

Gut bacteria are important for neurodevelopment

The bacteria in a baby's gut in the first year of life may be associated with enhanced neurodevelopment at age two, CHILD finds.

The research, published in the journal *Gut Microbes*, found that boys with a gut bacterial composition high in the bacteria *Bacteroidetes* at one year of age had more advanced cognition and language skills one year later.

"It's well-known that female children score higher than boys at early ages in cognition and language," said Dr. **Anita Kozyrskyj**, (University of Alberta), "but when it comes to gut microbial composition, it was in the male infants that we saw this obvious connection between *Bacteroidetes* levels and improved scores."

GIRLS' VS. BOYS' GUTS

"The differences between male and female gut microbiota are subtle, but we do know from CHILD data that girls at early ages are more likely to have more of these *Bacteroidetes*. Perhaps most girls have a sufficient quantity and that's why they have improved scores over boys early in life," she added.

The researchers analyzed the bacteria in stool samples taken from over 400 infants participating in CHILD's Edmonton site, identifying three groups of infants exhibiting different dominant clusters of bacteria. The researchers then evaluated the infants on a variety of neural developmental scales.

"We found that infants with a *Bacteroidetes*-dominant microbial composition achieved 4.8-point and 4.2-point higher cognitive and language development scores, respectively, compared to the other two groups,"

said Dr. **Piush Mandhane**, leader of the CHILD Edmonton site.

INSTRUMENTAL BACTERIA

Bacteroidetes are one of a very few bacteria that produce metabolites called sphingolipids, which are instrumental for the formation and structure of neurons in the brain.

"It makes sense that if you have more of these microbes and they produce more sphingolipids, you would see some improvement in terms of greater connectivity in brain areas that support cognitive development and language acquisition," commented Dr. **Hein Tun** (University of Hong Kong), co-first author of the study.

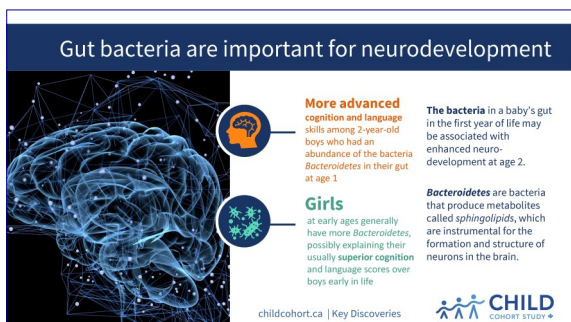
"Our findings contribute to growing evidence that neurodevelopmental outcomes are shaped by gut microbial composition in a sex-dependent manner," noted co-first author Dr. **Sukhpreet Tamana** (Simon Fraser University).

"This may be especially important during the first few years of life when children's brains are rapidly developing and their gut microbiomes are changing."

RISK IDENTIFICATION

While their findings don't mean children with fewer *Bacteroidetes* will remain behind their peers later in life, the researchers believe the findings hold early promise as a way to potentially identify children at risk of neurodevelopmental disorders.

"We hope to continue to follow these children in CHILD to determine if our findings can be predictive of autism or ADHD and to look at other factors that may have an impact on neurodevelopment in infants," said Dr. Kozyrskyj.



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- More advanced cognition and language skills among 2-year-old boys who had an abundance of the bacteria *Bacteroidetes* in their gut at age 1**
- Girls at early ages generally have more *Bacteroidetes*, possibly explaining their usually superior cognition and language scores over boys early in life**
- The bacteria in a baby's gut in the first year of life may be associated with enhanced neurodevelopment at age 2.**
- Bacteroidetes* are bacteria that produce metabolites called sphingolipids, which are instrumental for the formation and structure of neurons in the brain.**

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