All weight gain is not the same: When overeating, calories, not protein, contribute to increase in body fat

January 3 2012

In a study conducted among 25 healthy individuals living in a controlled setting who were randomized to overconsumption of different levels of protein diets, those consuming the low-protein diet had less weight gain compared to those consuming normal and high protein diets, and calories alone, and not protein appeared to contribute to an increase in body fat, according to a study in the January 4 issue of *JAMA*. The researchers also found that protein did contribute to changes in energy expenditure and lean body mass.

"Obesity has become a major public health concern with more than 60 percent of adults in the United States categorized as overweight and more than 30 percent as obese," according to background information in the article. The role of diet composition in response to overeating and energy dissipation is unclear.

George A. Bray, M.D., of the Pennington Biomedical Research Center, Baton Rouge, La., and colleagues conducted a study to determine whether the level of dietary protein differentially affected body composition, weight gain, or energy expenditure under tightly controlled conditions. The randomized controlled trial included 25 U.S. healthy, weight-stable male and female volunteers, ages 18 to 35 years, with a body mass index between 19 and 30. The first participant was admitted to the inpatient metabolic unit in June 2005 and the last in October 2007. After consuming a weight-stabilizing diet for 13 to 25 days, participants

were randomized to receive diets containing 5 percent of energy from protein (low protein), 15 percent (normal protein), or 25 percent (high protein), which they were overfed during the last 8 weeks of their 10- to 12-week stay in the inpatient metabolic unit. Compared with energy intake during the weight stabilization period, the protein diets provided approximately 40 percent more energy intake, which corresponds to 954 calories a day.

All participants in the study gained weight and there were no differences by sex. The rate of weight gain in the low protein diet group was significantly less than in the other 2 groups (6.97 lbs. [3.16 kg] vs. 13.3 lbs [6.05 kg] for the normal protein diet group and 14.4 lbs [6.51 kg] in the high protein diet group).

"Body fat increased similarly in all 3 protein diet groups and represented 50 percent to more than 90 percent of the excess stored calories. Resting energy expenditure, total energy expenditure, and body protein did not increase during overfeeding with the low protein diet," the authors write.

Lean body mass (body protein) decreased during the overeating period by 1.5 lbs. (0.70 kg) in the low protein diet group compared with a gain of 6.3 lbs. (2.87 kg) in the normal protein diet group and 7 lbs. (3.18 kg) in the high protein diet group. Resting energy expenditure (normal protein diet: 160 calories/day; high protein diet: 227 calories/day) increased significantly with the normal and high protein diets.

"In summary, weight gain when eating a low protein diet (5 percent of energy from protein) was blunted compared with weight gain when eating a normal protein diet (15 percent of energy from protein) with the same number of extra calories. Calories alone, however, contributed to the increase in body fat. In contrast, protein contributed to the changes in energy expenditure and lean body mass, but not to the increase in body fat," the researchers write.

"The key finding of this study is that calories are more important than protein while consuming excess amounts of energy with respect to increases in body fat."

In an accompanying editorial, Zhaoping Li, M.D., Ph.D., and David Heber, M.D., Ph.D., of the University of California, Los Angeles, write that the results of this study "informs primary care physicians and policy makers about the benefits of protein in weight management."

"The results suggest that overeating low protein diets may increase fat deposition leading to loss of lean body mass despite lesser increases in body weight. Policy makers and primary care physicians need to understand the role of the Western diet in promoting overweight and obesity. Because this diet increases the risks of overnutrition through fat deposition beyond that detected by body mass index, the method used to assess the current obesity epidemic and the magnitude of the obesity epidemic may have been underestimated. Clinicians should consider assessing a patient's overall fatness rather than simply measuring body weight or body mass index and concentrate on the potential complications of excess fat accumulation. The goals for obesity treatment should involve fat reduction rather than simply weight loss, along with a better understanding of nutrition science."

More information: JAMA. 2012;307[1]:47-55.
JAMA. 2012;307[1]:86-87.