

Hypoxic Ischemic Encephalopathy (HIE)

What is Hypoxic Ischemic Encephalopathy?

Hypoxic ischemic encephalopathy is also called Neonatal Encephalopathy. It means brain injury resulting from decreased oxygen or blood flow to the brain for some time. The staff in the hospital often refer to this condition by its abbreviation “H-I-E”.

- Hypoxic (hy-POK-sic) means not enough oxygen
- Ischemic (is-KEM-ik) means not enough blood flow
- Encephalopathy (en-sef-a-lo-path-ee) means brain disorder

What causes HIE?

There are several causes of HIE, and it may occur during pregnancy, during labor and delivery and after delivery. However, there are times when the exact cause is not found.

Some of the problems are:

1. During pregnancy

- Congenital infections
- Severe fetal anemia
- Decreased blood flow to the placenta
- Drug and alcohol abuse

2. During labor and delivery

- Blockage of the umbilical cord
- Placental separation from the uterus before birth (aka placental abruption)
- Rupture of the uterus
- Abnormal fetal position

3. After delivery

- Trauma to the baby’s brain

- Severe prematurity
- Infections
- Prolonged respiratory failure or cardiac arrest

What are the signs and symptoms of HIE?

The signs and symptoms of HIE will depend on the severity of brain injury, but may involve:

- Difficulty feeding
- Blood work abnormalities
- Seizures
- Muscle control problems

How do we treat HIE in the NICU?

We use a treatment called therapeutic hypothermia (you may hear providers refer to this as “cooling”). This involves using a cooling blanket for 3 days to protect your baby’s brain and organs. There will also be monitoring of their brain waves during this time. Your baby will likely receive imaging of his/her brain while in the NICU as well.

What is cooling?

The only brain-specific therapy for HIE that has been proven to reduce the risk of long-term neurodevelopmental handicaps is brain or whole-body hypothermia (cooling the infant’s body temperature by 3-4 degrees to approximately 33.5 degrees Celsius or 92 degrees Fahrenheit)

Who qualifies for cooling?

- Infants with moderate to severe HIE, not mild cases
- Infants who do not have another cause of brain dysfunction such as a brain malformation or bleeding into the brain.
- Infants less than 6 hours old. Laboratory studies show that after 6 hours of life, there appears to be less benefit in cooling for HIE.

Where is cooling performed?

Cooling is only performed in Level III/IV neonatal intensive care units (this is the highest level of medical care for infants) that have access to highly trained nursing staff and doctors that can care for infants with HIE.

How is cooling performed?

Infants are cooled using a cooling blanket that tightly regulates the infant's body temperature.

- Cooling has been shown to be beneficial for treating infants with HIE.
- Cooling occurs over 72 hours or 3 days. After that time, the infant's body temperature is re-warmed slowly to a normal temperature value.

Does cooling help all infants with HIE?

Unfortunately, cooling only helps approximately 1 in 8 babies with moderate to severe HIE. At this time, when a doctor starts the cooling process it is impossible to know which babies will benefit from cooling and which babies will not. Further research is currently ongoing in this area.

Is cooling safe?

To date, clinical trials involving more than 550 infants have been published to assess the benefit of cooling for HIE. These trials have demonstrated that cooling for brain protection in infants with moderate to severe HIE is both beneficial and safe. However, in these trials, some noted potential side effects of cooling were skin changes that resolved in time, more use of blood pressure medications, and a slight decrease in the blood's ability to clot.