Prophylactic Hypothermia for severe traumatic brain injury

see Selective brain cooling

Hypothermia is well recognized to preserve cells and tissue in the face of metabolic challenge. Evidence supports the administration of hypothermia as standard of care for neuroprotection after cardiac arrest from acute coronary syndromes.

There has been long- standing interest in applying hypothermia to reduce the tissue damage associated with central nervous system trauma; however, benefit cannot be presumed. In addition to suggested neuroprotective effects, hypothermia is well known for its ability to reduce intracranial pressure. However, hypothermia bears risks, including coagulopathy and immunosuppression, and profound hypothermia bears the additional risk of cardiac dysrhythmia and death.

Hypothermia can be administered either early after injury and prior to intracranial pressure elevation, in which case it is termed “prophylactic,” or as a treatment for refractory intracranial pressure elevation, typically referred to as “therapeutic.” Prophylactic hypothermia has been subject to scrutiny in studies that have reported conflicting results.

Of uncertain relevance to adult traumatic brain injury (TBI), two high-quality pediatric trials failed to show benefit and additionally suggested harm related to prophylactic hypothermia for TBI.

Interest has thus shifted to exploring how specific aspects of induced hypothermia, such as the duration and depth, relate to clinical effect.

For instance, it is generally suggested that gradual rewarming can mitigate the inherent risk of rebound intracranial pressure elevation6 and there has been interest in localized cerebral cooling in the hopes of obtaining the desired benefits without the systemic side effects.

Existing drugs with cooling effects belong to the following categories: (1) dopamine receptor agonists; (2) cannabis; (3) opioid receptors; (4) vanilloid receptors; (5) vasopressins (potent neurotensin receptor agonists); (6) thyroid drugs; (7) adenosine drugs; and (8) purine drugs [1)].

RECOMMENDATIONS

Level I and II A • There was insufficient evidence to support a Level I or II A recommendation for this topic.

Level II B • Early (within 2.5 hours), short-term (48 hours post-injury) prophylactic hypothermia is not recommended to improve outcomes in patients with diffuse injury.

1)
Ma J, Wang Y, Wang Z, Li H, Wang Z, Chen G. Neuroprotective effects of drug-induced therapeutic hypothermia in central nervous system diseases. Curr Drug Targets. 2017 Jun 6. doi: 10.2174/1389450118666170607104251. [Epub ahead of print] PubMed PMID: 28595536.