

Correspondence

Gut microbiota diversity and atopic disease: Does breast-feeding play a role?

To the Editor:

Using new technology, the recent report by Abrahamsson et al¹ confirms previous findings that low diversity of the infant gut microbiota is associated with an increased risk for allergic disease. In this study of 40 high-risk infants, the authors report that exclusion of subjects receiving probiotics or antibiotics, which could influence microbiota diversity, did not substantially change the results. On the basis of our own research, we propose that breast-feeding might represent another potential confounding factor that warrants investigation.

Infant diet is an established determinant of gut microbiota composition, and the protective effect of breast-feeding against atopic disease has been a frequent subject of study (and debate) for many years.² Consistent with previous studies,³ in our population-based cohort of healthy full-term Canadian infants, we have detected decreased fecal microbiota richness and diversity in infants who are exclusively breast-fed compared with those who are partially or not breast-fed at the age of 4 months (Table I). This association has been attributed to human milk oligosaccharides, which are found exclusively in breast milk and serve as a selective metabolic substrate to limit the number of gut microbes and reduce diversity.⁴

Together, these results present an interesting paradox: breast-feeding promotes lower intestinal microbiota diversity, and low diversity is associated with an increased risk of atopic disease, yet breast-feeding is generally considered protective against atopy. Clearly, breast-feeding has physiologic effects beyond the gut microbiota, but these contradictory findings nevertheless signal the need for further research and careful consideration of the clinical relevance of summary measures for microbiota diversity. Abrahamsson et al¹ report that all infants in their study were breast-fed for at least 1 month, but they do not specify whether breast-feeding was exclusive or supplemented with formula. This distinction might be important because, based on our findings, the relative amount of breast-feeding seems to influence microbiota richness and diversity (Table I). Because it appears that exclusivity of breast-feeding was documented in their study,⁵ it would be informative for the authors to provide more detailed infant feeding data and present their results after stratification by degree of formula supplementation.

We also note that maternal atopy was present for nearly all infants in the high-risk Abrahamsson et al¹ cohort. Maternal atopy modifies the association between infant feeding and atopic disease, with breast-feeding by atopic mothers actually increasing the risk of child atopy.⁶ It has been shown that the breast milk of atopic mothers has an altered microbial composition, which affects the infant gut microbiota.⁷

In summary, new technology is facilitating analysis of the human microbiome in unprecedented detail; however, the development of meaningful and clinically relevant measures of microbiota composition and diversity remains challenging. It will be important to investigate the effects of infant feeding on gut microbiota in larger, population-based cohorts to confirm and better understand the association with atopic disease. We are pursuing such research within the Canadian Healthy Infant

TABLE I. Richness and diversity of infant fecal microbiota according to breast-feeding status at 4 months of age

Diet at 4 mo	No.	Chao1 Estimator: Richness			Shannon Index: Diversity		
		Mean	SD	P value	Mean	SD	P value
Exclusively breast-fed	10	9.0	4.1	.006	1.19	0.51	.12
Partially breast-fed	5	12.6	5.3		1.42	0.64	
Not breast-fed	9	15.0	4.0		1.58	0.47	

Comparisons were done by using ANOVA with posttest for linear trend.

Longitudinal Development national birth cohort and look forward to complementary reports from our colleagues around the world.

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