Sleep loss limits fat loss

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Cutting back on sleep reduces the benefits of dieting, according to a study published October 5, 2010, in the *Annals of Internal Medicine*.

When dieters in the study got a full night's sleep, they lost the same amount of weight as when they slept less. When dieters got adequate sleep, however, more than half of the weight they lost was fat. When they cut back on their sleep, only one-fourth of their weight loss came from fat.

They also felt hungrier. When sleep was restricted, dieters produced higher levels of ghrelin, a hormone that triggers hunger and reduces energy expenditure.

"If your goal is to lose fat, skipping sleep is like poking sticks in your bicycle wheels," said study director Plamen Penev, MD, PhD, assistant professor of medicine at the University of Chicago. "Cutting back on sleep, a behavior that is ubiquitous in modern society, appears to compromise efforts to lose fat through dieting. In our study it reduced fat loss by 55 percent."

The study, performed at the University of Chicago's General Clinical Resource Center, followed 10 overweight but healthy volunteers aged 35 to 49 with a body mass index ranging from 25, considered overweight, to 32, considered obese. Participants were placed on an individualized, balanced diet, with calories restricted to 90 percent of what each person needed to maintain his or her weight without exercise.

Each participant was studied twice: once for 14 days in the laboratory with an 8.5-hour period set aside for sleep, and once for 14 days with only 5.5 hours for sleep. They spent their waking hours engaged in home- or office-like work or leisure activities.

During the two-week, 8.5-hours-in-bed phase, volunteers slept an average of 7 hours and 25 minutes each night. In the 5.5-hour phase, they slept 5 hours and 14 minutes, or more than two hours less. The number of calories they consumed, about 1,450 per day, was kept the same.

The volunteers lost an average of 6.6 pounds during each 14-day session. During weeks with adequate sleep, they lost 3.1 pounds of fat and 3.3 pounds of fat-free body mass, mostly protein. During the short-sleep weeks, participants lost an average of 1.3 pounds of fat and 5.3 pounds of fat-free mass.

Getting adequate sleep also helped control the dieters' hunger. Average levels of ghrelin did not change when dieters spent 8.5 hours in bed. When they spent 5.5 hours in bed, their ghrelin levels rose over two weeks from 75 ng/L to 84 ng/L.

Higher ghrelin levels have been shown to "reduce energy expenditure, stimulate hunger and food intake, promote retention of fat, and increase hepatic glucose production to support the availability of fuel to glucose dependent tissues," the authors note. "In our experiment, sleep restriction was accompanied by a similar pattern of increased hunger and … reduced oxidation of fat."

The tightly controlled circumstances of this study may actually have masked some of sleep's benefits for dieters, suggested Penev. Study subjects did not have access to extra calories. This may have helped dieters to "stick with their lower-calorie meal plans despite increased

hunger in the presence of sleep restriction," he said.

The message for people trying to lose weight is clear, Penev said. "For the first time, we have evidence that the amount of sleep makes a big difference on the results of dietary interventions. One should not ignore the way they sleep when going on a diet. Obtaining adequate sleep may enhance the beneficial effects of a diet. Not getting enough sleep could defeat the desired effects."

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