---

This activity is supported by funding from WebMD.

Medscape Medical News

# Reduced Carbohydrate Intake May Lower Cardiovascular Risk CME

**News Author: Laurie Barclay, MD**
**CME Author: Charles Vega, MD, FAAFP**

Complete author affiliations and disclosures, and other CME information, are available at the end of this activity.

**Release Date: November 15, 2005**; **Valid for credit through November 15, 2006**

## Credits Available

**Physicians** - up to 0.25 AMA PRA Category 1 continuing medical education credits for physicians ;
**Family Physicians** - up to 0.25 AAFP Prescribed continuing medical education credits for physicians

All other healthcare professionals completing continuing education credit for this activity will be issued a certificate of participation. Participants should claim only the number of hours actually spent in completing the educational activity.

---

Nov. 15, 2005 — A diet in which carbohydrates are partially substituted with protein and monounsaturated fats can improve blood pressure, lipid levels, and estimated cardiac risk, according to the results of a study reported in the Nov. 16 issue of *JAMA*.

"Reduced intake of saturated fat is widely recommended for prevention of cardiovascular disease [CVD]," write Lawrence J. Appel, MD, MPH, from Johns Hopkins University in Baltimore, Maryland, and colleagues from the OmniHeart Collaborative Research Group. "The type of macronutrient that should replace saturated fat remains uncertain."

This crossover-design feeding study was conducted in Baltimore, Maryland, and Boston, Massachusetts, from April 2003 to June 2005. To compare the effects of three healthful diets, each with reduced saturated fat intake, the investigators randomized 164 adults with prehypertension or stage 1 hypertension to one of three feeding periods, each lasting six weeks. One diet was rich in carbohydrates; the second was rich in protein, about half from plant sources; and the third diet was rich in unsaturated fat, predominantly monounsaturated fat. Body weight was kept constant through isocaloric feeding.

Compared with baseline, blood pressure, low-density lipoprotein cholesterol (LDL-C) levels, and estimated coronary heart disease risk were lower on each diet. However, compared with the carbohydrate diet, the protein diet was associated with further decreases in mean systolic blood pressure of 1.4 mm Hg ($P$ = .002) and of 3.5 mm Hg ($P$ = .006) in patients with hypertension. The protein diet was also associated with further decreases in mean LDL-C of 3.3 mg per dL (0.09 mmol/L; $P$ = .01), high-density lipoprotein cholesterol (HDL-C) level of 1.3 mg per dL (0.03 mmol/L; $P$ = .02), and triglyceride levels of 15.7 mg per dL (0.18 mmol/L; $P$ < .001).

Compared with the carbohydrate diet, the unsaturated fat diet was associated with decreases in systolic blood pressure of 1.3 mm Hg ($P$ = .005) and of 2.9 mm Hg in patients with hypertension ($P$ = .02). Although this diet had no significant effect on LDL-C, it was

associated with increases in HDL-C of 1.1 mg/dL (0.03 mmol/L; *P* = .03) and with decreases in triglyceride levels of 9.6 mg per dL (0.11 mmol/L; *P* = .02).

Compared with the carbohydrate diet, the protein and unsaturated fat diets were associated with lower estimated 10-year coronary heart disease risk. This risk was similar with both the protein and unsaturated fat diets.

"In the setting of a healthful diet, partial substitution of carbohydrate with either protein or monounsaturated fat can further lower blood pressure, improve lipid levels, and reduce estimated cardiovascular risk," the authors write.

Study limitations include brief duration of feeding on each diet, failure to adjust for multiple comparisons, use of CVD risk factors as trial outcomes, and lack of data on the confounding effects of weight loss.

"Results from OmniHeart have important implications," the authors conclude. "The magnitude of effects [has] both public health and clinical importance. The blood pressure reductions and improved lipid profiles should reduce CVD risk in the general population and mitigate the need for drug therapy in persons with risk factor levels above treatment thresholds."

The National Institutes of Health have disclosed that it funded this study. The authors have disclosed no financial relationships. The Almond Board, International Tree Nut Council, Olivio Premium Products, Inc., and The Peanut Institute donated food.

In an accompanying editorial, Myron H. Weinberger, MD, from Indiana University Medical Center in Indianapolis, notes various study limitations, including lack of generalizability. In his opinion, the most surprising finding was the reduction in HDL-C after the high-protein phase.

"Given the potential effect of HDL cholesterol on cardiovascular disease, more information regarding this finding will be needed before such a diet can be routinely recommended," Dr. Weinberger writes. "Long-term outcome trials focusing on cardiovascular events will also be required to convince both clinicians and the public that the reduction in HDL cholesterol levels associated with the high-protein diet is reflected in a decrease in actual events, which is contrary to conventionally held notions about HDL cholesterol."

Dr. Weinberger has disclosed no financial relationships.

*JAMA*. 2005;294:2455-2466; 2497-2498

## Learning Objectives for This Educational Activity

Upon completion of this activity, participants will be able to:

- List outcomes improved by introduction of the Dietary Approaches to Stop Hypertension (DASH) diet.
- Compare the DASH diet vs isocaloric diets that are higher in unsaturated fat and protein.

## Clinical Context

The DASH diet combines a reduced intake of salt with increased consumption of fruits, vegetables, and low-fat dairy products. It has been demonstrated to reduce blood pressure and LDL-C levels. However, this diet has no effect on triglyceride levels and can reduce HDL-C levels. In turn, reduced HDL-C levels can increase the risk for cardiovascular events.

In contrast, diets that are higher in monounsaturated fats and protein can reduce triglyceride levels. Given these multiple effects on cardiovascular risk factors associated with the different diets, the authors of the current study compared them in terms of their effects on individual cardiovascular risk factors as well as overall estimated cardiovascular risk.

## Study Highlights

- Patients eligible for study participation were healthy adults who were at least 30 years old and had a systolic blood pressure between 120 to 159 mm Hg and a diastolic blood pressure between 80 to 99 mm Hg. Patients with diabetes, CVD, or significant elevations of cholesterol levels were excluded from study participation, as were those who weighed more than 159 kg.

- Participants were randomized to 1 of 6 crossover diet sequences involving 3 diets. Each feeding period lasted 6 weeks, and a washout period of 2 to 4 weeks separated the feeding periods. Meals were provided to study participants. Weight was measured and was kept steady in the study cohort by adjusting diets and feeding cookies to participants. Subjects were asked to maintain similar levels of exercise and alcohol intake from baseline through the study period.
- The study diets were isocaloric and included a carbohydrate diet, an unsaturated fat diet, and a protein diet. The carbohydrate diet was similar to the DASH diet. The unsaturated fat diet emphasized monounsaturated fats from olive, canola, and sunflower oils along with a variety of nuts and seeds. The protein diet cut 10% of the carbohydrate from the DASH-like diet and replaced this carbohydrate with protein.
- The main study outcomes were the lipid levels and blood pressure, which were measured during and at the end of the various feeding periods. Subjects were also followed up for their estimated cardiovascular risk, as measured by the Framingham risk equation.
- 164 patients were randomized into the trial. The mean age was 53.6 years, and 45% of subjects were women. 55% of participants were African American, and 40% were non-Hispanic white. The mean body mass index of participants was 30.2 kg per $m^2$.
- Subjects spent an average of 41 days consuming each diet.
- The mean systolic blood pressure decreased from baseline in all treatment groups (-8.2 to -9.5 mm Hg), as did the mean diastolic blood pressure (-4.1 to -5.2 mm Hg). Both the protein and unsaturated fat diets lowered blood pressure to a similar and more significant degree than the carbohydrate diet.
- Lipid levels generally decreased with all diets, with the exception that triglyceride levels were essentially unchanged in the carbohydrate diet group. LDL-C levels were reduced by 11.6 to 14.2 mg per dL, and the protein diet was associated with a greater reduction in LDL-C than the carbohydrate diet. The effect on LDL-C between the carbohydrate diet and unsaturated fat diet was similar.
- The protein diet had the greatest impact in improving levels of total cholesterol, non-HDL-C, and triglycerides. A surprising finding of this study was that the protein diet reduced HDL-C by a mean of 2.6 mg per dL, which was more of an effect on HDL-C than was found in either the unsaturated fat or carbohydrate diet groups.
- The respective reductions in the Framingham cardiovascular risk score for the carbohydrate, unsaturated fat, and protein diet groups were 16.1%, 19.6%, and 21%.
- The pattern of study results was similar in subgroup analyses based on sex and race.
- The protein diet was associated with slightly higher rates of poor appetite and bloating vs the other diets.

## Pearls for Practice

- The DASH diet can improve blood pressure and LDL-C levels, but it has little effect on triglyceride levels and can lower HDL-C levels.
- Replacement of some of the carbohydrates in the DASH diet with either unsaturated fat or protein can produce better results in terms of blood pressure and lipid levels. A diet higher in protein appears to reduce levels of LDL-C, total cholesterol, non-HDL-C, and triglycerides compared with diets higher in unsaturated fat or carbohydrates.

## Instructions for Participation and Credit

There are no fees for participating in or receiving credit for this online educational activity. For information on applicability and acceptance of continuing education credit for this activity, please consult your professional licensing board.

This activity is designed to be completed within the time designated on the title page; physicians should claim only those credits that reflect the time actually spent in the activity. To successfully earn credit, participants must complete the activity online during the valid credit period that is noted on the title page.

FOLLOW THESE STEPS TO EARN CME/CE CREDIT*:

1. Read the target audience, learning objectives, and author disclosures.
2. Study the educational content online or printed out.
3. Online, choose the best answer to each test question. To receive a certificate, you must receive a passing score as designated at the top of the test. Medscape encourages you to complete the Activity Evaluation to provide feedback for future programming.

You may now view or print the certificate from your CME/CE Tracker. You may print the certificate but you cannot alter it. Credits will be tallied in your CME/CE Tracker and archived for 5 years; at any point within this time period you can print out the tally as well as the certificates by accessing "Edit Your Profile" at the top of your Medscape homepage.

*The credit that you receive is based on your user profile.

## Target Audience

This article is intended for primary care physicians, cardiologists, and other specialists who care for adults at risk for CVD.

## Goal

The goal of this activity is to provide the latest medical news to physicians and other healthcare professionals in order to enhance patient care.

## Accreditation Statements

### For Physicians

Medscape is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Medscape designates this educational activity for **0.25 Category 1 credit(s)** toward the AMA Physician's Recognition Award. Each physician should claim only those credits that reflect the time he/she actually spent in the activity.

Medscape Medical News (MMN) has been reviewed and is acceptable for up to 150 Prescribed credits by the American Academy of Family Physicians. AAFP accreditation begins 09/01/05. Term of approval is for 1 year from this date. This component is approved for 0.25 Prescribed credit. Credit may be claimed for 1 year from the date of this issue.

Contact This Provider

For questions regarding the content of this activity, contact the accredited provider for this CME/CE activity: mailto:CME@webmd.net For technical assistance, contact CME@webmd.net.

---

## Authors and Disclosures

As an organization accredited by the ACCME, Medscape requires everyone who is in a position to control the content of an education activity to disclose all relevant financial relationships with any commercial interest. The ACCME defines "relevant financial relationships" as "financial relationships in any amount, occurring within the past 12 months," that could create a conflict of interest.

Medscape encourages Authors to identify investigational products or off-label uses of products regulated by the U.S. Food and Drug Administration, at first mention and where appropriate in the content.

### News Author

**Laurie Barclay, MD**
is a freelance writer for Medscape.

Disclosure: Laurie Barclay, MD, has disclosed no relevant financial relationships.

### Clinical Reviewer

**Gary Vogin, MD**
Senior Medical Editor, Medscape

Disclosure: Gary Vogin, MD, has disclosed no relevant financial relationships.

## CME Author

**Charles P Vega, MD**
Associate Professor, Residency Director, Department of Family Medicine, University of California, Irvine

Disclosure: Charles Vega, MD, FAAFP, has disclosed that he has received grants for educational activities from Pfizer.

## About News CME

News CME is designed to keep physicians and other healthcare professionals abreast of current research and related clinical developments that are likely to affect practice, as reported by the Medscape Medical News group. Send comments or questions about this program to mailto:%20cmenews@medscape.net.



## Legal Disclaimer



Registration for CME credit and the post test must be completed online.
To access the activity Post Test, please go to:
http://www.medscape.com/viewarticle/516977