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GUT MICROBIOTA

Firmicutes and Bacteroidetes involved in insulin resistance by mediating levels of glucagon-like peptide 1

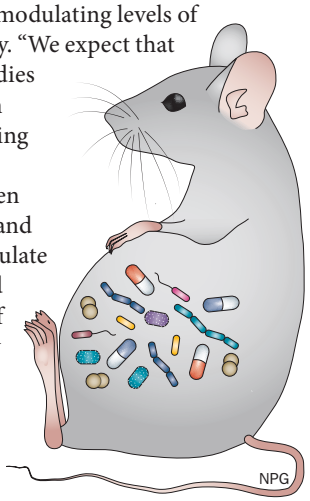
Reducing levels of bacteria from the Firmicutes and Bacteroidetes phyla improves insulin sensitivity in mice with diet-induced obesity, according to new research. Furthermore, the investigators demonstrated that levels of glucagon-like peptide 1 (GLP-1) increased with the decreased abundance of Firmicutes and Bacteroidetes, which could be the cause of the change in insulin resistance.

The team fed 8-week-old mice a normal chow diet for 4 weeks, followed by a high-fat diet for a further 4 weeks. To deplete the gut microbiota, another group of mice were given drinking water that contained vancomycin hydrocholoride and bacitracin zinc salt for 4 weeks before they were switched from a normal diet to a high-fat diet; these mice continued to receive the antibiotics while on the high-fat diet.

Pyrosequencing of the microbial 16S ribosomal RNA gene sequence revealed that the abundance of Firmicutes and Bacteroidetes was greatly reduced in the mice that were given antibiotics. This change in the composition of the gut microbiota was associated with improvements in glucose intolerance, hyperinsulinaemia and insulin resistance. "Intriguingly, removal of Firmicutes and Bacteroidetes increases GLP-1 secretion in parallel with alterations in levels of beneficial gut metabolites, which appear to mediate the improvement of insulin sensitivity," says corresponding author Jae Bum Kim (Seoul National University, South Korea).

The team note that some controversy surrounds the roles of Firmicutes and Bacteroidetes in the development of obesity and its comorbidities, with many investigators finding that the abundance of these phyla is not associated with obesity. However, they suggest that their results support the importance of these microbiota components in modulating the host response during obesity.

Kim and his colleagues are now planning to identify which bacteria are responsible for modulating levels of GLP-1 in obesity. "We expect that these future studies would underpin our understanding of the complex interplay between gut microbiota and the host to modulate obesity-induced dysregulation of systemic energy homeostasis in the host," comments Kim.



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Original article Hwang, I. *et al.* Alteration of gut microbiota by vancomycin and bacitracin improves insulin resistance via glucagon-like peptide 1 in diet-induced obesity. *FASEB J.* doi:10.1096/fj.14-265983