DHA Lowers Blood Triglycerides in Diet Study

High blood levels of fats known as triglycerides may increase risk of heart disease. So may an unhealthy ratio of the good HDL cholesterol to the bad LDL cholesterol. Coronary heart disease that can result from these or other factors kills more Americans than any other disease.

Scientists with the Western Human Nutrition Research Center have seen triglyceride levels go down in volunteers who ate meals supplemented with a moderately high level of DHA, a polyunsaturated fatty acid. DHA is short for docosahexaenoic (DOE-coe-suh-hex-uh-noy-ick) acid. The center, part of USDA's Agricultural Research Service, is in San Francisco, California.

Volunteers on a DHA-enriched regimen also showed an increase in HDL cholesterol, the kind known to protect against heart disease.

What's more, DHA may do this without unwanted side effects such as prolonged bleeding time or slower-than-normal blood clotting. These negative effects have been found in some studies of another polyunsaturated fat known as EPA, or eicosapentaenoic (EE-coe-suh-pent-uh-noy-ick) acid. EPA and DHA belong to the family of omega-3 fatty acids.

"From results with our small group of 10 volunteers," says ARS research chemist Gary J. Nelson, "it appears dietary DHA may be beneficial in altering an individual's risk of cardiovascular disease. But longer studies are needed before we can be certain."

The study was designed to help separate the effects of DHA and EPA.

"In fish oils, in particular," says Nelson, "these two polyunsaturated fats have been of intense interest in nutrition research since the 1970s. That's when studies suggested that the cardiovascular health of Greenland Eskimos might result in part from the predominance of oil-rich fish in their diets. Purported benefits include lowering the total amount of triglycerides in the blood.

"Fish and fish oils contain both DHA and EPA," Nelson says. "Of the two, EPA is predominant in fish that live in cold oceans. The presence of both EPA and DHA makes it difficult to determine which of the two is the major contributor to the health benefits claimed for fish or fish oil."

To help differentiate the effects of DHA and EPA, Nelson and colleagues used a natural oil extracted from golden algae that contains 40 percent DHA—but no EPA. This substance, according to Nelson, "has only recently become available as a source of purified DHA."

For the experiment, Nelson collaborated with chemists Darshan S. Kelley, Perla C. Schmidt, and Giovanni L. Bartolini, of the nutrition center, and David J. Kyle, vice president of Martek Corp. The Columbia, Maryland, company manufactures the DHA-rich oil used in the study.

Ten volunteers—healthy, nonsmoking males aged 20 to 39—lived at the research center for the 4-month-study—the longest DHA experiment reported with in-residence volunteers. For the first 30 days, the volunteers ate a baseline diet that provided less than 50 milligrams a day of DHA.

For the remaining 90 days, 6 grams—about a teaspoon—of the DHA-rich oil was mixed with salad dressings or with bean, guacamole, or salsa dips served to six of the volunteers. That's about 100 times more DHA per day than most Americans

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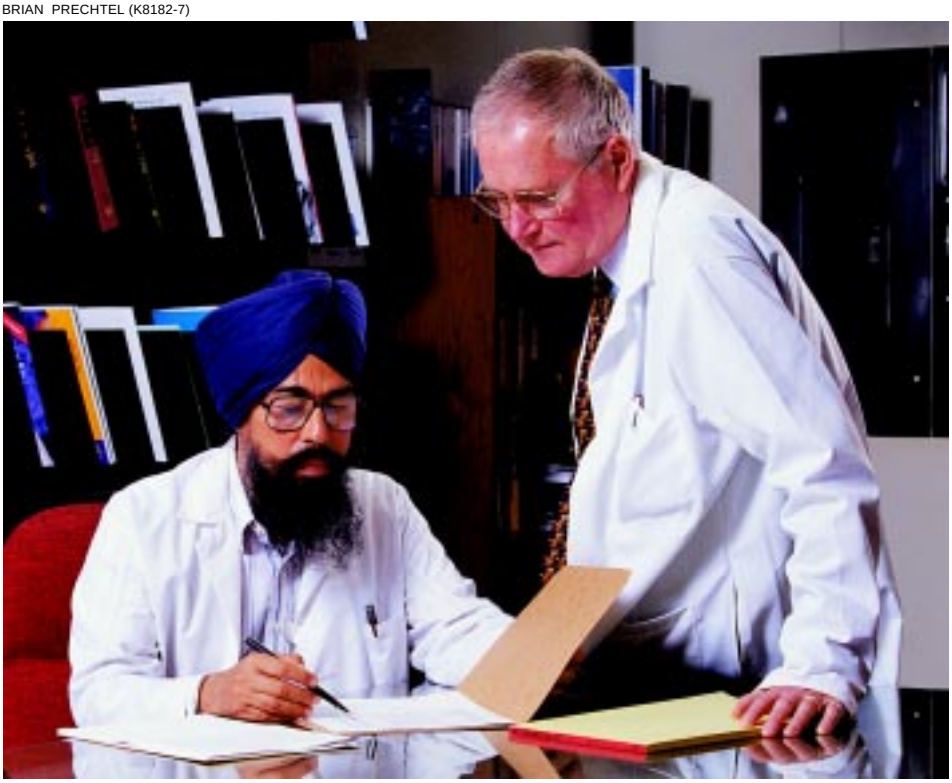

Chemists Darshan Kelley (left) and Gary Nelson analyze data from the longest DHA study yet reported with in-residence volunteers.

consume. The other volunteers got safflower oil instead.

All meals for all volunteers were very low in EPA. To ensure that all the men received enough antioxidants, they took a 100-milligram vitamin E capsule every 5 days.

Meals featured familiar foods prepared with precision by the research center's dietary staff. One day's menus included, for instance, buttermilk pancakes, maple syrup, and sliced bananas for breakfast; canned peaches, sliced ham with jack cheese, lettuce, and mayonnaise on whole-wheat bread for lunch—with a salad of sliced cucumbers and french dressing on the side. A dinner of canned pineapple, roast chicken with teriyaki sauce, brown rice, and green beans was followed by chocolate cake as the evening snack.

Triglycerides in blood decreased by about 26 percent in volunteers on the DHA regimen. Their HDL cholesterol—the good kind—rose an average of 9 percent.

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Chemist Perla Schmidt uses a rotary evaporator to remove solvent from lipids extracted from volunteers' blood samples. She is putting dry ice in the top of the evaporator to cool and condense the solvent for removal.

The DHA-supplemented group also showed an increase of about 69 percent in apoprotein-E. This compound carries cholesterol from peripheral tissues back to the liver for breakdown and excretion. Increased apo-E, Nelson says, "has not been reported in other DHA or EPA studies with humans."

Nelson and co-workers looked at several indicators of normal bleeding and clotting. They found no significant differences in these measures before or after the high-DHA diet. "That's unlike fish oils," says Nelson. "They have been shown to increase bleeding times. Fish oils have also been shown to inhibit aggregation of blood platelets needed to form clots."

DHA and EPA are essential to good health. Our bodies need fats to carry fat-soluble vitamins like A, D, and K; to make steroid hormones; to keep skin healthy; and to perform other biochemical chores.

But health officials today generally recommend that fats take up no more than 30 percent of each day's total calories. Saturated fats—ones like butter and lard that stay solid at room temperature—should make up no more than 10 percent.—By **Marcia Wood**, ARS.

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Gas chromotography enables chemist Giovanni Bartolini to evaluate DHA samples obtained from participants in the San Francisco test.