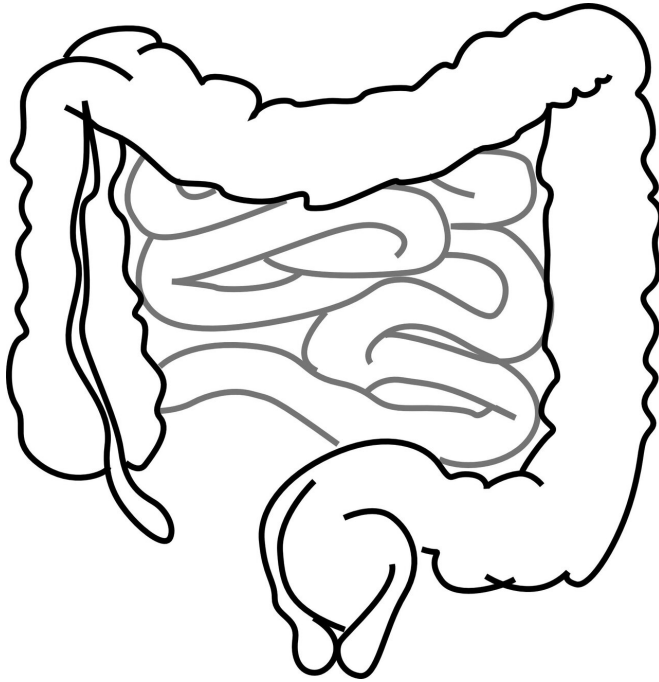


# Study finds gut microbiome plays important role in sleep regulation

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Obstructive sleep apnea (OSA) is a chronic sleep condition affecting more than one billion people worldwide. Evidence suggests OSA can alter the gut microbiome (GM) and may promote OSA-associated co-morbidities, including diabetes, hypertension and cognitive problems. Researchers from the University of Missouri School of Medicine and MU Health Care have discovered how OSA-related sleep disturbances affect the gut microbiome in mice and how transplanting those gut bacteria into other mice can cause changes to sleep patterns in the recipient mice.

David Gozal, MD, the Marie M. and Harry L. Smith Endowed Chair of Child Health at the MU School of Medicine, said the study shows the gut [microbiome](#) plays a major role in sleep regulation. This ultimately could translate into treatments that

target the gut microbiome in humans with OSA.

"By manipulating the gut microbiome, or the byproducts of the gut microbiota, we would be in a position to prevent or at least palliate some of the consequences of sleep apnea," said Gozal, the lead author of the study. "For example, if we combine [continuous positive airway pressure](#) (CPAP) with customized probiotics that change the patient's gut microbiome, we might be able to eliminate some of the tiredness and fatigue and reduce the likelihood of the comorbidities associated with OSA that affect cognition, memory, cardiovascular disease or metabolic dysfunction. If we can do any one of those things, then this is a major movement forward in the way we treat OSA."

The study exposed male [mice](#) to either room air or [intermittent hypoxia](#)—a condition in which the body doesn't get enough oxygen—designed to mimic OSA. After six weeks, researchers collected fecal material from all of the rodents. A third group of mice was divided up and given either a [fecal transplant](#) from the mice breathing room air or those exposed to intermittent hypoxia. The transplanted mice underwent sleep recordings for three consecutive days. Researchers found the mice who received transplants from the intermittent hypoxia group slept longer and slept more often during their normal period of wakefulness, suggesting increased sleepiness.

"This is the first study that evaluated sleep in naïve mice subjected to a fecal microbiome transplant from mice exposed to intermittent hypoxia," Gozal said. "The fecal microbiome analysis showed profile differences between the mice transplanted from intermittent hypoxia donor mice versus those exposed to room air, indicating that the transplant altered the GM of the recipient mice."

Emerging evidence suggests the GM can influence health and sleep quality through the brain-gut microbiome axis (BGMA). The next step is to study

the mechanism involved in the relationship between the brain and the gut to determine how changes in the [gut microbiome](#) can affect sleep structure and, in turn, how OSA can contribute to co-morbidities.

**More information:** Mohammad Badran et al, Fecal microbiota transplantation from mice exposed to chronic intermittent hypoxia elicits sleep disturbances in naïve mice, *Experimental Neurology* (2020). [DOI: 10.1016/j.expneurol.2020.113439](#)

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