#0170 - Modulation of the immune system in feto-maternal tissues by prebiotics supplementation during pregnancy: A future strategy for allergy prevention (presentation will only be available during the three Congress days)

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Background
Allergies are multifactorial diseases related to the dysfunction of the microbiota, epithelial barriers and the immune system leading to a failure in the establishment of immune tolerance. Pregnancy represents an optimal window of intervention in the regulation of the allergic process by modulating the immune and microbial systems of the fetus. Prebiotics can modulate the immune system, the microbiota and the intestinal barrier. A preclinical study carried out in our laboratory shows that prebiotics supplementation during pregnancy and lactation reduces the development of food allergy in offspring. The aim of this study was to understand the immunological processes of prebiotics administered during pregnancy on fetal and maternal tissues to highlight the potential establishment of a tolerogenic environment.

Method
Pregnant Balb/c mice received a standard diet or a diet enriched with prebiotics (GOS/inulin). After 18 days of gestation, the frequency of the different lymphoid and myeloid cell populations was determined in the different gestational (decidua, placenta, uterus), maternal (spleen) and fetal (intestine, blood) tissues. The effect of prebiotics on the frequency of hematopoietic stem cells from mother and fetus femur was also determined.

Results
Supplementation with prebiotics during gestation increases the frequency of $CD19^{+}CD9^{+}$ and $CD19^{+}CD25^{+}$ regulatory B lymphocytes in the placenta compared to mice on a standard diet (26.8%±4 and 12.8%±4 vs 13.3%±1.6 and 2.7%±0.6 respectively, $p<0.005$). These B cells are functional, characterized by their ability to secrete IL-10. They are also found in the fetus, in the intestine for $CD19^{+}CD25^{+}$ B cells (8.6%±1.7 vs 1.4%±0.2 in prebiotic diet vs control respectively, $p<0.005$) and in the bone marrow for $CD19^{+}CD9^{+}$ B cells (63%±5 vs 20%±5 in prebiotic diet vs control respectively, $p<0.001$). The rate of $CD4^{+}CD25^{hi}FoxP3^{+}$ regulatory T cells is also increased in the placenta of mice supplemented with prebiotics compared to control mice (2.2%±0.3 vs 0.8%±0.1 respectively, $p<0.001$). Prebiotics have no effect on the frequency of dendritic cells nor on the homeostasis of hematopoietic stem cells.

Conclusion
In conclusion, prebiotic supplementation during pregnancy leads to the establishment of a tolerogenic environment which could protect the fetus against future allergies.