

Low-carb diet shown to improve cardiometabolic risk profile

September 28 2021



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Low-carbohydrate diets are popular for weight loss and diabetes control. However, for most of the past 50 years, medical and public health experts have instead embraced low-fat diets, concerned about the health

effects of saturated fats on cardiovascular risk factors like LDL cholesterol. As a result, low-fat and fat-free foods have proliferated—many of them high in processed carbohydrates.

A clinical trial led by Boston Children's Hospital, one of the largest and most rigorous study of its kind, now challenges that thinking. It demonstrates that low-carb diets—even though higher in saturated fat—produce better cardiovascular and metabolic profiles than low-fat, higher-carb diets. The findings were published online September 28 by the *American Journal of Clinical Nutrition*.

"Surprisingly, the [low-carb diet](#) did not adversely affect LDL ("bad") cholesterol, despite having saturated fat levels far in excess of current recommendations," says David Ludwig, MD, Ph.D., who led the study together with first author Cara Ebbeling, Ph.D..

Carbohydrates, insulin resistance, and disease

While high LDL cholesterol is the traditional risk factor for [heart disease](#), a group of other risk factors is increasingly being tied to both heart disease and diabetes: high triglycerides, low HDL ("good") cholesterol, [high blood pressure](#), high blood sugar, chronic inflammation, a tendency toward blood clotting, and fatty liver.

These factors are hallmarks of metabolic syndrome, also known as insulin resistance syndrome because the body's cells lose their sensitivity to signals from insulin to take up sugars from the blood. Mounting evidence implicates increased consumption of carbohydrates, especially highly processed carbs like refined grains and added sugars.

As people switch to low-fat diets, carbohydrates make up more and more of what we eat. This is one reason why metabolic syndrome is rising—while obesity remains an epidemic.

Comparing low-carb and low-fat diets

Ebbeling and Ludwig wanted to test the idea that a low-carb diet would improve people's cardiometabolic risk profiles as compared with a low-fat diet. In partnership with Framingham State University, they enrolled 164 adults with overweight or obesity who had lost 10-14 percent of their body weight on a reduced-calorie diet.

The participants then followed one of three weight-loss maintenance diets for five months, assigned at random:

- Low-carb diet (20 percent carbs, 60 percent fat, 20 percent protein)
- Moderate-carb diet (40 percent carbs, 40 percent fat, 20 percent protein)
- High-carb diet (60 percent carbs, 20 percent fat, 20 percent protein)

All participants received fully prepared, customized meals that they could eat in cafeterias or take to go. This protocol ensured that they stuck to the diets, unlike many other studies that just give people nutritional guidelines.

"We had a commercial food service provide more than 100,000 meals, tailored to each participant's caloric needs," says Ebbeling. "The meals were designed to keep participants at the same weight throughout the five months, so that everything we saw in this study would be independent of weight loss."

In all three diets, 35 percent of the fat consumed was saturated fat. This meant that the low-carb diet had three times the saturated fat of the high-carb diet (21 vs. 7 percent), well above the range of current recommendations.

But of note, the low-carb diet wasn't a ketogenic diet—a restrictive very-low-carb, very high-fat diet in which carbs typically constitute less than 10 percent of calories.

"The less restricted low-carb diet we studied is pragmatic," says Ludwig. "There's still room for whole fruits, all the non-starchy vegetables you want, beans, and small amounts of grains."

The benefits of restricting carbs

As compared with higher-carb, lower-fat diets, the low-carb diet improved the profiles of a range of blood lipids related to cardiovascular disease and insulin resistance. It also increased adiponectin, a hormone made by fat cells that promotes sensitivity to insulin and protects against atherosclerosis (the formation of fatty plaques in the arteries).

"We also found that the low-carb diet reduced lipoprotein(a), an under-appreciated risk factor for atherosclerosis, heart disease, and stroke that previously was not thought to be influenced by diet," says Ludwig.

Specifically, lipoprotein(a) fell by an average of nearly 15 percent with the low-carb diet, versus a 2 percent reduction with the moderate-carb diet and a slight increase of 0.2 percent with the high-carb [diet](#).

In a related, recently published commentary, Ludwig, Ebbeling, and their colleagues specifically implicate refined carbohydrates—not excess calories—as fueling the obesity epidemic. Foods like [white bread](#), white rice, most breakfast cereals, and highly-processed snack foods cause spikes in blood sugar and insulin that slow metabolism, increase hunger, and set the stage for weight gain, the authors write.

What about children?

Although the clinical trial was done in adults, low-carb diets are appropriate for children, says Ludwig. Children coming to the Optimal Wellness for Life (OWL) clinic at Boston Children's may be prescribed diets with reduced proportions of carbohydrates depending on their individual needs. Pediatric cardiologists are also starting to embrace [low-carb](#) diets.

"The roots of heart disease are planted in childhood," Ludwig says. "A moderate change now could lead to a huge benefit when kids reach middle age, and if you establish healthy habits early, they're more likely to stick. We're trying to shift the lifetime trajectory of heart disease risk."

More information: Cara B Ebbeling et al, Effects of a low-carbohydrate diet on insulin-resistant dyslipoproteinemia—a randomized controlled feeding trial, *The American Journal of Clinical Nutrition* (2021). [DOI: 10.1093/ajcn/nqab287](https://doi.org/10.1093/ajcn/nqab287)

Provided by Children's Hospital Boston

Citation: Low-carb diet shown to improve cardiometabolic risk profile (2021, September 28) retrieved 25 April 2024 from <https://medicalxpress.com/news/2021-09-low-carb-diet-shown-cardiometabolic-profile.html>

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