**ARABINOXYLANS AND METABOLIC HOMEOSTASIS: EFFECT ON PREBIOTIC PROPERTIES, GLYCEMIC CONTROL, WEIGHT MANAGEMENT AND IMMUNE MODULATION**

Sam Possemiers[a], Pieter Van den Abbeele[a], Audrey Neyrinck[b], Patrice Cani[b], Nathalie Delzenne[b] and Willy Verstraete[a]. [a] Laboratory of Microbial Ecology and Technology (LabMET), Ghent University, B-9000 Ghent, Belgium; [b] Unit PMNT, Université Catholique de Louvain, B-1200 Brussels, Belgium
Contact: sam.possemiers@ugent.be, +32 9 264 59 78

INTROUCTION AND AIMS: Arabinoxylan (AX), is a dietary fiber constituent from cereals, consisting of β-(1,4)-linked D-xylopyranosyl residues with α-L-arabinofuranose side chains and potential substitution with ferulic acid. Indications of potent health effects of AX with different structure and chain length have been reported in several studies. In this work, we describe the potential health benefits of a concentrate of long-chain water-extractable AX, which were studied using *in vitro*, animal and human intervention studies. Endpoints of the investigation was the complex system of metabolic homeostasis. This was studied by investigating the effect on glucose and insulin control, prebiotic properties in the intestine and at the gut mucosa, effects on weight gain after AX consumption in combination with high fat intake and modulation of the immune system.
MATERIALS AND METHODS: The effect of AX on glycemic control was investigated in a human intervention study, In which either 15g AX or placebo were administered for 6 wks in a cross-over design to prediabetic volunteers. Prebiotic properties were investigated using the dynamic *in vitro* SHIME (Simulator of the Human Intestinal Microbial Ecosystem) and in gnotobiotic rats, with inulin acting as control. In addition to luminal effects, prebiotic effects on the mucus-associated microbiota were investigated using a new *in vitro* adhesion model and gut fragments from the rat study. To test the effect of AX on weight management and immune modulation, mice were either fed a control, high fat or high fat + AX diet for 4 wks.
RESULTS AND DISCUSSION: With regard to effects on glycemic control, a glucose challenge after the interventions showed significant improvement of the glucose and insulin response and a lowering of fasted blood triglyceride concentrations. Whereas inulin increased butyrate production both *in vitro* and in the rat intestine, AX significantly increased the production of propionate, known to beneficially regulate cholesterol and fatty acid synthesis in the liver. Molecular analysis of the lumen microbiota showed that both carbohydrates support growth of bifidobacteria, yet different species were selectively enhanced. Overall selective effects towards positive commensalistic bacteria were summarized by calculating a Prebiotic Index (PI) for the luminal and an Adhesion Related Prebiotic Index (AR-PI) for the mucosal community. This confirmed that both products exert prebiotic properties at both the gut lumen and gut mucosa, in which a much more potent activity was observed for AX compared to inulin in the SHIME study. In the mice study, high fat administration induced a significantly increased fasted glycemia, plasma total cholesterol and more than doubled the animals' body weight gain. In case of AX co-administration, significantly lower total cholesterol, adiposity and body weight gain were observed, although kcal consumption was unaffected. In addition, AX administration led to a significantly lower inflammatory tone. With respect to the microbial community, AX co-administration neutralized the negative effects of high fat intake and increased bacterial fermentation.
These data indicate that the AX concentrate has a unique biological activity by affecting multiple targets related to metabolic homeostasis, both in the gut and in the rest of the body, which may lead to promising applications related to diabetes, weight management and immune health.