

HYPOXIC ISCHAEMIC ENCEPHALOPATHY

What is hypoxic ischaemic encephalopathy (HIE)?

HIE is the medical term that describes the effect on the infant brain when there has been an interruption or decrease in the blood supply providing oxygen to the brain. Causes of interruption or decrease in blood supply to the brain include problems with the umbilical cord and bleeding from the placenta. Sometimes there is no identifiable cause.

What effects does this have on my baby's brain?

When there has been an interruption or decrease in blood supply to the brain, some of the cells of the brain will swell and die. As a result of these cells swelling and dying the electrical activity of the brain may be altered. This may result in the baby having seizures (fits). The number and type of cells that have been damaged will determine whether your baby will have any long-term developmental problems.

How do we treat HIE?

If your baby meets a number of criteria (these have been determined by a number of large clinical trials) and the attending neonatologist thinks that it is appropriate, your baby may be cooled. Cooling and rewarming is usually done on an automatic blanket placed under the baby. This is connected to a machine which pumps water through the blanket to cool or warm the baby. Your baby's body temperature will be cooled to 33–34 degrees Celsius for 72 hours. Normal body temperature for a baby is 36.5 to 37.5 degrees Celsius. To monitor your baby's core temperature during the cooling and rewarming process a small temperature probe will need to be inserted into his/her anus. During the period of cooling and rewarming your baby will have continuous monitoring of his/her heart rate, respiration rate, oxygen levels and blood pressure. Regular blood tests will also be required to check blood glucose levels, electrolytes and other organ function.

After 72 hours your baby will be rewarmed to a normal temperature, over 12–24 hours.

Are there any risks with cooling my baby?

Your baby will feel cold to touch and sometimes may shiver. We may give your baby a sedating medication (such as morphine) to minimise any discomfort. Your baby's heart rate may be slower than usual, but this is rarely a significant problem and can be resolved by increasing his/her temperature slightly. Cooling may sometimes affect liver function and the blood's ability to clot. We will monitor these levels throughout the period of cooling and rewarming.

Can I touch or hold my baby during cooling?

Your baby needs to remain on the cooling blanket during the cooling and rewarming phase to maintain the target temperature so holding your baby will not be possible. However you are able to hold his/her hand or foot and talk quietly to them during this time.

How do we monitor your baby's progress?

When your baby has been admitted to the nursery we may place four monitoring sensors to the scalp to assess your baby's brain wave pattern. This is called an amplitude integrated EEG or cerebral function monitor (CFM). This helps us determine whether your baby is having seizures, which we may or may not be able to see. It can give us some idea of the severity of the brain injury. If your baby meets a number of criteria they may be cooled to a body temperature of 33–34 degrees Celsius for 72 hours. This has been shown to reduce the severity of neurological damage.

An ultrasound of the brain (similar to the ultrasound you had when you were pregnant) may be done to look for signs of swelling or bleeding.

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A full electroencephalogram (EEG) where many sensors are placed on the scalp to look at the brain wave patterns will often be performed within the first week after birth. This again helps us determine whether there are any seizures occurring and if certain areas of the brain have been damaged.

At 5-7 days of age an MRI (**m**agnetic resonance imaging) scan of the brain may be arranged. The scan is done close to one week of age as this is the earliest that we can detect significant long term damage. A normal brain scan is a very good sign, but does not always guarantee that your baby will develop normally. When the MRI scan shows areas of damage to the brain it does not always mean that your child is going to have significant problems, but indicates areas that need to be observed as your child gets older.

Will your child continue to have seizures?

Many infants who have HIE will have seizures in the first few days of life. These often stop after several days, and the majority of infants will have no further seizures and not require any long-term medical treatment. Some babies may continue to have seizures or develop seizures later in childhood and require medications on a long-term basis. This will be discussed with you by the medical and nursing staff.

Are seizures harmful?

Seizures that last for only a short time are generally not harmful, and are thought not to cause any further brain damage. However, seizures that last for a long time (> 30 minutes) may potentially cause further damage.

Are other organs affected?

If there has been an interruption or decrease in the oxygen supply to the brain, other organs may also have been affected. The heart can be affected and as a result the baby's blood pressure may need support with medication. Some babies may require assistance with their breathing and consequently have a tube placed in their airway (ETT – endotracheal tube) which is attached to a ventilator. The kidneys can be affected and the baby may pass very small amounts of urine. The liver and bone marrow (organs which produce platelets and other factors that clot the blood) can be affected and your baby may require a transfusion of plasma which contains these clotting factors or some platelets. The stomach and intestine will need to be rested so your baby will not be fed milk in the first couple of days. However, if you are intending to breast feed it is important for you to start expressing breast milk and keeping it for when the baby is ready to be fed. These organs usually recover without long term problems.

What can you expect in the long term?

The long term mental and physical development of infants who have had HIE is very unpredictable. The medical staff will inform you of the findings of the various investigations that have been performed and what this may mean for your baby. However, the only way that we can tell if your baby is going to have problems in the long-term is by closely watching his/her development. The NICU Growth and Development Clinic is a team of physiotherapists, developmental paediatricians and neonatologists who will see your baby at 8, 18 months and 3 years of age. If there are problems identified by this team you will be informed at the time and regular physiotherapy, speech therapy or other requirements arranged to maximise your child's development.

If you have any further questions please ask any of the nursing or medical staff.