NEONATAL ENCEPHALOPATHY

PREM STEM

What is neonatal encephalopathy?

Encephalopathy means **damage or injury** to the brain

In newborn babies, it's called **neonatal encephalopathy**

One type of encephalopathy – **hypoxic-ischemic encephalopathy** – happens when a baby doesn't get enough oxygen or blood supply during the pregnancy or the birth

3 in every 1,000 live births are believed to be affected by neonatal encephalopathy

There are a range of different causes and risk factors

- Problems with the umbilical cord
- Problems with the placenta
- Bleeding in the baby's brain
- Genetic disorders
- Metabolic disorders
- Family history of seizures
- Infection

Symptoms differ between mild, moderate and severe cases

Mild symptoms

Trouble feeding
Excessive crying
Irritability
Rigid in appearance

Babies with a mild diagnosis of hypoxic-ischemic encephalopathy often have good outcomes

Moderate and severe symptoms

- Seizures
- Trouble breathing or staying conscious
- Slow to react (poor reflexes)
- Body blue in colour and floppy

Seizures occur with uncontrolled bursts of electric activity in the brain

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How do we treat neonatal encephalopathy?

Six hours after injury occurs, the body's cells begin to run out of energy and symptoms of encephalopathy begin to show

Hypoxic-ischemic encephalopathy is the only type of neonatal encephalopathy that has an approved treatment – **therapeutic hypothermia** – and it's only offered to babies with a moderate to severe diagnosis

It's critical to start therapeutic hypothermia in the six-hour window after injury occurs

What does therapeutic hypothermia involve and what does it do?

Babies usually receive therapeutic hypothermia for three days

It lowers the baby's body temperature to 33.5°c

It slows down the various processes taking place within the cells of the body – including those which are going wrong

It reduces inflammation in the brain, and research is showing that it has a positive effect on the survival of brain cells

Some babies who receive therapeutic hypothermia may need help with their breathing using a ventilator, medication for seizures, or sedatives

The treatment comes with an increased risk of heart or gut issues or blood clots

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Survivors of neonatal encephalopathy face lifelong changes linked to the brain injury
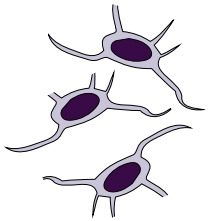
- Memory, speech or hearing problems
- Impaired movement
- Learning difficulties
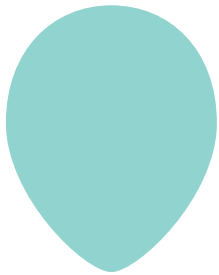- Cerebral palsy
- Epilepsy
- Behavioural disorders

PREMSTEM researchers are contributing to a brighter future for babies with neonatal encephalopathy

We're researching the potential of stem cells donated from umbilical cord tissue to treat brain damage in preterm born babies, which is known as **encephalopathy of prematurity**

We're also looking at **exosomes** – balloon-shaped sacs that form on the side of cells – which, like their stem cell big brothers, may have a positive effect on brain injury and perhaps could be used in combination with therapeutic hypothermia

The active components of exosomes are the growth factors and other molecules found inside the sacs
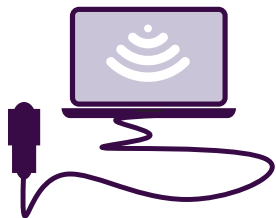
We're developing improved scanning techniques using **ultrafast ultrasound** to allow clinicians to see inside the brain in more detail and at a higher resolution to the technology we currently use

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