

# Gut bacteria affect our metabolism

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Credit: Technical University of Denmark (DTU)

Mice that receive gut bacteria transplants from overweight humans are known to gain more weight than mice transplanted with gut bacteria from normal weight subjects, even when the mice are fed the same diet. A study from the National Food Institute confirms this finding while seeking new perspectives on the reasons behind this link.

The [human gut microbiota](#) has repeatedly been linked to obesity.

In a new study, researchers from the National Food Institute transferred

bacterial communities from 32 children and adolescents – half of which were overweight and half within the normal weight range – into specially bred [mice](#) with no bacteria in their intestines. The researchers subsequently examined differences in weight gain and metabolism among the mice and compared these findings with the corresponding differences between the children, who had originally 'donated' the bacteria.

## **Same diet, different weight gain**

"The study, in which we have used [gut bacteria](#) from children, confirms results from previous studies among adults, which have shown that mice colonized with gut bacteria from overweight people gain more weight than mice whose intestines are colonized by bacteria from people within the [normal weight](#) range – even though they eat the same diet," Professor Tine Rask Licht from the National Food Institute explains.

The new study is based on a larger number of humans than previous similar studies. As such it is possible to compare each mouse with their 'bacteria donor' and to examine other differences between the donors which are potentially transferred to the mice. Additionally, the researchers have investigated how the spread of bacteria between individual mice affects their digestion/metabolism.

The study design is different than previous studies within this field and as such the researchers are able to obtain new observations related to the effect of gut microbes on host metabolism.

## **Bacterial composition affects metabolism**

The National Food Institute study has measured a larger amount of unspent energy in faeces from mice with the smallest weight gain.

"The bacterial community in the intestine of mice with the smallest [weight gain](#) has been less capable of converting dietary fibre in the feed, which partly explains the difference in weight between the animals," Tine Rask Licht says.

The study also shows that the gut bacterial composition affects a number of other measurements, which have to do with the ability of the mice to convert carbohydrates and fats, and which affect the development of diseases such as type 2 diabetes (e.g. levels of insulin and tryglycerides). However, it cannot be concluded that bacterial communities from the overweight children affects the mice in a specific direction e.g. in relation to the risk of developing type 2 diabetes.

Meanwhile, the study shows that the spread of bacteria from mouse to mouse, which occurs e.g. through the keeper's handling, is enough to affect the measurements – and this is a completely new observation.

When interpreting studies such as this one it is important to keep in mind that not all gut bacteria from humans are able to establish themselves in the mouse intestine.

"The larger number of human 'bacteria donors' in our study has given us a unique opportunity to follow which of the human-derived bacteria that generally colonize the mouse gut, and which don't. This provides important insights for future research," Tine Rask Licht explains.

**More information:** Li Zhang et al. Environmental spread of microbes impacts the development of metabolic phenotypes in mice transplanted with microbial communities from humans, *The ISME Journal* (2016). [DOI: 10.1038/ismej.2016.151](https://doi.org/10.1038/ismej.2016.151)

Provided by Technical University of Denmark

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