Late-Night Snacks: Worse Than You Think

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(PhysOrg.com) -- Eat less, exercise more. Now there is new evidence to support adding another "must" to the weight-loss mantra: eat at the right time of day.

A Northwestern University study has found that eating at irregular times -- the equivalent of the middle of the night for humans, when the body wants to sleep -- influences weight gain. The regulation of energy by the body's circadian rhythms may play a significant role. The study is the first causal evidence linking meal timing and increased weight gain.

"How or why a person gains weight is very complicated, but it clearly is not just calories in and calories out," said Fred Turek, professor of neurobiology and physiology in the Weinberg College of Arts and Sciences and director of the Center for Sleep and Circadian Biology. "We think some factors are under circadian control. Better timing of meals, which would require a change in behavior, could be a critical element in slowing the ever-increasing incidence of obesity."

The findings could have implications for developing strategies to combat obesity in humans, as the United States and the world battle what has been called an "obesity epidemic." More than 300 million adults worldwide are obese, including more than a third of American adults.

Details of the obesity study, which was led by Turek, will be published online Sept. 3 by the journal *Obesity*.

"One of our research interests is shift workers, who tend to be

overweight," said lead author Deanna M. Arble, a doctoral student in Turek's lab. "Their schedules force them to eat at times that conflict with their natural body rhythms. This was one piece of evidence that got us thinking -- eating at the wrong time of day might be contributing to weight gain. So we started our investigation with this experiment."

Simply modifying the time of feeding alone can greatly affect body weight, the researchers found. Mice that were fed a high-fat diet during normal sleeping hours gained significantly more weight (a 48 percent weight increase over their baseline) than mice eating the same type and amount of food during naturally wakeful hours (a 20 percent increase over their baseline). There was no statistical difference between the two groups regarding caloric intake or the amount of activity.

Over a period of six weeks, both groups of mice were allowed to eat as much high-fat diet as they wanted during their daily 12-hour feeding phase. (Much like many humans, mice have a preference for high-fat food.) Since mice are nocturnal, the 12-hour feeding phase was during the day for those fed during normal sleeping hours and during the night for those fed during naturally wakeful hours. Food was not provided during the other 12 hours of their day.

Our circadian clock, or biological timing system, governs our daily cycles of feeding, activity and sleep, with respect to external dark and light cycles. Recent studies have found the body's internal clock also regulates energy use, suggesting the timing of meals may matter in the balance between caloric intake and expenditure.

The researchers next plan to investigate the molecular mechanisms behind their observation that eating at the "wrong" time can lead to weight gain.

More information: The title of the *Obesity* paper is "Circadian Timing of

Food Intake Contributes to Weight Gain."

Source: Northwestern University (news : web)