Immune system of newborn babies is stronger than previously thought

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Contrary to what was previously thought, newborn immune T cells may have the ability to trigger an inflammatory response to bacteria, according to a new study led by King's College London. Although their immune system works very differently to that of adults, babies may still be able to mount a strong immune defense, finds the study published in the journal *Nature Medicine*.

Our immune system is made up of several different types of immune cells, including neutrophils which play an important role in the frontline defense against infection, and lymphocytes: B cells which produce antibodies, and T cells that target cells infected with viruses and microbes.

Up to now, it was generally believed that babies have an immature immune system that doesn't trigger the same inflammatory response normally seen in adults. Although babies need to protect themselves from the harmful pathogens they are exposed to from birth, it was thought that their T cells were suppressed to some extent to prevent inflammatory damage to the developing child. Sceptical of this notion, the King's-led study set out to characterise the properties of T cells, examining very small samples of blood in twenty-eight highly premature babies, as they developed over the first few weeks of life.

The team discovered that whilst T cells in newborn babies are largely different to those in adults, it is not because they are immunosuppressed; rather, they manufacture a potent anti-bacterial molecule known as IL8 that has not previously been considered a major product of T cells, and that activates neutrophils to attack the body's foreign invaders.

Dr Deena Gibbons, lead author in the Department of Immunobiology at King's College London, says: "We found that babies have an in-built anti-bacterial defense mechanism that works differently to adults, but nevertheless may be effective in protecting them. This may also be a mechanism by which the baby protects itself in the womb from infections of the mother. The next stage of our work will be to better understand the pathways that result in the immune cells of newborns being so different to those in adults."

This T cell activity could become a target for future treatments aimed at boosting the immune system of neonates in intensive care, where

infection is a major risk for morbidity and mortality. Premature babies are also at serious risk of developing inflammatory diseases such as necrotising enterocolitis (NEC), where severe inflammation destroys tissues in the gut. NEC is the most common gastrointestinal surgical emergency in preterm babies, with mortality rates of around 15 to 30 per cent in the UK.

More information: Interleukin-8 (CXCL8) production is a signatory T cell effector function of human newborn infants, *Nature Medicine*, DOI: 10.1038/nm.3670

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