

Babies distinguish pain from touch at 35-37 weeks

September 8 2011

Babies can distinguish painful stimuli as different from general touch from around 35-37 weeks gestation – just before an infant would normally be born – according to new research.

In a study published online in the journal *Current Biology*, scientists show that neural activity in the [brain](#) gradually changes from an immature state to a more adult-like state from 35 weeks of development. This change may indicate that neural circuitry allows [babies](#) to process pain as a separate sensation from touch.

Dr Rebeccah Slater, UCL Neuroscience, Physiology and Pharmacology, said: "Premature babies who are younger than 35 weeks have similar brain responses when they experience touch or pain. After this time there is a gradual change, rather than a sudden shift, when the brain starts to process the two types of stimuli in a distinct manner."

Scientists looked at the brain activity of 46 babies at the University College Hospital Elizabeth Garrett Anderson Wing. 21 babies in the study were born prematurely, giving scientists the opportunity to measure activity at different stages of human brain development, from babies at just 28 weeks of development through to those born 'full term' at 37 weeks.

Using electroencephalography (EEG), the scientists measured the babies' electrical brain activity when they were undergoing a routine heel lance – a standard procedure essential to collect blood samples for clinical use.

In the premature babies the EEG recorded a response to the heel lance of non-specific 'neuronal bursts' – general bursts of electrical activity in the brain. After 35-37 weeks the babies' response changed to localised activity in specific areas of the brain, indicating that they were now perceiving painful stimulation as separate to touch.

Dr Lorenzo Fabrizi, lead author of the paper from UCL Neuroscience, Physiology and Pharmacology, said: "We are asking a fundamental question about human development in this study – when do babies start to distinguish between sensations? In very young brains all stimulations are followed by 'bursts' of activity, but at a critical time in development babies start to respond with activity specific to the type of stimulation."

Dr Fabrizi added: "Of course, babies cannot tell us how they feel, so it is impossible to know what babies actually experience. We cannot say that before this change in brain activity they don't feel pain."

Previous studies have shown that there is a similar shift from neuronal bursts to evoked potentials in the visual system at this time, suggesting that 35-37 weeks is a time when important neural connections are formed between different parts of the brain.

Dr Slater said: "It is important to understand how the human brain develops so that we can provide the best clinical care for hospitalised infants."

Provided by University College London

Citation: Babies distinguish pain from touch at 35-37 weeks (2011, September 8) retrieved 24 April 2024 from <https://medicalxpress.com/news/2011-09-babies-distinguish-pain-weeks.html>

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