Medical Xpress

Sleep loss tied to changes of the gut microbiota in humans

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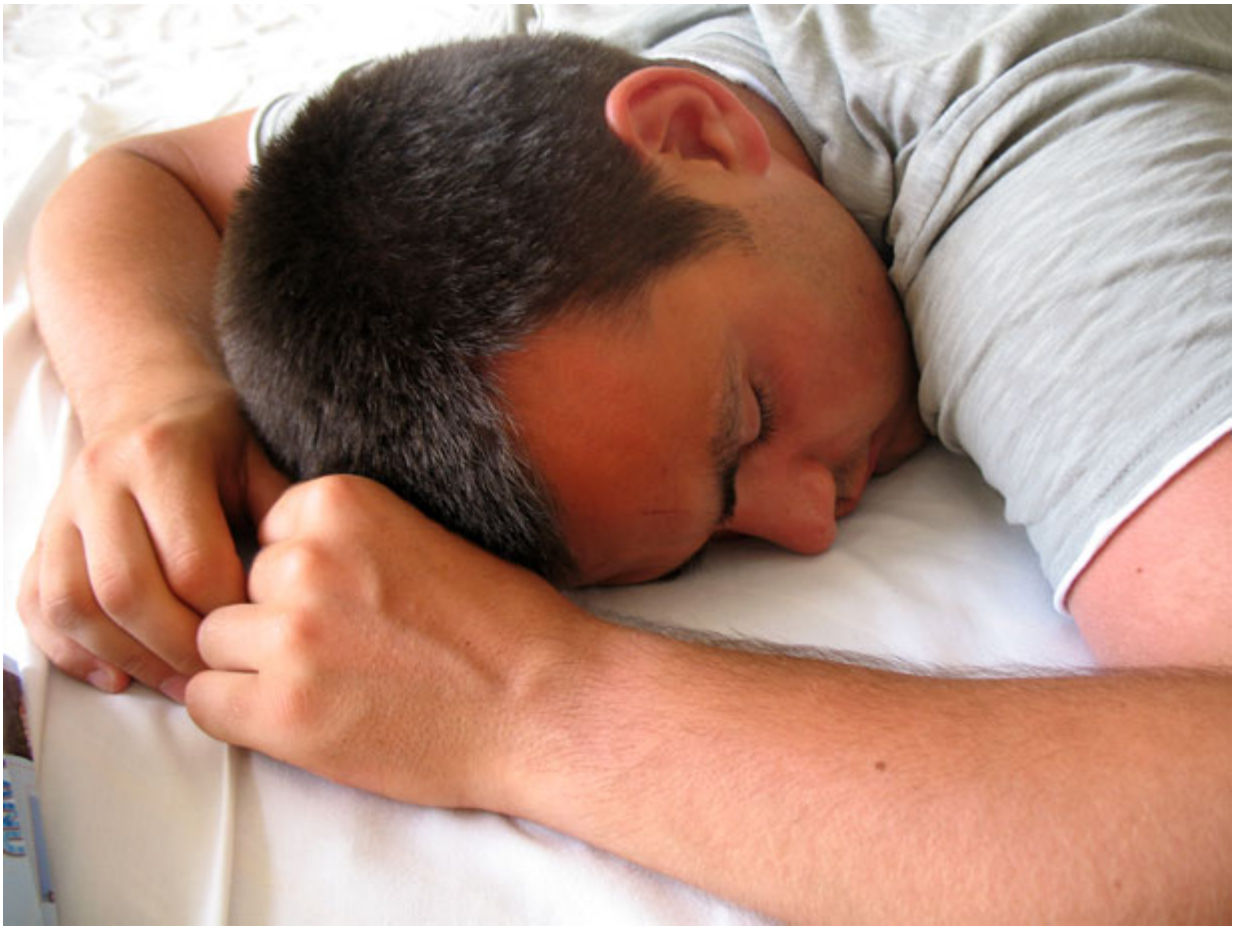

Credit: Vera Kratochvil/public domain

Results from a new clinical study conducted at Uppsala University

suggest that curtailing sleep alters the abundance of bacterial gut species that have previously been linked to compromised human metabolic health. The new article is published in the journal Molecular Metabolism.

Changes in the composition and diversity of the gut microbiota have been associated with diseases such as obesity and type-2 diabetes in humans. These diseases have also been linked with chronic sleep loss. However, it is not known whether sleep loss alters the gut microbiota in humans. With this in mind, Christian Benedict, associate professor of neuroscience, and Jonathan Cedernaes, M.D., Ph.D, both from Uppsala University, collaborated with researchers from the German Institute of Human Nutrition Potsdam-Rehbruecke. In their study, the researchers sought to investigate in nine healthy normal-weight male participants whether restricting sleep to about four hours per night for two consecutive days as compared with conditions of normal sleep (about 8 hours of sleep opportunity) may alter the gut microbiota in humans.

"Overall we did not find evidence that suggests that the diversity of the gut microbiota was altered by sleep restriction. This was somewhat expected given the short-term nature of the intervention and the relatively small sample size. In more specific analyses of groups of bacteria, we did however observe microbiota changes that parallel some of the microbiota changes observed when for instance obese subjects have been compared with normal-weight subjects in other studies, such as an increased ratio of Firmicutes to Bacteroidetes. Longer and larger clinical sleep interventions will be needed to investigate to what extent alterations of the gut microbiota may mediate negative health consequences attributed to sleep loss, such as weight gain and insulin resistance," says senior author Jonathan Cedernaes.

"We also found that participants were over 20 percent less sensitive to the effects of the hormone insulin following sleep loss. Insulin is a

pancreatic hormone needed to bring down blood glucose levels. This decreased insulin sensitivity was however unrelated to alterations in gut microbiota following sleep loss. This suggests that changes in microbiota may not, at least in the short-term, represent a central mechanism through which one or several nights of curtailed sleep reduce insulin sensitivity in humans," says first author Christian Benedict.

"The gut microbiota is very rich and its functional role far from completely characterized. Future studies will hopefully be able to ascertain how the composition and functional role of the gut microbiota is able to modulate at the individual level how sensitive we humans are to negative metabolic, but also cognitive, effects of sleep loss," concludes senior author Jonathan Cedernaes.

More information: Christian Benedict et al. Gut Microbiota and Glucometabolic Alterations in Response to Recurrent Partial Sleep Deprivation in Normal-weight Young Individuals, *Molecular Metabolism* (2016). DOI: 10.1016/j.molmet.2016.10.003

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