

Sleep loss may equal weight gain  
By Nanci Hellmich, USA TODAY  
Too little sleep can make you fat.

Snooze and learn: Researcher Eve Van Cauter shows a sleep-study room at the University of Chicago.  
By John Zich, USA TODAY

That's the conclusion of some groundbreaking research, including two new studies released Monday.

Scientists have found that sleep deprivation increases levels of a hunger hormone and decreases levels of a hormone that makes you feel full. The effects may lead to overeating and weight gain.

It could explain why so many Americans who are chronically sleep-deprived also are overweight. And it could be part of the reason sleepy college students, new parents and shift workers pack on pounds.

Researchers say getting enough shut-eye might be a critical component of weight control. And nutritionists one day might routinely advise dieters to "sleep it off" as well as to cut calories and increase exercise.

"We know the obesity epidemic is due to overeating — too big portions, too much rich food and too little activity — but why do we crave too much of these rich foods?" says Eve Van Cauter, a University of Chicago sleep researcher who is the lead investigator on one of the new studies. Maybe, she says, it's because "we are sleep-deprived and unable to curb our appetites."

Sleep does indeed appear to be an important piece of the weight-control puzzle, says Stanford University sleep researcher Emmanuel Mignot, who also is releasing new research.

If that's true, it might be part of the solution to the nation's obesity problem. Sixty-five percent of Americans are overweight or obese, which increases their risk of heart disease, type 2 diabetes, cancer and other diseases.

This percentage takes on a special significance when balanced against the fact that an estimated 63% of American adults do not get the recommended eight hours of sleep a night, according to the National Sleep Foundation. In fact, the average adult gets 6.9 hours of sleep on weeknights and 7.5 hours on weekends, for a daily average of seven hours.

Van Cauter has spent 25 years doing research on the hormones that are affected by sleep. She says sleep deprivation activates a small part of the hypothalamus, the region of the brain that also is involved in appetite regulation. She is especially intrigued by, and has done several studies on, two critical hormones involved in regulating food intake: ghrelin and leptin.

How much is enough?

Sleep needs vary, but in general most adults need seven to nine hours a night, experts say. There are some people who can do with less, and others who need more.

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

Sleep researcher Eve Van Cauter, professor of medicine at the University of Chicago, recommends trying to get a handle on your sleep need by doing this:

The next time you're on vacation, sleep as much as you can the first couple of days. That way you can pay off your sleep debt, she says. Then, when your sleep has stabilized, record how

much you sleep, plus or minus 15 minutes.

That is your sleep need or capacity.

They influence eating in different ways. Ghrelin is an appetite-stimulating hormone released mostly by the stomach. When ghrelin levels are up, people feel hungry, Van Cauter says. On the other hand, leptin, considered a satiety or fullness hormone, is released by the fat cells and tells the brain about the current energy balance of the body.

When leptin levels are high, that sends a message to the brain that the body has enough food, and the person feels full, she says. Low levels indicate starvation and increase appetite.

The hormones "have been called the yin and yang of hunger," Van Cauter says. "One is the accelerator for eating (ghrelin), and the other is the brake (leptin)."

Hungry for sleep — and food

Van Cauter, who directs the Research Laboratory on Sleep, Chronobiology and Neuroendocrinology at the University of Chicago School of Medicine, examined the effect of sleep deprivation on these two hormones for her latest study, published in today's *Annals of Internal Medicine*. She had 12 healthy, normal-weight men, average age 22, come into a hospital laboratory to sleep, and eat dinner and breakfast.

On one occasion, they were limited to four hours in bed for each of two consecutive nights. At another time, they were allowed up to 10 hours in bed for two nights. Their blood was drawn at regular intervals, and they were asked about their hunger. Findings:

- Leptin levels were 18% lower and ghrelin levels were 28% higher after they slept four hours.
- The sleep-deprived men who had the biggest hormonal changes also said they felt the most hungry and craved carbohydrate-rich foods, including cakes, candy, ice cream, pasta and bread. Those who had the smallest changes reported being the least hungry.

Matt Tierney, 23, who is studying biology at DePaul University in Chicago, participated in the study. He says that after getting only four hours of sleep for two straight nights, he was so hungry he could have "eaten my pillow." He had no problems with hunger after the longer nights of sleep.

Link found to body mass index

Other research released Monday had similar findings. Scientists at the University of Wisconsin and Stanford University tracked 1,024 people ages 30 to 60. Participants from the Wisconsin Sleep Cohort Study took sleep tests and blood tests every four years and reported their sleep habits.

Findings:

- People who routinely slept five hours a night had a 14.9% higher level of ghrelin and a 15.5% lower level of leptin than those who slept eight hours.
- Those who regularly slept less than 7.7 hours had a slightly higher body mass index (BMI).

"It's amazing how much people's sleep is reflected in the hormones in their blood," says Mignot, a

Howard Hughes Medical Institute investigator at Stanford. His work is reported in today's online issue of the Public Library of Science Medicine.

Several epidemiological studies show the same connection, including one out last month from Columbia University in New York that used government data on 6,115 people to compare sleep patterns and obesity.

Researchers found that people who sleep two to four hours a night are 73% more likely to be obese than those who get seven to nine hours. Those who get five or more hours of sleep a night are 50% more likely to be obese than normal sleepers. Those who sleep six hours are 23% more likely to be obese.

And, the researchers reported, those who get 10 or more hours are 11% less likely to be obese.

In a way, the latest findings seem counterintuitive "because most people think that sleeping too much contributes to making people fat, but we found the opposite is true," Mignot says.

He believes that sleep-deprived people eat more because they're hungrier, they're awake longer and may be tempted by foods everywhere they go. They often consume far more calories than they burn in the extra hours they're awake.

People are usually pretty sedentary in that extra waking time — watching TV, reading, responding to e-mail, Van Cauter says. They may burn an extra 50 calories or so in several hours, but the changes in hormones prompt them to eat far more than 50 calories.

"We believe the changes in appetite regulation are way in excess of the calories needed for the extra hours of wakefulness. We are testing this rigorously in the laboratory now," she says.

Sleep may ease holiday stress

Obesity experts are intrigued by these findings. "We've known that people use food as a pick-me-up when they are tired, but now it appears they are hungrier than we realized, and there is a hormonal basis for their eating," says Thomas Wadden, director of the Weight and Eating Disorders Program at the University of Pennsylvania in Philadelphia.

"The one thing that is clear is that during the holidays people should sleep as much as they can and not get too stressed out. That could prevent some of the holiday weight gain."

Samuel Klein, director of the Center for Human Nutrition at Washington University School of Medicine in St. Louis, says it looks as if "we should tell overweight patients to get more sleep. This is advice that's easier to follow than eat less and exercise more. "

"It means watching a little less TV at night and getting to bed earlier," Klein says. "Who on earth would argue about getting more sleep?"

Getting enough sleep and controlling stress are subtle things that could have an impact on weight, agrees Louis Aronne, president of the North American Association for the Study of Obesity and director of the Comprehensive Weight Control Program at New York Presbyterian Hospital.

Other studies are underway. Van Cauter is looking at how sleep loss affects people on low-calorie diets; how shift workers' sleep habits affect their weight; and how sleep affects the hunger levels of the morbidly obese. She's also investigating sleep deprivation in women and older people.

Mignot says researchers now must do an intervention study in which sleep-deprived people

increase their sleep time to see if it helps them lose weight.

"More and more we're realizing that healthy eating, healthy sleeping and regular exercise are three important things that everyone should do," he says.

Van Cauter believes that some people might be extra-sensitive to sleep deprivation, which "makes it very hard" for them to control their appetites.

"Our body is not wired for sleep deprivation," she says. "The human animal is the only one that does this."