



APPLICATION OF CONTROLLED THERAPEUTIC HYPOTHERMIA IN NEONATES WITH SEVERE PERINATAL ASPHYXIA

Saidova D.I.

Head of the Neonatology Department, Bukhara Regional Children's
Multidisciplinary Medical Center.

<https://doi.org/10.5281/zenodo.18280303>

ARTICLE INFO

Received: 15th January 2026

Accepted: 16th January 2026

Online: 17th January 2026

KEYWORDS

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ABSTRACT

Hypoxic-ischemic encephalopathy (HIE) remains a leading cause of neonatal mortality and long-term neurological disability. Despite advances in neonatal intensive care, pharmacological neuroprotection often shows limited efficacy. Currently, controlled therapeutic hypothermia (TH) is the only evidence-based intervention proven to reduce the risk of cerebral palsy and cognitive impairment by slowing down the secondary phase of brain injury.

Introduction:

Hypoxic-ischemic encephalopathy (HIE) remains a leading cause of neonatal mortality and long-term neurological disability. Despite advances in neonatal intensive care, pharmacological neuroprotection often shows limited efficacy. Currently, controlled therapeutic hypothermia (TH) is the only evidence-based intervention proven to reduce the risk of cerebral palsy and cognitive impairment by slowing down the secondary phase of brain injury.

Methods:

A prospective study was conducted on 20 full-term neonates diagnosed with moderate to severe HIE. Whole-body cooling was initiated within the first 6 hours of life using an automated servo-controlled system. The target rectal temperature was maintained at 33.5°C for 72 hours, followed by controlled rewarming at a rate of 0.5°C per hour. Continuous amplitude-integrated EEG (aEEG) monitoring was performed throughout the procedure.

Results:

Successful completion of the 72-hour TH protocol was achieved in 90% of cases. At the end of the cooling phase, 75% of infants showed no focal parenchymal lesions on Brain MRI. The use of aEEG monitoring allowed for the detection and treatment of subclinical seizures in 30% of the patients, which significantly improved the overall prognosis. Compared to historical controls, the mortality rate decreased by 18%, and the incidence of severe neurological deficits at discharge was reduced by 15%.

Discussion:

The findings confirm that the "therapeutic window" (first 6 hours of life) is critical for the success of neuroprotective strategies. Controlled TH is safe when the protocol is strictly

followed, showing no irreversible adverse effects on cardiac rhythm or coagulation. Implementing TH as a standard of care in level III perinatal centers is essential for reducing neonatal disability. Further long-term follow-up is required to assess the neurodevelopmental outcomes at 18–24 months of age.

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