

# Early gut colonisation by *Bifidobacterium breve* and *B. catenulatum* differentially modulates eczema risk in children at high-risk of developing allergic disease

## ABSTRACT

**BACKGROUND:** An altered compositional signature and reduced diversity of early gut microbiota are linked to development of allergic disease. We investigated the relationship between dominant *Bifidobacterium* species during early postnatal period and subsequent development of allergic disease in the first year of life.

**METHODS:** Faecal samples were collected at age 1 week, 1 month and 3 months from 117 infants at high risk of allergic disease. *Bifidobacterium* species were analysed by quantitative PCR and terminal restriction fragment length polymorphism. Infants were examined at 3, 6 and 12 months, and skin prick test performed at 12 months. Eczema was diagnosed according to the UK-Working Party criteria.

**RESULTS:** The presence of *B. catenulatum* at 3 months was associated with a higher risk of developing eczema (OR<sub>adj</sub> =4.5; 95% CI 1.56 to 13.05, *p*<sub>adj</sub> =0.005). Infants colonised with *B. breve* at 1 week (OR<sub>adj</sub> =0.29; 95% CI 0.09 to 0.95, *p*<sub>adj</sub> =0.04) and 3 months (OR<sub>adj</sub> =0.15; 95% CI 0.05 to 0.44, *p*<sub>adj</sub> =0.00001) had a reduced risk of developing eczema. Furthermore, the presence of *B. breve* at 3 months was associated with a lower risk of atopic sensitisation at 12 months (OR<sub>adj</sub> =0.38; 95% CI 0.15 to 0.98, *p*<sub>adj</sub> =0.05). *B. breve* colonisation patterns were influenced by maternal allergic status, household pets and number of siblings.

**CONCLUSIONS:** Temporal variations in *Bifidobacterium* colonisation patterns early in life are associated with later development of eczema and/or atopic sensitisation in infants at high risk of allergic disease. Modulation of the early microbiota may provide a means to prevent eczema in high risk infants. This article is protected by copyright. All rights reserved.

**Keyword:** *Bifidobacterium breve*; *Bifidobacterium catenulatum*; Atopic sensitization; Eczema; Gut microbiota; Terminal restriction fragment length polymorphism