

Low blood sugars in newborns linked to later difficulties

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Credit: University of Auckland

A newborn condition affecting one in six babies has been linked to impairment in some high-level brain functions that shows up by age 4.5 years.

Researchers found that children who had experienced low [blood sugar](#) levels as newborns were two to three times more likely to have difficulties with executive function (skills for problem-solving, planning, memory and attention) and visual-motor co-ordination (skills for fine control of movement, and understanding what you see) at age 4.5 years than children who had [normal blood sugar](#) levels.

Overall, the lower the blood sugar levels, or the more often they dropped, the greater the impairment was. Strikingly, children who had experienced a drop in blood sugar that was not detected using routine blood sugar monitoring were four times more likely to have difficulties with these skills – the first time this has been shown.

There was no link with lowered intelligence as measured by IQ.

The findings, published in top-ranking journal *JAMA Pediatrics*, are the latest from a major long-term study, dubbed the "CHYLD" study (Children with Hypoglycaemia and their Later Development), by an international research team led by Distinguished Professor Jane Harding at the University of Auckland-based Liggins Institute.

The team includes researchers from the Liggins Institute, the University of Auckland, Waikato Hospital, the University of Canterbury and the

University of Waterloo. They are following 614 New Zealand babies born at risk of [low blood sugar](#) levels (neonatal hypoglycaemia) into childhood to see if the condition affects their later growth and development.

Low blood sugar affects up to 15 percent of all babies, and is the only common preventable cause of brain damage in infancy. At-risk babies – up to a third of all born - are those born premature, smaller or larger than usual and babies whose mothers have diabetes.

Health guidelines say at-risk babies should be tested with heel-prick blood tests in the first few hours after birth. If their blood sugar is too low, they are treated with dextrose (sugar) gel to return it to normal levels – a breakthrough treatment pioneered in 2013 by Professor Harding and her team.

Half of the babies in the CHYLD study were diagnosed with, and treated for low blood sugars, as per guidelines. Seventy percent received extra, continuous monitoring of their blood sugar levels, which detected in some babies low levels that were not diagnosed by the routine blood tests. Researchers thoroughly assessed these babies' growth and development at two years, and again at 4.5 years (477 of the original 614 babies took part in the latest follow-up).

"At two years there was no relationship between blood sugar levels and later brain development, but at age 4.5 years, it's clear that the children who experienced low [blood sugar levels](#) were more likely to have specific difficulties," says Professor Harding.

"We don't know yet what these impairments mean for the child in practical terms, but executive function and visual motor integration are believed to be important for learning at school, particularly for maths and reading."

To investigate whether the impairments at 4.5 years translate to learning or behaviour difficulties at school, the research team are now starting to follow up the children at age 9-10 years, supported by a \$1.2 million grant from the Health Research Council.

"What was especially concerning in our 4.5 year results was the four-fold increase in risk of [executive function](#) difficulties in children who had experienced low blood sugars that were not detected in routine testing," says the paper's lead author, Dr Chris McKinlay, also from the Liggins Institute. "This is the first time this has been shown."

Internationally, there is no agreed cut-off for safe versus unsafe levels of [blood sugar](#) in newborns, he says. The one most commonly used in New Zealand, and in the CHYLD study, is

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