

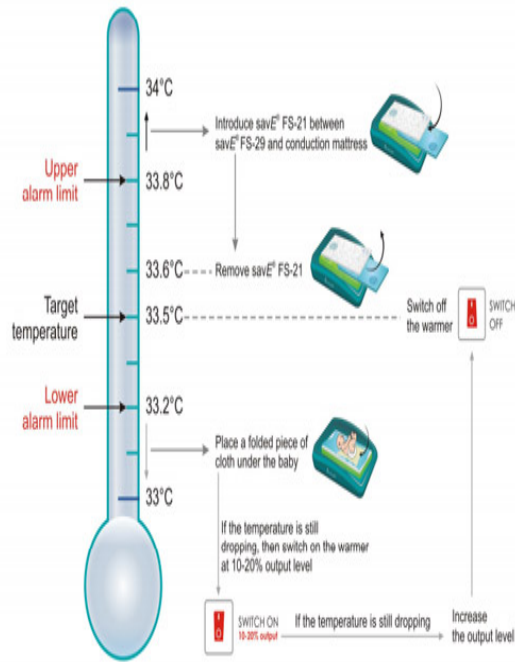
THERAPEUTIC HYPOTHERMIA (TH)

- Institution of moderate therapeutic hypothermia (33°C to 34°C) initiated within 4- 6 hr and continued for 72hr of age in ICU has been shown to reduce mortality and neuro-morbidity by 18 months of age in infants of at least 35 weeks' gestation with moderate to severe encephalopathy.
- TH can be instituted by selectively cooling the head or the whole body. It is a safe modality in settings where intensive care facilities to manage sickest neonates are available.

MECHANISM OF ACTION:

TH has been shown to be protective at critical cellular and vascular sites of cerebral injury. It acts by the following mechanisms to reduce the extent of brain injury :

1. Decreased cerebral metabolism and blood flow: Decrease in energy requirement and cerebral edema.
2. Decreased brain lactic acid, glutamate, and nitric oxide concentrations: Less excitotoxic and oxidative injury.
3. Inhibits protease activation, mitochondrial failure, free radical damage, lipid peroxidation: Less apoptosis and necrosis.



SELECTION CRITERIA OF NEONATES FOR THERAPEUTIC HYPOTHERMIA

S.no	Criteria	Inborn neonates	Out-born neonates
1.	Gestation/birth weight	≥ 35 weeks/≥2 kg	≥ 2 kg(if gestation not known)
2.	Age at presentation	≤ 6 hours since birth	≤ 6 hours since birth
3.	Evidence of birth asphyxia	Any one of the following: a) Apgar score at 5 minutes ≤5 b) Need of IPPV till 5 minutes of birth c) Cord arterial blood or blood obtained within 1h of birth pH <7.0 d) Cord arterial blood or blood obtained within 1 h of birth base deficit ≥ 16.0	Any one of the following: a) Absence of cry at 5 minutes of age b) Need of IPPV till 5 minutes of birth
4.	Staging of encephalopathy	Any one of the following: a) Clinicalseizures b) Altered state of consciousness (lethargy, stupor or coma) AND any one of thefollowing: i) Hypotonia ii) Abnormal reflexes including oculomotor or pupillary abnormalities iii) Absent or weak suck	Same as for 'inborn' neonates

CONTRAINDICATIONS:

- Neonates with following conditions should not be considered for TH:
- Major congenital malformations, suspected/known chromosomal disorder, clinical and echocardiographic evidence of PPHN, active bleeding, or catecholamine resistant shock.

HOW TO INITIATE WHOLE BODY COOLING:

- 1) Counsel the parents about indications, benefits and risks of therapy
- 2) Prepare the cooling system for operation.
- 3) Set the cooling blanket temperature to 33.5⁰ C.
- 4) Monitor and document the infant's pre-cooling vital signs.
- 5) Place and secure central and arterial lines before starting hypothermia.
- 6) Gently insert the rectal probe 2 cm into the infant's rectum, and secure to the infant's leg with tape.
- 7) Place the infant on the warmer in the supine position with the entire head and body resting on the cooling blanket.
- 8) The infant must lie directly on the cooling blanket, wearing a diaper only.

REWARMING:

- 1) Increase the infant's core temperature by 0.5⁰C every hour 0 until 36.5⁰ C has been reached.
- 2) When the infant's core temperature is 36.5⁰ C, remove the patient from the cooling blanket/device.
- 3) Re-activate the radiant warmer, monitor and document the infant's temperature with the skin probe.
- 4) Problems while rewarming: seizures and hypotension

MONITOI RNG FREQUENCY:

Parameter	Day 1	Day 2	Day 3
Vitals monitoring including invasive blood pressure monitoring	Q 1 hour	Q 1 hour	Q 1 hour

Neurological monitoring	Q 12 hours	Q 12 hours	Q 12 hours
Urine output	Q 6 hours	Q 6 hours	Q 6 hours
ECG	Continuously	Continuously	Continuously
aEEG	Continuously	Continuously	Continuously
Skin integrity	Q 6 hours	Q 6 hours	Q 6 hours
Investigations			
Glucose	Q 6 hours	Q 6 hours	Q 6 hours
Blood gas	Q 6 hours or as indicated by condition of baby	Q 12 hours or as indicated	Q 12 hours or as indicated
Renal function test	Once	Once	Once
Electrolytes	Once	Once	Once
Complete hemogram	Only if required	Only if required	Only if required
Neurosonogram	If abnormal	If abnormal	If abnormal

Supportive therapy during TH

Sedative/analgesics	Morphine (preferred) or fentanyl may be given by infusion during therapeutic hypothermia
Enteral feeds	Start MEN, if hemodynamically stable
Antibiotics	Prophylactic antibiotics should not be given
Anticonvulsants	Anticonvulsants should be given in the presence of seizures; electric seizures in absence of clinical correlates should be treated
Platelet concentrate	If platelet count is less than 100,000 /cmm
Fresh frozen plasma	Only if there is active bleeding

ADVERSE EFFECTS OF TH:

The common adverse effects include sinus bradycardia (heart rate < 80/min) and thrombocytopenia (platelet count < $150 \times 10^9/L$)

