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Gut bacteria can control organ functions

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Bacteria in the human gut may not just be helping digest food but also could be exerting some level of control over the metabolic functions of other organs, like the liver, according to research published this week in the online journal *mBio*. These findings offer new understanding of the symbiotic relationship between humans and their gut microbes and how changes to the microbiota can impact overall health.

"The gut microbiota enhances the host's metabolic capacity for processing nutrients and drugs and modulates the activities of multiple pathways in a variety of organ systems," says Sandrine Claus of the Imperial College of London, a researcher on the study.

Claus and her colleagues exposed germ-free mice to bedding that had previously been used by conventional mice with normal microbiota and followed their metabolic profiles for 20 days to observe changes as they became colonized with gut bacteria.

Over the first 5 days after exposure, the mice exhibited a rapid increase in weight (4%). Colonization also triggered a number of processes in the liver in which sugars (glucose) are converted to starch (glycogen) and fat (triglycerides) for short-term and long-term energy storage. Statistical modeling between liver metabolic functions and microbial populations determined that the levels of glucose, glycogen and triglycerides in the liver were strongly associated with a single family of bacteria called Coriobacteriaceae.

"Here we describe the first evidence of an in vivo association between a

family of bacteria and hepatic lipid metabolism. These results provide new insights into the fundamental mechanisms that regulate host-gut microbiota interactions and are of wide interest to microbiological, nutrition, metabolic, systems biology and pharmaceutical research communities," says Claus.

Another important finding in the paper, according to Claus, is that gut colonization strongly stimulated the expression and activity of the cytochrome P450 3A11, an essential enzyme in drug-detoxification pathways.

Although she warns about being careful to extrapolate the specific findings from mice to humans, Claus notes the results of this research will provide a basis to further develop new strategies to beneficially modulate host metabolism by altering microbial communities in the gut.

More information: mbio.asm.org/

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