

Too Little Sleep Plays Havoc with Fat Cells

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Here's another reason to get a good night's sleep: Too little shut-eye plays havoc with your fat cells, which could lead to weight gain and type 2 diabetes, researchers reported Monday.

Scientists have known for years that sleep deprivation makes you tired and cranky and less able to think clearly. **It also can make you fat because it increases levels of a hunger hormone and decreases levels of a fullness hormone, which could lead to overeating and weight gain.**



The latest study indicates that not getting enough sleep reduces your fat cells' ability to respond properly to the hormone insulin, which is crucial for regulating energy storage and use. Over time the disruption could lead to weight gain, type 2 diabetes and other health problems, the researchers say.

"Our fat cells need sleep to function properly," says Matthew Brady, one of the study's authors and vice chair of the committee on Molecular Metabolism and Nutrition at the University of Chicago. "If you're sleep deprived, your brain may feel groggy, and it turns out that your fat cells also need sleep or they are metabolically groggy."

The study is the first to examine the effects of sleep deprivation on fat cells in humans, he says.

Brady and colleagues had seven healthy, lean young adults live in a sleep laboratory for four days on two separate occasions, spaced four weeks apart. Participants were fed identical meals for the eight days, and they had no access to snacks.

For one part of the study, the participants spent 8½ hours in bed on four consecutive nights. They slept an average of 7.87 hours a night. For the other part, they spent 4½ hours in bed for four consecutive nights, sleeping an average of 4.35 hours. At the end of the four days, they were sleep-deprived by an average of 14 hours.

After the fourth night under each experimental condition, researchers measured participants' overall response to insulin, and they collected abdominal fat tissue from the participants to measure how the fat cells reacted to insulin after sleep deprivation. "We looked at insulin on the cellular level," Brady says.

The findings reported in Tuesday's issue of the *Annals of Internal Medicine* showed that after four nights of sleep deprivation, the body's overall ability to respond to insulin properly decreased by an average of 16%, which is the first step toward developing type 2 diabetes, Brady says.

Also, after too little sleep, the fat cells' ability to use insulin properly, called insulin sensitivity, dropped by 30%. When fat cells don't respond to insulin properly, lipids (fats) circulate in the blood, which can lead to other health problems, including type 2 diabetes, Brady says.

People think of fat as a bad guy, but some fat "is your friend," Brady says. "When fat cells are functioning properly, they safely store fat away for future use such as when you are sleeping or exercising. Fat cells remove fatty acids and lipids from circulating in the body and damaging other tissues. But when your fat cells stop responding to insulin properly, then lipids leave the fat cells and leach out into your blood."

That allows lipids to accumulate in other tissues, such as the liver, he says.

Insulin also plays an important role in the release of the hormone leptin, which is involved in making people feel full.

"Insulin promotes release of leptin, so if your fat cells are less insulin-sensitive, you will make less leptin, which is associated with an increase in food consumption and weight gain," Brady says.

Leptin is released by the fat cells and tells the brain about the energy balance of the body, says Eve Van Cauter, another author of the study and co-director of the Sleep, Metabolism and Health Center at the University of Chicago. Low leptin levels tell your body it's starving and increase your appetite, she says.

Van Cauter says these new findings "are fascinating because they tell us that sleep is important not only for brain cells as we have known for a long time but for all cells of the body, including fat cells and probably muscle cells, liver cells and others."

David Neubauer, associate director of the Johns Hopkins Sleep Disorders Center, who wasn't involved in this study, says the research "is an important step in our understanding of the relationship of sleep and physiological functioning, particularly regarding the increased risk for type 2 diabetes and obesity in people who have inadequate sleep — whether due to chronic sleep deprivation or perhaps from sleep disorders, such as sleep apnea.

"This study reinforces the importance of good sleep generally in promoting health," he says.

The kind of sleep deprivation experienced by the participants in the study happens in the "real world" when people are cramming for finals, have a newborn in the house or have a lot of extra work for their job, Brady says. "A lot of people have had stretches where they have only been able to get three or four hours of sleep a night."

"Even for these healthy students, going just four nights without enough sleep impacted their fat cells' response to insulin," he says.

Brady recommends aiming for eight hours of sleep a night. "It's very important for not only your brain but likely the rest of your body."

How much sleep is enough?

Sleep needs vary, but in general most young adults need seven to nine hours a night, says Van Cauter. There are some people who can do with less, and others who need more. With aging, sleep need decreases to about seven to eight hours a night, she says.

Yet, many people don't know exactly how much sleep they need.

Van Cauter recommends trying to get a handle on your sleep needs by doing this: The next time you're on vacation, go to bed at your usual time, but do not use an alarm clock



to wake up. The first couple of days, you may sleep more than usual. That way you will pay your sleep debt, she says.

Then, when your sleep has stabilized, record how much you sleep, plus or minus 15 minutes, she says. That is your sleep need or capacity

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