

An Update on the Role of Nuts in Healthful Diets

Reappraisal of the role of fats in the diet, as well as recognition of nuts' nutrient density, reaffirms that nuts can be a part of healthful diets. Over the past decade, compelling evidence about various health-promoting effects of nuts has emerged. Nut consumption has been shown to lower total blood cholesterol, as well as LDL-cholesterol and has been associated with decreased risk of cardiovascular disease. More recently, scientists have identified another promising, albeit preliminary, area of investigation—the potential role nuts may play in weight management.

Nutrient Contributions of Nuts

While an ounce of nuts contains about 160 to 200 calories and 13 to 20 grams of fat, nuts have a distinctive fat and nutrient profile (1-3). On average, 85% of the fat in nuts is from heart-healthy mono- and polyunsaturated fats (see Table 1), with walnuts having a unique profile in that they are rich in n-6 (linoleate) and n-3 (linolenate) polyunsaturated fatty acids. Nuts are also naturally cholesterol- and *trans* fat-free and many are low in saturated fat. Nuts are nutrient dense and, depending on the specific nut variety, contribute varying amounts of plant protein, dietary fiber (see Table 1), vitamin E, folic acid, vitamin B6, niacin, magnesium, copper, zinc and potassium (see Table 2). Of these nutrients, *Dietary Guidelines for Americans, 2005*, identifies potassium, fiber, magnesium and vitamin E as nutrients adults often consume in inadequate amounts (4). Nuts also contain other healthful bioactive substances, including plant sterols, antioxidant phenolics and phytochemicals (1, 5).

Nuts and Cardiovascular Health

The components of nuts believed to offer cardioprotective effects include their fatty acid profiles, dietary fiber, certain vitamins and minerals and other bioactive compounds (5-6). Thus, in practice, both the DASH diet and Portfolio Eating Plan, designed to reduce the risk of heart disease, include nuts in their dietary patterns. Recommendations from the National Heart, Lung, and Blood Institute, *Dietary Guidelines for Americans, 2005*, and the American Heart Association also recognize that replacing saturated fats in the diet with unsaturated fats, such as those found in fish, nuts and vegetable oils, can help lower blood cholesterol levels and reduce heart disease risk (4, 7-8).

Epidemiologic studies have consistently identified beneficial effects of nut consumption on coronary heart disease morbidity and mortality in various population groups. The Adventist Health Study, a large prospective epidemiologic study of more than 30,000 non-Hispanic white Seventh-Day Adventists in California, found that when compared to those eating nuts less than once a week, individuals who ate nuts one to four times a week had a 22% reduced risk of myocardial infarction and death from coronary heart disease (CHD), while those eating nuts five or more times a week had a 51% reduction in risk (9).

The Iowa Women's Health Study reported a similar association (10). Among nearly 34,500 postmenopausal women followed over a seven-year period, researchers observed that women who ate nuts and seeds more than four times a month had a 40% reduction in risk of CHD compared to those who never ate nuts or seeds. In a review by Hu and Stampfer (11), the authors estimated that substitution of the fat from one ounce of nuts for equivalent energy from carbohydrate in an average diet is associated with a 30% reduction in CHD risk, and the substitution of nut fat for saturated fat is associated with 45% reduction in risk.

Several clinical studies have observed beneficial effects of diets that incorporated nuts (including walnuts, peanuts, almonds and other nuts) on blood lipids. Kris-Etherton and colleagues compared data for actual cholesterol response of nut-containing experimental diets to predicted response (5). Results showed that individuals who consumed test diets with varying amounts of nuts had an approximately 25% greater cholesterol-lowering response than predicted. In a clinical study of 27 hyperlipidemic men and women, Jenkins and colleagues measured significant reductions in levels of blood lipids when participants consumed a supplement of either 2.5 ounces (73g/day) or 1.3 ounces (37g/day) of almonds (12). The findings suggest a dose response in which ~7 grams of almonds per day may reduce LDL cholesterol by ~1%.

A clinical study conducted by researchers at the Pennsylvania State University compared several cholesterol-lowering diets—including three different high-monounsaturated fat diets (34% to 36% of calories as fat) and a low-fat diet (25% of calories as fat)—to the average American diet (34% of calories as fat). All of the cholesterol-lowering diets, including the diet with peanuts and peanut butter and the diet with peanut oil, lowered total blood cholesterol by ~10% and LDL cholesterol by ~14% compared with the average

American diet; however, the high-monounsaturated fat diets did not lower HDL cholesterol (13). In a study conducted at the University of Toronto, researchers found that including almonds, along with other cholesterol-lowering dietary components such as plant sterols, soy protein and viscous fibers, was as effective as cholesterol-lowering statin drugs (14). In four weeks, the mean decrease in LDL-cholesterol levels among study participants following the dietary portfolio protocol was 28.6%.

Another area of study is the role of long-chain polyunsaturated omega-3 (n-3) fatty acids in heart health. Examples of n-3 are alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Walnuts and certain vegetable oils such as canola and flaxseed are principal sources of ALA (the precursor of EPA and DHA, found in fatty fish and fish oils). The Dietary Reference Intakes (DRIs), issued by the Institute of Medicine, estimated 0.6 to 1.2% of daily energy intake (~1.3 to 2.7g/day, based on a 2000-calorie diet) to be an Acceptable Macronutrient Distribution Range for ALA (15). The lower end of the range corresponds to the Adequate Intake for ALA (1.6g/day for men, 1.1g/day for women); the upper end corresponds to the highest intakes of ALA from foods eaten by individuals in the US and Canada. While findings are limited, available scientific evidence suggests that higher intakes of ALA may be somewhat protective against CHD (2, 16–17).

Nuts “Qualify” for a Health Claim

Based on available epidemiologic and clinical evidence, nuts are allowed to carry a “qualified” health claim on appropriate product labels. In a July 2003 ruling, the US Food and Drug Administration (FDA) allowed manufacturers to include the following statement on labels of qualifying nut products:

Scientific evidence suggests but does not prove that eating 1.5 ounces per day of most nuts as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease.

A “qualified” health claim has sound scientific evidence to support the claim, but the evidence is not considered conclusive. Nuts qualified to carry this health claim include almonds, hazelnuts, peanuts, pecans, pistachios and walnuts. One and one-half ounces of nuts is about a handful or ~1/3 cup of nuts.

Nuts and Weight Management

Traditionally, foods higher in fat are restricted on weight loss or maintenance diets because of their energy density. However, epidemiologic studies find that those who eat nuts regularly tend to

have the lowest body mass indexes. Possible explanations for this observation include satiety, increased resting metabolic rate and/or incomplete absorption of energy from nuts (18–20). Satiety, in particular, is an important factor in weight management. If individuals feel satisfied for a longer period of time, they may eat fewer calories over the course of a day. Some have speculated that it may be the protein, fat and fiber that make nuts satisfying.

Including nuts in a weight loss diet may also improve long-term compliance. In a study by McManus and colleagues, participants followed isocaloric low-energy diets, either low-fat with 20% of calories from fat or high-unsaturated fat with 35% of calories from total fat and including tree nuts, peanuts and canola and olive oils (21). After 18 months, participants following the moderate-fat diet plan had greater and more sustained weight loss than did those following the low-fat diet plan. Of note, only 20% from the low-fat group were still actively participating in the study, compared to 54% from the moderate-fat group.

Research also suggests that people who include nuts as part of their diets do not gain weight, and some may even lose weight. Wien and coworkers found that the addition of almonds to the diet in place of calories from other foods resulted in weight loss (22). Obese participants followed a weight reduction diet supplemented with either almonds (3 ounces per day) or the same number of calories from complex carbohydrate foods. The participants eating almonds had greater and sustained weight loss during the study period. Similar results have been reported with walnuts and peanuts (3, 18). One explanation derived from previous studies with almonds, pecans and peanuts is that some of the fat in nuts may not be absorbed in the intestines due to incomplete chewing and intact particles, suggesting that nuts do not contribute as many calories as expected (18, 23–24).

Other Emerging Health Effects of Nuts

Preliminary research is being conducted to investigate possible effects of nuts on other health problems, including type 2 diabetes and cancer. In diabetes, nuts may play a role in improving glycemic control. Nuts are rich in unsaturated fatty acids and supply other nutrients that may work in the body to improve glucose and insulin homeostasis and lower risk for type 2 diabetes. A prospective cohort study of more than 83,000 women participating in the Nurses Health Study showed that nut consumption was inversely associated with risk of type 2 diabetes after adjusting for factors such as age, body mass index, family history of diabetes, physical activity, smoking, alcohol use and total energy intake (25). In another area, the antioxidant polyphenols, fiber and vitamin E in certain nuts

may be the components that exert possible protection against cancer.

Other dietary components of nuts may confer protective health effects (1–3, 5, 17). The protein in nuts is rich in the amino acid arginine, a precursor of nitric oxide, which is a potent vasodilator that acts much like nitroglycerin. Nuts contain vitamin E and folic acid; both of these vitamins have been shown to play roles in reducing risk of CHD. Vitamin E works in the body to inhibit LDL-cholesterol oxidation, a key step in the atherogenic process. Folic acid may help lower elevated levels of homocysteine, which has been linked to increased risk of CHD. Nuts also contain copper and magnesium, two minerals that may also be protective against CHD.

Nuts in a Healthful Diet

The US Department of Agriculture’s MyPyramid food guidance system includes a daily recommendation for oils, based on energy requirements (26). For example, 6 teaspoons (2 tablespoons) of oils per day is advised for a 2000-calorie diet. One ounce of

peanuts or almonds is equivalent to about 3 teaspoons (1 tablespoon) of oil. Nuts can be included in healthful diets that comply with guidelines to keep total fat intake to less than 35% of daily calories and saturated fat less than 10% of calories. For example, a one-ounce serving of peanuts, providing 14 grams of fat and 2 grams of saturated fat, is equivalent to 21% of the total daily fat allowance based on 30% of total calories for a 2,000-calorie diet, and 13% of the total daily saturated fat allowance based on 7% of total calories. In lower fat diets, nuts can be included by substituting them for other fat sources in the diet, such as butter or margarine, vegetable oil or foods with saturated fat. As a component of the Meat & Beans Group of MyPyramid, nuts play an important role in vegetarian diets, supplying essential fatty acids, protein, fiber and other key nutrients.

Given their many positive nutritional attributes, nuts have re-earned their reputation as a nutritious food. The nutritional benefits of nuts make them a choice that can be recommended as part of an overall healthful diet that does not exceed energy needs.

Table 1. Approximate Nut Macronutrient Composition (1 ounce)*+

| Nuts (# of nuts per ounce) | Calories | Total fat (g) | Saturated fat (g) | Mono-unsaturated fat (g) | Poly-unsaturated fat (g) | Protein (g) | Dietary fiber (g) |
|----------------------------|----------|---------------|-------------------|--------------------------|--------------------------|-------------|-------------------|
| Almonds** (23) | 160 | 14 | 1 | 9 | 3 | 6 | 3 |
| Brazil nuts (6) | 190 | 19 | 4 | 7 | 6 | 4 | 2 |
| Cashews (18) | 160 | 13 | 3 | 8 | 2 | 4 | 1 |
| Hazelnuts** (21) | 180 | 17 | 1 | 13 | 2 | 4 | 3 |
| Macadamia nuts (10–12) | 200 | 22 | 3 | 17 | 0.5 | 2 | 2 |
| Peanuts** (28) | 170 | 14 | 2 | 7 | 4 | 7 | 2 |
| Pecans** (19 halves) | 200 | 20 | 2 | 12 | 6 | 3 | 3 |
| Pine nuts (167) | 190 | 19 | 1 | 5 | 10 | 4 | 1 |
| Pistachios** (49) | 160 | 13 | 2 | 7 | 4 | 6 | 3 |
| Walnuts** (14 halves) | 190 | 18 | 2 | 3 | 13 | 4 | 2 |

Source: USDA National Nutrient Database for Standard Reference, Release 19 (2006).

*Values are rounded according to federal rounding regulations.

+Values are for raw or dry-roasted nuts; data can vary depending on degree/type of processing.

**Nuts qualifying for FDA Allowed Health Claim.

Table 2. Approximate Nut Micronutrient Composition (1 ounce)*+

| Nuts (# of nuts per ounce) | Vit E (mg) | Folic Acid (mcg) | Niacin (mg) | Vit B-6 (mg) | Magnesium (mg) | Copper (mg) | Zinc (mg) | Potassium (mg) |
|----------------------------------|---------------|---------------------|----------------|-----------------|-------------------|----------------|--------------|-------------------|
| Almonds** (23) | 7.0 | 8 | 1.1 | 0.04 | 78 | 0.3 | 1.0 | 205 |
| Brazil nuts (6) | 1.6 | 6 | 0.1 | 0.03 | 105 | 0.5 | 1.2 | 185 |
| Cashews (18) | 0.3 | 20 | 0.4 | 0.07 | 75 | 0.6 | 1.6 | 160 |
| Hazelnuts** (21) | 4.0 | 32 | 0.5 | 0.2 | 45 | 0.5 | 1.7 | 190 |
| Macadamia nuts (10–12) | 0.2 | 3 | 0.7 | 0.01 | 35 | 0.2 | 0.4 | 105 |
| Peanuts** (28) | 2.0 | 40 | 4.0 | 0.07 | 50 | 0.2 | 0.9 | 185 |
| Pecans** (19 halves) | 0.4 | 6 | 0.3 | 0.06 | 35 | 0.3 | 1.3 | 115 |
| Pine nuts (167) | 2.5 | 10 | 1.2 | 0.03 | 70 | 0.4 | 1.8 | 170 |
| Pistachios** (49) | 0.6 | 14 | 0.4 | 0.4 | 35 | 0.4 | 0.7 | 295 |
| Walnuts** (14 halves) | 0.2 | 28 | 0.3 | 0.2 | 45 | 0.5 | 0.9 | 125 |

Source: USDA National Nutrient Database for Standard Reference, Release 19 (2006).

*Values are rounded according to federal rounding regulations.

+Values are for raw or dry-roasted nuts; data can vary depending on degree/type of processing.

**Nuts qualifying for FDA Allowed Health Claim.

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