

Low-carb diets cause people to burn more calories

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Most people regain the weight they lose from dieting within one or two years, in part because the body adapts by slowing metabolism and burning fewer calories. A meticulous study led by Boston Children's Hospital, in partnership with Framingham State University, now finds that eating fewer carbohydrates increases the number of calories burned. The findings, published November 14 in the *BMJ*, suggest that low-carb

diets can help people maintain weight loss, making obesity treatment more effective.

The study, known as the Framingham State Food Study, or (FS)², tightly controlled what people ate by providing them with fully prepared food-service meals for a 20-week period. Researchers carefully tracked participants' [weight](#) and measured [insulin secretion](#), metabolic hormones and total [energy expenditure](#) (calories burned).

"This is the largest and longest feeding study to test the 'Carbohydrate-Insulin Model,' which provides a new way to think about and treat obesity," says David Ludwig, MD, Ph.D., who is co-principal investigator with Cara Ebbeling, Ph.D. (Ludwig and Ebbeling are co-directors of the New Balance Foundation Obesity Prevention Center in Boston Children's Division of Endocrinology.) "According to this model, the processed carbohydrates that flooded our diets during the low-fat era have raised insulin levels, driving fat cells to store excessive calories. With fewer calories available to the rest of the body, hunger increases and metabolism slows—a recipe for weight gain."

Comparing carb levels head to head

After careful telephone screening of 1,685 potential participants, Ebbeling, Ludwig and colleagues enrolled 234 overweight adults (age 18 to 65, body mass index of 25 or higher) to an initial weight-loss [diet](#) for about 10 weeks. Of these, 164 achieved the goal of losing 10 to 14 percent of body weight and went on to the study's maintenance phase.

These participants were then randomized to follow high-, moderate- or low-carbohydrate diets for an additional 20 weeks—with carbs comprising 60, 40 and 20 percent of total calories, respectively. Carbs provided to all three groups were of high quality, conforming to guidelines for minimizing sugar and using whole rather than highly

processed grains.

In all three groups, total [calorie intake](#) was adjusted to maintain weight loss, so participants' weight did not change notably. During this phase, the goal was to compare energy expenditure—how the different groups burned calories at the same weight. Energy expenditure was measured by a gold-standard method using doubly labeled water.

Over the 20 weeks, total energy expenditure was significantly greater on the low-carbohydrate diet versus the high-carbohydrate diet. At the same average body weight, participants who consumed the low-carb diet burned about 250 kilocalories a day more than those on the high-carb diet.

"If this difference persists—and we saw no drop-off during the 20 weeks of our study—the effect would translate into about a 20-pound weight loss after three years, with no change in calorie intake," says Ebbeling.

In people with the highest insulin secretion at baseline, the difference in calorie expenditure between the low- and high-carb diets was even greater, about 400 kilocalories per day, consistent with what the Carbohydrate-Insulin Model would predict. Ghrelin, a hormone thought to reduce calorie burning, was significantly lower on the low- versus high-carb diet.

"Our observations challenge the belief that all calories are the same to the body," says Ebbeling. "Our study did not measure hunger and satiety, but other studies suggest that low-carb diets also decrease hunger, which could help with [weight loss](#) in the long term."

Ludwig and Ebbeling recently launched another clinical trial called FB4, in which 125 adults with obesity live in a residential center for 13 weeks. Participants are being randomized to one of three diets: very-low-carb,

high carb/low sugar or high carb/high sugar diets, with their calorie intakes individually matched to their energy expenditure. Results are expected in 2021.

More information: *BMJ* (2018). [DOI: 10.1136/bmj.k4583](https://doi.org/10.1136/bmj.k4583) ,
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