Food allergy-induced symptoms attenuation and gut microbiota modulation by a new symbiotic

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Food allergy is an adverse immune reaction to food leading to local and/or systemic allergic symptoms. Changes in gut microbiota composition have been reported in food allergies. Currently the only efficient solution is dietary restriction. Probiotics and prebiotics could promote health benefits in several gut inflammatory states and may sometimes restore the microbiota profile. This work was aimed at studying the effect of a synbiotic in an ovalbumin-food allergy mouse model.

The synbiotic was prepared from a combination of probiotics and a prebiotic selected for their efficiency on the microbiota and the immune system. Three-week-old male mice were sensitised by two intraperitoneal injections of ovalbumin (OVA) (n=10 per group). Sensitisation was evaluated by OVA-specific IgE levels in serum. Oral daily synbiotic treatment began 10 days after the last sensitization until the end of the experiment. Mice have been challenged with OVA every 3 days for 18 days. Diarrhea was evaluated after each challenge. Finally, the intestinal microbiota was studied by 16S-targeted metagenomic analysis of bacterial DNA extracted from caeca.

OVA-specific IgE levels showed the effective sensitisation in both synbiotic-treated allergic (STA) and non-treated allergic (NTA) groups versus the unsensitised control group (CTL). CTL mice presented normal stools while NTA mice produced watery stool containing flecks of mucus at the last challenge. STA mice present a significant decrease of symptoms of diarrhea compared to NTA mice. Allergic challenges induce a dysbiosis in NTA mice compared to CTL mice with significant decrease in Firmicutes and increases of *Erysipelotrichaceae* and *Verrucomicrobiaceae,* probably in link with the excessive mucus production. By contrast, synbiotic treatment limited the microbiota imbalance and prevented the development of *Erysipelotrichaceae* and *Verrucomicrobiaceae*.

The synbiotic prevents the microbiota imbalance, and limits allergy-induced diarrhea. The use of synbiotics may be considered as a nutritional approach to reduce allergic symptoms.

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