

Transplanting human gut bugs into mice helps understanding of metabolic system

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Bugs found in the guts of humans, which play an important part in people's metabolic makeup, have been transplanted into mice to further understanding of the human and animal metabolic system, reveals a new study in the journal *Molecular Systems Biology*.

Bugs in the gut are known as gut microbes and they live symbiotically in human and animal bodies. The new study involved understanding the major role that gut microbes have in determining how the body absorbs fat and digests fibre, and their effects on metabolic pathways in the body.

The researchers, from Imperial College London and Nestlé Research Center, Lausanne, Switzerland, found that microbes affect the way fats are absorbed and metabolised, by affecting bile acids. Bile acids are made by the liver to allow emulsification of fats in the upper gut. The researchers found that gut microbes can change how effective this emulsification process is because they metabolise bile acids.

The bile acids are also hormonal regulators which change the way fat is processed in the liver, so changes made by gut microbes to bile acid metabolism can affect this internal process.

The scientists also explored how microbes break down fibre in the lower gut. Certain microbes allow dietary fibre to be digested and the more effective these microbes are, the more calories are absorbed from the diet.

Different people have different types of gut microbes living inside them and abnormalities in some types have recently been linked to diseases such as diabetes and obesity. The scientists believe that transplanting the bugs found in humans into mice will enable better understanding of gut microbes' effects, good and bad, and help them to develop better treatments (including probiotics and functional foods) for a wide range of conditions.

Professor Jeremy Nicholson, one of the lead authors of the paper from the Department of Biomolecular Medicine at Imperial College London, said: "Humans carry around 1.5kg of bacteria inside of us – that's the same sort of weight as your liver, so they have a big metabolic effect on our bodies. By transplanting human gut microbes into mice scientists from Nestlé Research Center, Lausanne were able to make them partially human from a metabolic point of view, because we made their biochemistry more like ours. This makes studies on mice much more relevant to human problems.

"We found that the humanised mice had very different metabolic profiles to normal mice with respect to the metabolism of fats and in future we might be able to modify their metabolism using probiotics, like those found in some natural yoghurts. This gives us a new way of studying the beneficial effects of probiotics and functional foods and understanding what they do to our 'friendly' bacteria. Our new approach allows us to explore which bugs are doing what in metabolic terms, to identify which bugs which might be causing chronic health problems, and investigate what effects different foods and probiotics can have on improving overall health," he added.

Source: Imperial College London

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