

A window into the brain provides clues for improving the well-being of children born very preterm

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An expert review of very preterm babies (born two or more months early) has found that while most now survive, the rate of developmental

problems is too high, largely due to brain injury and disrupted brain development.

Monash University researcher Professor Peter Anderson, from the School of Psychological Sciences, contributed to the review, published today in the *New England Journal of Medicine (NEJM)*.

Written with Professor Terrie Inder from the Children's Hospital of Orange County in California, and Professor Joseph Volpe from Boston Children's Hospital, it demonstrates that the challenges many children born very preterm face are due to specific injuries to the brain, as well as a disruption of important [brain development](#) processes.

Encouragingly, it found that strategies that minimize brain injury and support brain development are likely to greatly improve the long-term well-being of children born very preterm.

The review focused on research that used brain [magnetic resonance](#) imaging shortly after birth, which provides a window into the brain during the most rapid and critical period of brain development.

About 3,000 babies are born very preterm in Australia each year. Professor Anderson, who is also with the Turner Institute for Brain and Mental Health, says that their outcomes vary from child to child, with some experiencing severe challenges while others experience mild or no problems.

"Unfortunately, as a field, we are poor at predicting which children are going to have major developmental problems," he said. "However, we are slowly getting better at understanding how the different forms of brain injury and developmental processes are related to later learning, motor, educational and behavioral and social outcomes."

"Many factors contribute to brain injury and development in children born very preterm, some of which are likely related to their management and environment while in hospital.

"For example, nutrition has been related to improved brain maturation, and possibly a reduction in brain injury. Pain and stress, which are common experiences for the babies in the neonatal intensive care, have also been related to brain development and later behavioral issues. We also know that parenting behaviors greatly influence the development of children born very preterm."

Knowledge relating to brain injury and development has resulted in changes in the design of neonatal intensive care units, new approaches to reduce infant pain and stress, attempts to optimize the nutrition of very sick babies, and the involvement of parents in supporting and caring for their babies while in hospital.

"All these initiatives benefit babies born very preterm, but this is just the start," Professor Anderson said. "The more we understand about the factors that support or hinder brain development following very [preterm birth](#), the greater the opportunity to find strategies to enhance their long-term well-being."

The review found:

- Preterm birth remains common with improvements in survival but limited improvement in neurodevelopmental outcomes in the last 20 years, with challenges persisting for many children born very preterm
- The factors leading to high rates of neurodevelopmental challenges include [brain injury](#) and altered brain development
- Brain injury is very common in the preterm infant but can only

be fully defined by an MRI scan—which is often not available to these babies

- Altered [brain](#) development appears to result from injury AND the experiences and environment of the [neonatal intensive care unit \(NICU\)](#) with many adverse experiences, light and noise, and a paucity of enriching experiences, parent voice and holding
- The impact of being born very preterm on [brain structure](#) and function has lifelong implications, including for aging.

More information: Terrie E. Inder et al, Defining the Neurologic Consequences of Preterm Birth, *New England Journal of Medicine* (2023). [DOI: 10.1056/NEJMr2303347](https://doi.org/10.1056/NEJMr2303347)

Provided by Monash University

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