

# DASH Diet Enhanced to Further Lower CHD Risk

BY MITCHEL L. ZOLER  
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DALLAS — The health benefit of the carbohydrate-rich diet that's endorsed by the U.S. Department of Agriculture was improved by shifting some of the diet's calories to either protein or unsaturated fat in a study with 164 people.

"In the setting of a healthy diet, partial replacement of carbohydrate with protein or with monounsaturated fat can further lower blood pressure, improve lipid profiles, and reduce estimated coronary heart disease risk," Dr. Lawrence J. Appel said at the annual Scientific Sessions of the American Heart Association.

The benchmark diet that served as the baseline was a modified DASH diet, so named because it was first tested in the Dietary Approaches to Stop Hypertension (DASH) trials, a series of studies run by Dr. Appel and his associates. The efficacy of the DASH diet for lowering blood pressure

was so well established that it was endorsed last year by the Dietary Advisory Committee of the U.S. Department of Agriculture, and it's also been recommended in other reports and guidelines.

But the DASH diet has certain flaws, such as reducing serum levels of HDL cholesterol and a failure to lower serum levels of triglycerides (TG). This prompted Dr. Appel and his associates to compare a carbohydrate-rich diet similar to the DASH diet with two investigational modifications: one boosted protein levels, especially plant protein, while reducing carbohydrates, and the other increased unsaturated fat, especially monounsaturated fat, while also reducing carbohydrates. Results from the study were published concurrent with the meeting report (JAMA 2005;294:2455-64).

The DASH-like diet had 58% of its daily calories from carbohydrates, 27% from fat, and 15% from protein. The protein diet cut the carbohydrate fraction down to

## Modified Diets Improved Clinical Measures Relating to 10-Year CHD Risk

| Measure                 | Protein Diet | Unsaturated Fat Diet |
|-------------------------|--------------|----------------------|
| LDL cholesterol         | -3.3 mg/dL   | -1.5 mg/dL           |
| HDL cholesterol         | -1.3 mg/dL   | +1.1 mg/dL           |
| Triglycerides           | -15.7 mg/dL  | -9.6 mg/dL           |
| Systolic blood pressure | -1.4 mm Hg   | -1.3 mm Hg           |
| Framingham risk score   | -5.8%        | -4.2%                |

Notes: Changes are relative to measures in subjects while on a DASH-like diet. All 164 subjects followed each diet for 6 weeks.

Source: JAMA 2005;294:2455-64

48% of calories and boosted protein to 25% (with half from plant protein), while fat held steady at 27%. The unsaturated fat diet also used carbohydrates for 48% of total calories, fat 37% (monounsaturated fat 21%), and protein 15%. (See box at left.)

The study enrolled healthy adults aged at least 30 years who had a systolic blood pressure of 120-159 mm Hg or a diastolic pressure of 80-99 mm Hg. Excluded were patients with diabetes, those with an active or a prior diagnosis of cardiovascular disease, and those with a serum level of LDL cholesterol of more than 220 mg/dL or a fasting TG level of more than 750 mg/dL.

Participants followed each diet for 6 weeks, with a 2-week washout between diets. Each subject ate standardized meals. The weight of each was monitored daily, and total daily calories were adjusted for each person to maintain their weight within 2% of baseline levels, so that any changes in blood pressure and serum cholesterol levels were attributable solely to diet.

The protein and unsaturated-fat diets were each more effective than the DASH-like diet for lowering systolic blood pres-

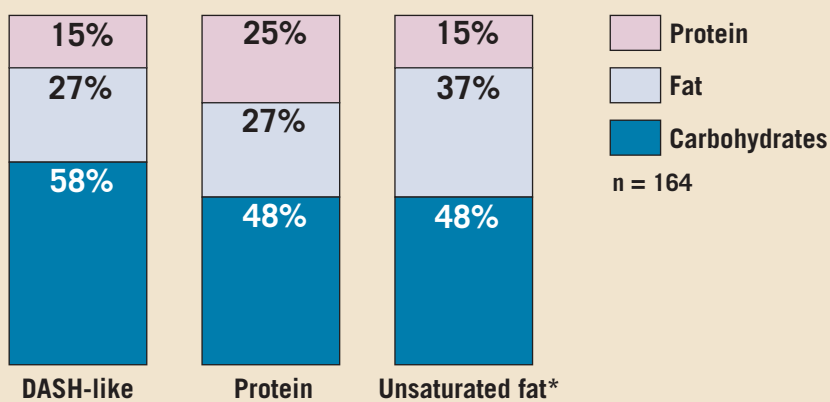
sure and serum levels of LDL, the study's two primary end points, and for improving other measures, including the calculated risk of developing coronary heart disease, said Dr. Appel, professor of medicine at Johns Hopkins University in Baltimore.

The protein diet cut systolic pressure by an average of 1.4 mm Hg, compared with the DASH-like diet, a statistically significant difference. The fat diet dropped systolic pressure by 1.3 mm Hg, also a significant reduction.

Serum levels of LDL cholesterol averaged 3.3 mg/dL lower with the protein diet compared with the higher carbohydrate diet, a statistically significant drop. The fat diet lowered LDL cholesterol by a mean of 1.5 mg/dL, not a significant difference.

The estimated 10-year risk of a coronary heart disease event based on the Framingham risk score averaged 4.0% when participants were on the protein diet, 4.3% when they were on the unsaturated fat diet, and 5.1% on the DASH-like diet. Other measures showed that the protein diet cut TG levels by 15.7 mg/dL and the fat diet cut them by 9.6 mg/dL. (See table above.) ■

## Macronutrient Composition of Diets



\*Fat content is 21% monounsaturated.  
Source: Dr. Appel

# Pediatric Metabolic Syndrome Predicts Adult Heart Disease

BY BRUCE JANCIN  
Denver Bureau

DALLAS — Children who meet criteria for metabolic syndrome are nearly ninefold more likely to develop cardiovascular disease before age 50, John A. Morrison, Ph.D., said at the annual scientific sessions of the American Heart Association.

They are also more than threefold more likely to develop diabetes mellitus prior to age 50 than individuals who didn't meet criteria for metabolic syndrome as children, added Dr. Morrison, professor of pediatrics at the University of Cincinnati and a researcher at Cincinnati Children's Hospital Medical Center.

While metabolic syndrome in adults is known to at least double the risk of cardiovascular disease and diabetes, little is known about the adult effects of pediatric metabolic syndrome. This hole in the knowledge base provided the impetus for Dr. Morrison to gather longitudinal data using the Princeton follow-up study, a 30-year follow-up of participants in the National Heart, Lung, and Blood Institute-sponsored Lipid Research Clinics Study.

He presented 30-year follow-up data on 917 subjects from 573 families who were 5-19 years old when they participated in the Lipid Research Clinics in the mid-1970s. As children, only 12 of them met National Cholesterol Education Program Adult Treatment Panel-III criteria for metabolic syndrome. However, those criteria work poorly in children, who seldom exhibit the full adult expression of abnormalities in waist circumference, blood pressure, and lipids.

For that reason, pediatric researchers often use the more appropriate age-adjusted Cook criteria; by this standard, 41 subjects had pediatric metabolic syndrome.

At 30-year follow-up, 21 participants had developed known cardiovascular disease and 52 had diabetes. The risk of cardiovascular disease in young adulthood was 8.5-fold greater in subjects who had metabolic syndrome as a youth than in

those who didn't. The risk of diabetes was increased 3.2-fold—and among those participants who had pediatric metabolic syndrome as well as a parental history of diabetes, the risk climbed to 5.3-fold.

In another recent study, he found that preteen central adiposity was the key precursor to development of metabolic syndrome during adolescence.

**The risk of CVD in young adulthood was 8.5-fold greater in those who had metabolic syndrome as children.**

DR. MORRISON

Those who had central adiposity as evidenced by an elevated waist circumference at age 11 years and who still had an increased waist circumference at age 18-19 had a 12.1% prevalence of metabolic syndrome at the latter age, a rate roughly sixfold greater than typical in young adulthood. In contrast, not a single participant who had an increased waist circumfer-

ence at age 11 but not at age 18-19 developed metabolic syndrome (Pediatrics 2005;116:1178-82).

In a separate presentation, Aaron S. Kelly, Ph.D., said several biochemical markers of cardiovascular risk show promise for identifying at-risk children even before they develop metabolic syndrome.

He reported on 34 children. One-third were of normal weight and healthy. Another third were overweight but otherwise healthy. The rest were overweight and met at least three of the Cook modified criteria for metabolic syndrome.

Levels of the adipocytokine leptin—known to be related to insulin resistance—increased stepwise from the normal to the overweight to the metabolic syndrome subjects. So did levels of C-reactive protein and interleukin-6, as well as 8-isoprostane, a marker of systemic oxidative stress.

In contrast, levels of adiponectin—which is associated with insulin sensitivity—were highest in the normal children and lowest in the overweight kids with metabolic syndrome, according to Dr. Kelly of the St. Paul (Minn.) Heart Clinic and the University of Minnesota, Minneapolis. ■

