

# Newborns with borderline thyroid function at higher risk of poor neurodevelopmental outcomes

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Babies born with moderately high concentrations of thyroid stimulating hormone have a higher risk of poor educational and development outcomes at school age, a world-first University of Sydney study reveals.

Published in the latest issue of *The Lancet Diabetes & Endocrinology*, this is the first population-based study demonstrating the association between moderately high thyroid stimulating hormone (TSH) concentrations in infants and their later school age neurodevelopmental outcomes.

Congenital hypothyroidism refers to abnormal thyroid function in newborn infants. Globally, about one in 2,000 children are born with congenital hypothyroidism each year and the incidence of subclinical thyroid disease is at least ten times higher than overt thyroid disease. If untreated for several months after birth, severe congenital hypothyroidism can lead to growth failure and permanent intellectual disability.

Screening for congenital hypothyroidism in the first days of life, done usually by testing concentrations of neonatal thyroid-stimulating hormone (TSH) in baby's blood, provides an opportunity to identify infants with abnormal thyroid hormone concentrations.

In developed countries, newborn screening of TSH levels and early

treatment for congenital hypothyroidism has nearly eliminated intellectual disabilities associated with congenital hypothyroidism. Currently, only newborns with TSH concentrations at the 99.95th percentile of the population range are diagnosed with [congenital hypothyroidism](#) and treated with thyroxine. At this percentile, blood concentration of TSH usually exceeds 20 mU per litre of whole blood.

## Key finding:

The researchers found that infants with a neonatal TSH concentration lower than the newborn screening cut-off (20 mU/L blood) but in the top quartile of the population have an increased likelihood of poor neurodevelopmental outcomes at school age. Said another way, the study reveals a gradual increasing risk of poor educational and development outcomes for newborns with increasing TSH concentrations from the 75th to the 99.95th percentile.

## Other findings:

- Compared to those with normal TSH levels (less than 75th percentile TSH concentrations) children had a 75 per cent higher risk of poor numeracy performance when TSH concentrations ranged between the 99.9th to 99.95th percentiles.
- Compared to those with normal TSH levels (less than 75th percentile TSH concentrations) children had a 42 per cent higher risk of poor reading performance when TSH concentrations ranged between the 99.9th to 99.95th percentiles.
- Compared to those with normal TSH levels (less than 75th percentile TSH concentrations) children had a 52 per cent higher risk of vulnerability in developmental domains when TSH concentrations ranged between the 99.9th to 99.5th percentiles.
- Compared to those with normal TSH levels (less than 75th

percentile TSH concentrations) children had a 68 per cent higher risk of having 'special needs' when TSH concentrations ranged between the 99.9th to 99.5th percentiles.

"The results showed a clear dose-response association between neonatal thyroid stimulating hormone and risk of scoring below the national minimum standard for numeracy and reading," said the University of Sydney's A/Professor Natasha Nassar, the study's senior author.

"This study can't prove a cause and effect relationship between [thyroid stimulating hormone](#) levels in newborns and educational and development outcomes in [school age](#) children, but it suggests an urgent need for prospective studies examining different thyroid hormone thresholds for intervening with thyroxine," said Dr Bridget Wilcken, Clinical Professor of Paediatrics and Child Health at the Children's Hospital at Westmead.

"Given that thyroxine is a relatively safe medication when indicated and properly monitored, this simple intervention may prevent significant learning and developmental problems in a small group of affected children.

A/Professor Nassar said: "The study also demonstrates the power of data linkage to provide a cost-effective platform to answer important research questions at a population and individual level."

Provided by University of Sydney

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