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FUT2-dependent breast milk oligosaccharides and allergy at 2 and 5 years of age in infants with high hereditary allergy risk.

Sprenger N[1], Odenwald H[2,3,4], Kukkonen AK[5], Kuitunen M[6], Savilahti E[6], Kunz C[7].

Author information

Abstract

PURPOSE: Manifestation of allergic disease depends on genetic predisposition, diet and commensal microbiota. Genetic polymorphism of mothers determines their breast milk glycan composition. One major determinant is the fucosyltransferase 2 (FUT2, secretor gene) that was shown to be linked to commensal microbiota establishment. We studied whether FUT2-dependent breast milk oligosaccharides are associated with allergic disease in breast-fed infants later in life.

METHODS: We analyzed FUT2-dependent oligosaccharides in breast milk samples of mothers (n = 266) from the placebo group of a randomized placebo-controlled trial of prebiotics and probiotics as preventive against allergic disease in infants with high allergy risk (trial registry number: NCT00298337). Using logistic regression models, we studied associations between FUT2-dependent breast milk oligosaccharides and incidence of allergic disease at 2 and 5 years of age.

RESULTS: At 2 years, but not at 5 years of age, we observed a presumed lower incidence ($p < 0.1$) for IgE-associated eczema manifestation in C-section-born infants who were fed breast milk containing FUT2-dependent oligosaccharides. By logistic regression, we observed a similar relation ($p < 0.1$) between presence of FUT2-dependent breast milk oligosaccharides and IgE-associated disease and IgE-associated eczema in C-section-born infants only. When testing with the levels of breast milk oligosaccharide 2'-fucosyllactose as proxy for FUT2 activity, we observed significant ($p < 0.05$) associations in the C-section-born infants with 'any allergic disease,' IgE-associated disease, eczema and IgE-associated eczema.

CONCLUSION: The data indicate that infants born by C-section and having a high hereditary risk for allergies might have a lower risk to manifest IgE-associated eczema at 2 years, but not 5 years of age, when fed breast milk with FUT2-dependent milk oligosaccharides. Further studies with larger cohorts and especially randomized controlled intervention trials are required to build on these preliminary observations.

KEYWORDS: Allergy; Breast-feeding; Human milk oligosaccharides; Mode of delivery

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