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Prebiotic supplementation during pregnancy alters the gut microbiota



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Brosseau C. *et al.*

Prebiotic supplementation during pregnancy modifies the gut microbiota and increases metabolites in amniotic fluid, driving a tolerogenic environment *in utero*

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Context

When a woman is pregnant, her diet alters the intestinal microbiota. Diet can thus impact the immune system of the foetus *in utero* by modifying the transfer of immune factors, microbial factors and bacterial metabolites mediated by the umbilical cord, placenta and amniotic fluid. Prebiotics are fibres that act as fermentable substrates for specific bacteria, which either leads to the release of metabolites or exerts direct effects on immune cells. We hypothesised that prebiotic supplementation during pregnancy could shift the maternal microbiota towards higher production of metabolites and promote a healthy immune system in the foetus.

Results

We demonstrated in mice that prebiotic (galacto-oligosaccharide/inulin) supplementation during gestation modifies the gut microbiota with an increase in the abundance of Bacteroidota and a decrease in Firmicutes associated with an increase in metabolite production. Of these metabolites, the concentration of acetate increases in the faeces as well as in the amniotic fluid. Prebiotic supplementation also increases the

frequency of immunoregulatory B and T lymphocyte cells in gestational tissues (uterus and placenta) and in the foetus (in the marrow and intestine). These cells are then found in the mouse pups at six weeks of life. We thus demonstrated that prebiotic supplementation during pregnancy leads to the transmission of specific microbial and immune factors from the mother to the offspring, allowing the establishment of a tolerogenic immune response in the foetus, which could protect the offspring from future conditions such as food allergies.

Future outlook

We would like to determine in mice whether the tolerogenic environment induced *in utero* by prebiotic supplementation during pregnancy could prevent the occurrence of food allergy in the offspring. This nutritional strategy is being investigated in our PREGALL cohort of pregnant mothers with allergies.

PROBE