

# Obesity's link to lack of sleep is gut-wrenching problem, study shows

Intestinal bacteria helps keep fat at bay – but late-night hours at the office is seen to prevent them from doing their job

BY DAVID SHAMAH | January 14, 2016, 4:23 pm |

**L**ack of sleep, any fitness guru will tell you, is a factor in weight gain. Magazines, websites, and diet plans all emphasize the importance of getting at least seven hours of sleep. The clear message: If you don't get a proper night's sleep, you won't be able to keep excess weight off.

What is the connection between sleep and weight loss? [Theories abound](#). A popular one states that there is a connection between calories consumed and brain activity; when people get less than six hours of sleep, a study showed, they end up eating as much as 600 calories worth of junk food, cakes and cookies, and other stomach-expanding goodies.

But new research from the Weizmann Institute shows that the path to weight loss runs not through the mind – but through the gut.

[In a study](#) in the journal *Cell*, Weizmann Institute scientists detailed for the first time how human biological clocks work in tandem with intestinal gut bacteria – the bugs residing in our intestines that help perform numerous bodily functions, including controlling blood sugar levels, essential to maintaining proper weight. The more the schedules of the gut bacteria were interrupted by late-night wakefulness, the study showed, the more likely weight gain.

The study was led by Dr. Eran Elinav of the Weizmann Institute's Immunology Department. [Elinav has been involved](#) in numerous research projects on gut bacteria – the trillions of bacteria that reside in various parts of the body, including the mouth, skin, intestines, etc. Recent research has shown that these organisms – which are far more complex than previously suspected, many of them containing millions of genes – play a very important role in many of the body's functions.

The intestinal bacteria (microbiota) have a major impact on digesting foods that the intestine finds hard to process, producing vitamins, fighting infections, and [preventing autoimmune disease](#). Indeed, said Elinav, “our inner microbial rhythm represents a new therapeutic target” that requires

much more exploration.

And apparently those bacteria can be affected by sleep, according to the study conducted by Elinav along with David Zeevi from the lab of Prof. Eran Segal of the Computer Science and Applied Mathematics Department, along with Christoph Thaiss and Maayan Levy of Elinav's lab. The study's findings show that mice and humans with disrupted daily wake-sleep patterns exhibit changes in the composition and function of their gut bacteria, thereby increasing their risk for obesity and glucose intolerance as gut bacteria associated with blood sugar maintenance levels went "on strike" when the patterns were interrupted.

Studies of gut bacteria conducted by Elinav and his team had previously highlighted a regular day-night cycle in both the composition and the function of certain populations of gut bacteria in mice. Despite living in the total darkness of the digestive system, the gut microbes were coordinate their activity to the mice's feeding cycles.

Exploring further, the team arranged to scramble some of the subjects' schedules by keeping them awake with lights and stimulation, making them essentially "jet-lagged." Almost immediately, the mice stopped eating at regular times – interrupting not only their eating schedule, but their gut bacteria's activity schedule as well. Without that activity, they began gaining weight.

And to verify their theory that it was the affected bacteria that was responsible for the weight gain, researchers transferred bacteria from the jet-lagged mice into mice with normal schedules. Those mice, too, [gained weight and developed high blood sugar levels](#).

Do jet-lagged humans face the same gut-wrenching dilemma? To find out, the researchers collected bacterial samples from two people flying from the US to Israel – once before the flight, once a day after landing when jet lag was at its peak, and once two weeks later when the jet lag had worn off. The researchers then implanted these bacteria into sterile mice. Those who received the "fresh" jet-lag samples gained weight, while the second group did not.

While jet lag is generally only an occasional problem, insomnia, late hours at work, and a lack of sleep affect almost everyone today. Surveys show that as many as 75% of Americans don't get enough sleep – with 40% reporting that they have a "restful" sleep (undisturbed by TV, etc.) for just four hours a night – far from the seven hours most sleep experts say people need.

While more research is needed, it's clear that there is a deep connection between proper sleep, gut bacteria, and weight gain, said the researchers. Further research, said Elinav, is needed to analyze that connection further, with the goal of "normalizing the microbiota in people whose lifestyle involves frequent alterations in sleep patterns, hopefully to reduce or even prevent their risk of developing obesity and its complications."