.g., abduction without adduction), weak or sluggish movement in either or both phases, or minimal arm movement without typical startle-embrace pattern.
   iii. Code 3 if Moro response is absent or if there is only hand opening but no response of arms.
   iv. If concern for clavicular fracture or brachial plexus injury, evaluate the other extremity.
   v. If the infant is intubated, assess Moro by gently raising and lowering the head.

6. Autonomic function
   a. Pupils
      i. Code 0 (normal) if normal size and reactive to light.
      ii. Code 1 if dilated and reactive to light.
      iii. Code 2 if constricted and reactive to light.
      iv. Code 3 if pupils are dilated and either fixed (non-reactive) or sluggishly reactive, if there is skew deviation (vertical misalignment), or if the pupils are asymmetric.
   b. Heart rate
      i. HR should be evaluated based on documented rate over the preceding minutes/hours (ideally prior to cooling).
      ii. Code 2 if bradycardia (< 100 bpm) with only occasional increases to > 120 bpm
      iii. Code 3 if HR varies widely between < 100 and > 120 bpm.
   c. Respiration
      i. Code 0 if the infant has a regular spontaneous breathing pattern.
      ii. Code 1 if the infant is hyperventilating.
      iii. Code 2 if the infant has periodic breathing, desaturations, or requires non-invasive positive pressure ventilation.
      iv. Code 3 if the infant is intubated, even if there is spontaneous breathing over the ventilator.

Additional informative components of the neurological exam

- Deep tendon reflexes
- Clonus (abnormal if > 4-5 beats)
- Hand opening/fisting
- Abnormal movements (excessive or involuntary movements, jerky movements, bicycling, or myotonic movements)
- Gag reflex (present or absent)
- Asymmetric tonic neck reflex (normal or abnormal/sustained)

Neonatal Neuro Exam Videos

- Targeted Neurological Examination for HIE (i.e., Modified Sarnat Exam): https://vimeo.com/411476648
- Dr. Harvey Sarnat narrating and performing the neonatal neuro exam: https://vimeo.com/411454068

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