

# Neonatal Hypoxic-Ischemic Encephalopathy



## What is neonatal hypoxic-ischemic encephalopathy ?

Hypoxic-ischemic encephalopathy (HIE) is a type of brain damage. It's caused by a lack of oxygen to the brain before or shortly after birth. It affects the central nervous system. Babies born with HIE may have neurological or developmental problems.

## What causes neonatal HIE?

HIE occurs when a baby's brain does not get enough oxygen before or shortly after birth. It's more likely to occur the longer a baby's brain is without oxygen. Many things can lead to HIE, such as problems during labor and delivery. Often the exact cause of HIE is unknown.

## Which babies are at risk for neonatal HIE?

Many things can raise a baby's risk for HIE. Some of these risk factors may reside with the pregnant parent. Others may be related to health problems in the developing child. Risk factors for HIE may include:

- Very low or high blood pressure in the mother
- Heart problems in the baby
- Problems with the uterus or placenta
- Problems during labor and delivery, such as an injury from the umbilical cord
- Emergency C-section
- Lack of blood flow to the baby's brain during birth
- Poor oxygen supply during pregnancy
- Trauma
- Fetal stroke, which may occur because of many reasons, such as the pregnant parent's blood pressure level, pelvic infection, or impaired blood flow in the placenta

## What are the symptoms of neonatal HIE?

The symptoms of neonatal HIE can vary from baby to baby. They depend on which part of a baby's brain is damaged. Symptoms can range from mild to severe. They may include:

- Unusual state of being awake and aware, such as highly alert or very low energy
- Trouble breathing
- Not eating
- Trouble hearing
- Seizures or other neurological problems
- Muscle or reflex problems
- Slow heart rate
- Organ failure

In severe cases, a baby may have delays in growth or development. They may also have cerebral palsy or a mental disability. The severity of these symptoms may not be seen until ages 3 to 4.

The symptoms of neonatal HIE can be like other health conditions. Make sure your child sees a healthcare provider for a diagnosis.

## How is neonatal HIE diagnosed?

In many cases, healthcare providers suspect HIE in a newborn shortly after birth. The diagnosis is often based on a child's symptoms, such as seizures, and any problems that took place during labor and delivery. To confirm the diagnosis, healthcare providers may use 1 or more of these tests:

- **Blood tests.** These are used to check the amount of oxygen in the blood. They can also show the levels of electrolytes, enzymes, certain nutrients like calcium, and other parts of the blood that may help with diagnosis.
- **Tests of the umbilical cord or placenta.** Testing the blood from the umbilical cord or examining the placenta may help figure out the cause of HIE.
- **Lumbar puncture.** During this test, a long needle is put into the lower back to take a sample of cerebrospinal fluid. The fluid is then checked for infection.
- **Ultrasound of the head.** This test can show if a baby has bleeding or a buildup of fluid in the brain.
- **Electroencephalography (EEG).** This test checks the electrical activity of the brain. It's done on the first day of life.
- **Brain MRI.** This test can show where parts of the brain have been damaged. It's often done at 4 to 7 days of age.

In some cases, a child may not be diagnosed with HIE until later in life. This may happen if symptoms are mild and don't appear right after birth. As a child grows, they may start to have problems with motor function or delays in development. To diagnose HIE, your child's healthcare provider will ask about your child's symptoms and health history. They'll give your child a physical exam.

## How is neonatal HIE treated?

Treatment depends on a baby's symptoms, age, and general health. It also depends on how severe the condition is. If HIE is suspected at birth, a newborn may receive:

- **Therapeutic hypothermia.** This treatment is used for moderate to severe neonatal HIE. It must be given within the first 6 hours after birth. During it, a cooling system lowers the child's body temperature to 91.4°F to 95°F (33°C to 35°C) for up to 72 hours. Doing so may improve the chances of a child's survival. It may also lower the risk for developmental problems or disability later in life.
- **Supportive care.** A baby may need oxygen or a ventilator to breathe. Medicines may also be given to treat seizures and other health problems.

Talk with your baby's providers about the risks, benefits, and possible side effects of all treatments.

## What are possible complications of neonatal HIE in a child?

Possible complications can vary from child to child. They depend on how serious the neonatal HIE is. They may include:

- Learning problems
- Attention-deficit/hyperactivity disorder
- Epilepsy
- Cerebral palsy
- Other developmental disorders

## How can I help prevent neonatal HIE?

You can help prevent HIE in your baby by lowering the risk for asphyxia (lack of oxygen) during pregnancy and birth. You may be able to lower that risk by doing the following:

- Be as healthy as possible before and during pregnancy. Get early and regular prenatal care.
- Don't smoke, drink alcohol, or take illegal drugs during pregnancy.
- Get vaccinated for certain diseases that can harm a developing baby.

## How can I help my child live with neonatal HIE?

As your child grows, they will need to see their healthcare provider regularly to check for any problems. Other treatments may then be done to help your child manage symptoms of neonatal HIE. Your child may also need physical and occupational therapy if symptoms cause cerebral palsy or other conditions.

## When should I call my child's healthcare provider?

Call your child's healthcare provider right away if your child has:

- Symptoms that don't get better or get worse
- New symptoms

## Key points about neonatal hypoxic-ischemic encephalopathy

- Neonatal hypoxic-ischemic encephalopathy (HIE) is a type of brain damage. It's caused by a lack of oxygen to the brain before or shortly after birth.
- Many things can lead to neonatal HIE, such as problems during labor and delivery. Often the exact cause of neonatal HIE is unknown.
- The symptoms of neonatal HIE can range from mild to severe. They may include seizures or trouble breathing, eating, and hearing.
- In many cases, healthcare providers suspect neonatal HIE in a child shortly after birth. But it can be diagnosed later in life.
- The main treatment for neonatal HIE is therapeutic hypothermia. It lowers a child's body temperature to help reduce the risk for neurological problems.
- Children with neonatal HIE may have problems with learning and development.

## Next steps

Tips to help you get the most from a visit to your child's healthcare provider:

- Know the reason for the visit and what you want to happen.
- Before your visit, write down questions you want answered.
- At the visit, write down the name of a new diagnosis and any new medicines, treatments, or tests. Also write down any new instructions your provider gives you for your child.
- Know why a new medicine or treatment is prescribed and how it will help your child. Also know what the side effects are.
- Ask if your child's condition can be treated in other ways.
- Know why a test or procedure is recommended and what the results could mean.

- Know what to expect if your child does not take the medicine or have the test or procedure.
- If your child has a follow-up appointment, write down the date, time, and purpose for that visit.
- Know how you can contact your child's provider after office hours. This is important if your child becomes ill and you have questions or need advice.

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