

# Study compares effect of three common diets on energy expenditure following weight loss

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In an examination of the effect on energy expenditure and components of the metabolic syndrome of 3 types of commonly consumed diets following weight loss, decreases in resting energy expenditure and total energy expenditure were greatest with a low-fat diet, intermediate with a low-glycemic index diet, and least with a very low-carbohydrate diet, suggesting that a low-fat diet may increase the risk for weight regain compared to the other diets, according to preliminary research published in the June 27 issue of *JAMA*.

"Many people can lose weight for a few months, but most have difficulty maintaining clinically significant weight loss over the long term. According to data from the [National Health and Nutrition Examination Survey](#) (1999-2006), only 1 in 6 overweight and [obese adults](#) report ever having maintained weight loss of at least 10 percent for 1 year," according to background information in the article. One explanation for the poor long-term outcome is that weight loss elicits biological [adaptations](#)—specifically a decline in energy expenditure and an increase in hunger—that promote weight. According to the authors, the effect of dietary composition on energy expenditure during weight-loss maintenance has not been studied.

Cara B. Ebbeling, Ph.D., of Children's Hospital Boston, and colleagues conducted a study to evaluate the effects of 3 weight-loss maintenance diets on energy expenditure, hormones, and components of the metabolic syndrome. The study, conducted between June 2006 and June 2010, included 21 [overweight](#) and obese young adults. After achieving

10 percent to 15 percent weight loss while consuming a run-in diet, participants consumed an isocaloric low-fat diet (60 percent of energy from carbohydrate, 20 percent from fat, 20 percent from protein; high glycemic load), low-glycemic index diet (40 percent from carbohydrate, 40 percent from fat, and 20 percent from protein; moderate glycemic load), and very low-carbohydrate diet (10 percent from carbohydrate, 60 percent from fat, and 30 percent from protein; low glycemic load) in random order, each for 4 weeks. The primary outcome measured was resting energy expenditure (REE), with secondary outcomes of total energy expenditure (TEE), hormone levels, and metabolic syndrome components.

The researchers found that [energy expenditure](#) during weight-loss maintenance differed significantly among the 3 diets. The decrease in REE from pre-weight-loss levels, measured by indirect calorimetry in the fasting state, was greatest for the low-fat diet (average relative to baseline, -205 kcal/d), intermediate with the low-glycemic index diet (-166 kcal/d), and least for the very low-carbohydrate diet (-138 kcal/d). The decrease in TEE also differed significantly by diet (average -423 kcal/d for low fat; -297 kcal/d for [low glycemic index](#); and -97 kcal/d for very low carbohydrate).

"Hormone levels and [metabolic syndrome](#) components also varied during weight maintenance by [diet](#) (leptin; 24-hour urinary cortisol; indexes of peripheral and hepatic insulin sensitivity; high-density lipoprotein [HDL] cholesterol; non-HDL cholesterol; triglycerides; plasminogen activator inhibitor 1; and C-reactive protein), but no consistent favorable pattern emerged," the authors write.

"The results of our study challenge the notion that a calorie is a calorie from a metabolic perspective," the researchers write. "TEE differed by approximately 300 kcal/d between these 2 diets [very low-carbohydrate vs. low-fat], an effect corresponding with the amount of energy typically

expended in 1 hour of moderate-intensity physical activity."

"These findings suggest that a strategy to reduce glycemic load rather than dietary fat may be advantageous for weight-loss maintenance and cardiovascular disease prevention. Ultimately, successful weight-loss maintenance will require behavioral and environmental interventions to facilitate long-term dietary adherence. But such interventions will be most effective if they promote a dietary pattern that ameliorates the adverse biological changes accompanying [weight loss](#)," the researchers conclude.

**More information:** *JAMA*. 2012;307[24]:2627-2634.

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