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Research Category

Basic Science

Abstract Title

Investigating associations between feeding practices, human milk composition, and immune system development in the first year of life

Background

Only one-third of infants in Canada are exclusively breastfed for the recommended six months, despite evidence that human milk (HM) bioactive components shape infant immune system development, and feeding HM direct from the breast (vs. formula or bottled HM) reduces infectious and chronic disease.

Objective

This work investigates: (1) Does HM composition differ by feeding experience (exclusively feeding HM vs supplementing with formula, or direct from the breast vs pumped/bottled HM)? (2) Are HM components associated with infant immune system markers?

Methods

We accessed data from 605 mother-infant dyads in the CHILd Cohort Study: human milk oligosaccharides (HMOs, $n=19$), fatty acids (FAs, $n=28$), and immune proteins ($n=28$) quantified in HM at 3 months postpartum, and immune biomarkers ($n=92$) measured in infant serum at 1 year. Relationships between HM components, feeding practices, and immune biomarkers were assessed using rank-sum tests, regression models, and machine learning (e.g. Principal component analysis, PERMANOVA).

Results

At 3 months of age, 64% of study infants were exclusively fed HM, and 79% received at least some indirect/pumped HM since birth. At the time of 1 year blood collection, 51% of infants were still receiving some HM. Principal component analysis of FAs in HM revealed a high correlation between longer-chain and unsaturated fatty acids; however, comparisons of FA, HMO, and immune protein profiles in HM by feeding group did not reveal clear separations. Serum immune biomarker profiles differed by pumping history ($F=4.22$, $p=0.004$), but not between exclusive or partial HM-fed infants ($F=1.32$, $p=0.193$). Regression modeling is in progress to further investigate whether HM composition can predict serum immune profiles.

Conclusion

This work suggests that infant feeding experience contributes to immune system development and provides a foundation for investigating strategies to promote long-term health.

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