

IMPACT OF GUT MICROBIOTA MODULATION ON THE EXPRESSION OF GPR41 AND GPR43, TWO G-PROTEIN COUPLED RECEPTORS THAT BIND SHORT CHAIN FATTY ACIDS

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Introduction and objectives: GPR41 and GPR43 are two G-protein coupled receptors that bind short chain fatty acids produced upon microbial fermentation of carbohydrates. GPR43 is mostly expressed in adipocytes and immune cells. GPR41 is highly expressed in intestinal enteroendocrine cells but its expression in the white adipose tissue remains controversial. Both receptors seem to be implicated in microbiota dependent regulation of adiposity. In this study, we have compared the impact of high-fat diet and prebiotic treatment on the expression of both receptors in intestinal and adipose tissues of mice.

Materials and methods: Male C57bl6/J mice were fed a standard diet or a high-fat diet without or with prebiotics (0.2g inulin-type fructans/day*mouse) during 4 weeks. Fat tissues and colon were removed and frozen to study the expression of target genes by RT-PCR. A Denaturing Gradient Gel Electrophoresis was performed on ceecal content to study the composition of gut microbiota.

Results and discussion: In high-fat fed mice, prebiotics increase the number of bifidobacteria and this correlates with a reduction of diet-induced adiposity. Prebiotics also counteract the over-expression of both GPR41 and GPR43 in the adipose tissue. In vitro (adipose tissue explants) and in vivo (acute or chronic treatment with LPS in mice) studies suggest that lipopolysaccharides (LPS) -which are increased upon obesity- might participate to the regulation of the expression of GPR41 but not GPR43. In the colon of high-fat fed mice, GPR43 expression is not modified by dietary treatments whereas prebiotics counteract the high-fat diet induced over-expression of GPR41. In conclusion, GPR41 and GPR43 expression is differentially regulated, but both are host targets potentially involved in the prebiotic-related control of adiposity.