

Breastmilk microbiome linked to method of feeding

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The idea that breastmilk has a microbiome (or microbiota)—a community of bacteria living within it—is relatively new and has sparked debate about where breastmilk bacteria come from. Some scientists believe breastmilk bacteria originate in the mother's gut while others believe they are transferred to the mother from the infant's mouth during breastfeeding.

New research from the CHILD Cohort Study—an ongoing birth cohort study involving thousands of Canadian children and their families—has shed some light on this question by highlighting the importance of the infant's mouth as a source of breastmilk bacteria.

The study, published today in [*Cell Host & Microbe*](#), found that among the many factors examined, the method of breastfeeding—whether mothers fed their infants directly at the breast or fed them pumped breastmilk from a bottle—was the most consistent factor associated with the milk microbiota composition.

“We found that milk bacteria are different in mothers who pump their milk,” said Dr. Meghan Azad, the University of Manitoba investigator who led the study. “We suspect that pumping may prevent the transfer of oral bacteria from the infant to the mother and might introduce other bacteria from the pump. Therefore, contrary or in addition to the hypothesis that milk bacteria come from the mother's gut, our results suggest that the infant's oral bacteria are important in shaping the milk microbiota.”

Dr. Azad is an AllerGen investigator, a Canada Research Chair in Developmental Origins of Chronic Disease at the University of Manitoba, and a research scientist at the Children's Hospital Research Institute of Manitoba (CHRIM). She co-leads the Manitoba site of the CHILD Cohort Study.

Dr. Azad's team also found that indirect breastfeeding (defined as providing at least one serving of pumped milk in the two weeks preceding the collection of a breastmilk sample for the study) was associated with a lower abundance of beneficial *Bifidobacteria*. “We found this especially interesting because we had previously found that feeding pumped breast milk – while advantageous compared to formula – was less beneficial than nursing at the breast when it comes to protecting infants from asthma and obesity.”

In addition, direct breastfeeding without a pump was associated with microbes typically found in the mouth, as well as higher overall bacterial richness and diversity. “Taken together, the findings suggest that direct breastfeeding facilitates the acquisition of oral microbiota from infants while feeding pumped milk leads to enrichment with different (perhaps pump-associated)

bacteria,” explained first author Dr. Shirin Moossavi, an AllerGen trainee and a PhD candidate at the University of Manitoba.

The researchers used data from nearly 400 infants and their mothers participating in the CHILD Cohort Study, representing one of the largest studies of the human milk microbiota performed to date, according to the authors.

“This study considerably expands our understanding of the human milk microbiota and the factors that might influence it,” commented Dr. Azad. “We hope the results will inspire new research about breastfeeding and human milk, especially related to pumping.”

This research was supported by an Early Research Leaders Initiative (ERLI) Grant, co-funded by the Canadian Respiratory Research Network (CRRN), the Canadian Lung Association, AllerGen NCE and other partners.

About the CHILD Cohort Study: Launched in 2008 by CIHR and AllerGen NCE, the [CHILD Cohort Study \(CHILD Study\)](#) is tracking more than 3000 Canadian infants and their families over early childhood to help determine the root causes of chronic diseases such as asthma, allergies and obesity. The CHILD Study spans four provinces, involving over 140 multidisciplinary researchers, students and research staff. [Watch the CHILD Study videos.](#)

About the Children’s Hospital Research Institute of Manitoba: The Children’s Hospital Research Institute of Manitoba was established in 2001. [CHRIM](#) is the research division of the Children’s Hospital Foundation of Manitoba. At the Institute, more than 270 world-class pediatric medical researchers, technical staff, students and support staff are involved in over \$10 million of research and clinical trial activity each year.

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