BREATHING FOR THE FIRST TIME - AN AMAZING JOURNEY!

Within seconds of birth, a baby takes in its own oxygen for the first time. For that to happen, their tiny lungs and circulatory system have to transform in a matter of seconds. So how does a tiny human manage to take what could be the most challenging breath of its life just seconds after birth?

During pregnancy, babies receive 100% of their oxygen from their mother. As she inhales, oxygen enters her bloodstream then flows to the placenta, and is transported to the baby through the umbilical cord. Carbon dioxide (CO_2) from the baby travel back through the cord to the placenta. From there they are transferred back into the maternal system to be disposed of.

But what about when your baby is born? When do babies take that first breath and how do they adapt to breathing for themselves? First, it helps to understand how the circulatory system - specifically, the lungs and heart work in utero. The lungs don't provide oxygen to the baby during gestation. Instead, they are partially collapsed and filled with a liquid called surfactant.

The process that happens at birth, when a baby switches from fetal circulation to breathing independently (newborn circulation) is complex but amazing.

- At birth, stimuli such as changes in temperature and environment cause the baby to inhale sharply
- Air is drawn into the baby's lungs
- The lungs expand and push amniotic fluid out of the alveoli (air sacs)
- This allows more oxygen-rich blood to flow into the lungs
- Pressure changes in the lungs and the heart cause special openings that only existed for fetal circulation to shut permanently. This redirects blood flow to the lungs.

This process completes the successful conversion from fetal to newborn circulation. The baby's muscles, organs, and brain are now oxygenated by the baby's own system.

How long does it take for a baby to take its first breath?

Your baby takes the first breath usually within ten seconds of birth. These first few breaths, initiated by the newborn, are the most difficult. Most full-term infants will gasp spontaneously within seconds of birth and 90-95% of newborns will complete this transformation without any help. The reality is that babies, like all mammals, are primed for survival.

Research suggests:

- Only 5-10% of babies require basic stimulation, such as drying and rubbing, to initiate breaths
- 3-6% require basic resuscitation steps (bag and mask ventilation)
- Less than 1% of babies require advanced resuscitation (cardiac compressions or drugs)

What factors may delay the first breath?

- Reduced oxygen levels. During birth, babies experience periods of lower oxygen levels, which allows carbon dioxide to build up. Babies are designed to cope with this for short periods, and it is important for the establishment of regular breathing when born. If this continues for extended periods it may require a c-section delivery

- Induced vs spontaneous labour. Research suggests stress hormones such as adrenaline increase in the baby towards the end of pregnancy, before the start of labour, and just before birth. These hormones help the baby to transition to life outside the uterus. When labour is induced, the baby misses out on these natural hormonal surges
- Mode of birth. Babies born vaginally are better equipped for these changes than babies born via c-section. During a vaginal birth, the baby's chest is compressed when squeezing through the vagina. Lung compression squeezes out as much fluid as possible and then, after birth, the chest can expand fully. Babies born via c-section are squeezed to a much lesser degree and are more likely to have fluid left in the lungs

Why do preterm babies have trouble breathing?

Preterm babies haven't had as much time to produce surfactant. This liquid also helps the lungs to inflate and prevents them from collapsing in on themselves, which makes breathing harder.
A baby normally begins to produce surfactant from 24-28 weeks of pregnancy. Most will produce enough to breathe normally by week 34.
Some babies born at this point, however, will still struggle to maintain breathing for themselves and might require respiratory support from a breathing machine or ventilator.
The lungs aren't considered mature until around 36 weeks. Generally the longer the gestation, the better it is for the health of newborn babies, as they are better equipped to deal with their new world.

So, why is the first breath the most difficult?

The first breath immediately after birth is mechanically the most difficult for all newborns because it's the first time the lungs are being used. Within a couple of breaths, the baby's lungs will inflate. They become filled with air and push out the fluid inside them. Only after this is done can the lungs effectively take in oxygen and eliminate carbon dioxide.

Imagine blowing up a balloon for the first time. The balloon is like the newborn's lungs. Your first attempt to blow up the balloon takes a lot of effort, but once you get started it becomes easier. The next time you blow it up, it's easier still and so on. The process is similar for the baby. Once their lungs have begun working, the muscles involved in breathing don't have to work so hard to keep them inflated.

Can a baby breathe with the umbilical cord attached?

Most babies will breathe spontaneously immediately after birth, even when they are still connected to the umbilical cord. Because blood is still flowing to the placenta, babies will still receive oxygen from their mother, even when breathing for themselves. This will continue until the cord naturally stops pulsing, usually 4 - 5 minutes after the baby is born. This is known as optimal cord clamping.

Ways to support babies in their newborn transition

The first moments after birth are incredibly precious as you meet your baby for the first time. While your newborn is adjusting to life outside the uterus, you can support this transition by:

- Skin to skin. This helps regulate your baby's heart rate, breathing, and temperature, whilst also providing much-needed reassurance and familiarity. If mums aren't feeling up to providing that initial skin to skin, partners can do skin to skin
- An early feed. Feeding within the first couple of hours of life allows your baby to conserve precious energy reserves
- Keeping baby warm. Similarly, keeping your newborn nice and cozy will prevent a loss of energy from trying to regulate body temperature