

The Mediterranean Diet and Cardiovascular Diseases

Translating Research Findings to Clinical Recommendations

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Evidence continues to accumulate for the cardiovascular benefits of adherence to a traditional Mediterranean-style dietary pattern. Certain foods and nutrients are identified as being common to this pattern, and the significant health benefits seem to result from the combination of these foods and nutrients in a whole-diet approach. Translating this general dietary pattern into more specific recommendations is crucial if consumers are to incorporate this type of diet into their usual lifestyle and be able to reap the benefits of reduced cardiovascular disease risk.

This article examines each of the foods and nutrients commonly found in the traditional Mediterranean diet and cites scientific evidence that supports their unique contributions to cardiovascular health. Based on this evidence, recommendations by the American Heart Association and other organizations for appropriate amounts of these foods and nutrients to consume are presented, along with suggestions for selecting and using these foods in a heart-healthy dietary plan. *Nutr Today*. 2009;44(3):124–133

Cardiovascular diseases (CVDs) continue to be the leading cause of morbidity and mortality for adults in the United States.¹ A number of contributing factors in the cause of heart disease have been identified and studied, both modifiable and nonmodifiable. Of the modifiable factors implicated in heart disease, diet has been shown to play a major role.

Considerable research has been undertaken and is continuing in the nutrition field with regard to heart

disease. Although agreement exists on certain dietary strategies that seem effective in reducing risk of CVD,² controversy still surrounds the makeup of the most effective overall diet for heart health. Few eating patterns take a whole-diet approach, as well as consider individual acceptance and relative ease of moving to and maintaining a new and different dietary pattern. The Mediterranean diet, a whole-diet approach, can be flexible and adaptable to individual needs and has been shown to provide significant cardioprotective effects.³

The term *Mediterranean diet* is more accurately described as a Mediterranean-style diet. Many countries border the Mediterranean Sea, and although these countries have some similarities in the types of food they consume, each has its own unique culinary traditions and customs. The term *diet* also needs to be clarified. Today, it is often used to mean a specific eating plan to follow for a relatively short period of time and then to go off this plan and later to go back on again or to try a different plan. The word *diet* is of Greek origin and originally meant “the usual food and drink one typically consumes.”

The first scientific research to highlight the health benefits of a Mediterranean-style diet began in the 1950s with Ancel Keys and his associates in the Seven Countries Study.⁴ Later, research efforts supported the findings of the Seven Countries Study, including the Lyon Diet Heart Study (1999) with its focus on the overall dietary intake of the subjects.⁵ Results from subsequent studies continue to provide consistent evidence of the health benefits, especially cardiovascular benefits, with adherence to a traditional Mediterranean-style dietary pattern.^{6–9} Whereas certain foods and nutrients are identified as being common to this pattern, the significant health benefits seem to result from the combination of these foods and nutrients in a whole-diet approach.

The Traditional Mediterranean Dietary Pattern

This dietary pattern is summarized in The Traditional Healthy Mediterranean Diet Pyramid (Figure 1).¹⁰ This diet is based on an abundance of foods from plant sources, including whole grains, vegetables, legumes, nuts, and fruits, as illustrated in the bottom 2 levels of the pyramid. Olive oil is the predominant fat used in cooking and in salads. Cheese and yogurt are consumed daily in low to moderate amounts. Fish, poultry, and eggs are also consumed in low to moderate amounts, but on a weekly basis. Red meat, at the tip of the pyramid, is consumed only a few times per month or somewhat more often in very small amounts. Wine, if consumed, is used in moderation and mainly with meals. Foods are minimally processed and often locally grown.

Basic similarities and differences between The Traditional Healthy Mediterranean Diet Pyramid and recommendations provided by 5 other programs and

plans (American Heart Association [AHA],¹ National Cholesterol Education Program [NCEP],¹¹ Dietary Approaches to Stopping Hypertension [DASH] Eating Plan,¹² 2005 Dietary Guidelines for Americans,¹³ and MyPyramid¹⁴) are highlighted in Table 1. The Mediterranean Diet Pyramid gives nonspecific food amounts due to variations that existed among the different Mediterranean countries. However, typical intakes of foods and food groups on a daily, weekly, or monthly basis are noted. Specific recommendations for amounts of foods to consume are provided by these other programs and plans in Tables 2 and 3. Additional similarities and differences between the Mediterranean Diet Pyramid and these other recommendations are presented in each of the subsections below.

Specific Foods and Nutrients of the Traditional Mediterranean Dietary Pattern and Recommended Amounts to Consume

Each of the common foods and nutrients of the traditional Mediterranean diet has scientific evidence to support their unique contributions to cardiovascular health and to support a low, moderate, or high intake. Translating this evidence into more specific and practical information for consumers is crucial, including recommendations for appropriate amounts to consume.

Reading and knowing how to interpret the information located on the Nutrition Facts panel of food labels should be paramount in determining how a particular food fits into one's dietary plan. The serving size, on which the calories and other nutrient amounts are based, is key. Selecting appropriate serving sizes is as important as selecting appropriate foods. Too much of a good thing is not healthful when it comes to food, even if the specific food is a healthy choice. Obesity has become a major problem in the United States, and many other countries are beginning to follow suit. Portion sizes, especially restaurant portions, have increased over the decades, so what seems a normal size now often represents double or more what it used to be. Food models can help individuals be more aware of appropriate portion sizes.

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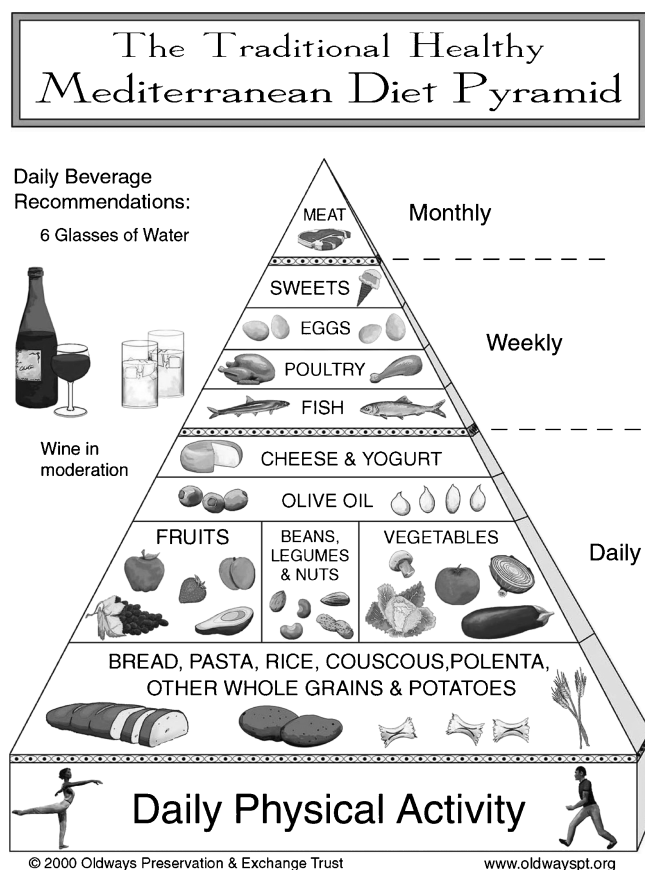


Figure 1. The Traditional Healthy Mediterranean Diet Pyramid. Reprinted with permission from The Oldways Preservation & Exchange Trust.¹⁰

Fatty Acid Intakes

Low in saturated fats. The common dietary fats and oils, saturated, trans, monounsaturated, and polyunsaturated,

Table 1. Basic Similarities and Differences Between The Traditional Healthy Mediterranean Diet Pyramid¹⁰ and a Composite of Recommendations From the American Heart Association (AHA),¹ the National Cholesterol Education Program (NCEP),¹¹ Dietary Approaches to Stopping Hypertension (DASH) Eating Plan,¹² 2005 Dietary Guidelines for Americans,¹³ and MyPyramid¹⁴

The Traditional Healthy Mediterranean Diet Pyramid	AHA, NCEP, DASH, 2005 Dietary Guidelines for Americans, MyPyramid
Grains	Grains
Daily intake	Daily intake
Emphasis on whole grains	Emphasis on whole grains
Fruits and vegetables	Fruits and vegetables
Daily intake	Daily intake
Fruit typically consumed as dessert	Specific types of vegetables emphasized
Legumes and nuts	Legumes and nuts
Daily intake	Specific amounts per week
Fats	Fats
Daily intake	Emphasis on different types of fat (total, saturated, trans, polyunsaturated, monounsaturated) and types to consume
Olive oil the principal fat	
Dairy	Dairy
Daily intake of cheese and yogurt	Specific amounts per week
Milk seldom used as a beverage by itself	Emphasis on low-fat or fat-free milk and milk products
Fish, poultry, and eggs	Fish, poultry, and eggs
Weekly intake	Suggested daily intake of ≤ 6 oz fish, lean meat, and poultry
Low to moderate amounts	Emphasis on fish, especially "fatty fish"
	Eggs up to 1 per day for healthy adults
Red meat	Red meat
A few times per month (or somewhat more often in very small amounts)	Emphasis on lean meats (see fish, poultry, and eggs)
Sweets	Sweets
Not more than a few times per week	Foods and beverages with little added sugars and caloric sweeteners
Alcohol	Alcohol
Wine in moderation and drunk with a meal	Alcohol of any kind is not recommended, but if used, then specific amounts are given

are composed of fatty acids. In general, the more saturated fat in a food, the more solid it remains at room temperature compared with liquid unsaturated fats. Saturated fatty acids (SFAs) raise blood levels of total and low-density lipoprotein (LDL) cholesterol, which in turn may increase the risk of heart disease.¹¹

The AHA¹ and the NCEP¹¹ both recommend limiting saturated fat to less than 7% of total energy intake (see Table 2). This percentage translates to a total daily saturated fat intake of less than 16 g (9 cal per fat gram) for a 2,000-cal meal plan. A specific number of saturated fat grams should be tailored to an individual's needs to help make healthy dietary decisions easier.

Saturated fats are widespread in many foods, including poultry, especially in the skin; various meats; full-fat dairy products, including milk, yogurt, cheese, and ice cream; some vegetable oils, such as coconut and palm oils; and many commercial baked goods. Saturated fats from animal foods also contain varying amounts of

cholesterol. To reduce intake of saturated fat, choose more foods low in saturated fat. The Food and Drug Administration (FDA) has defined "low saturated fat" as 1 g or less of saturated fat per serving of a specific food.¹⁵

Low in trans-fats. *Trans*-fatty acids have been shown to have an even more detrimental effect on heart health than SFAs do, not only by raising the blood level of LDL cholesterol but also by reducing its particle size and by lowering high-density lipoprotein (HDL) cholesterol.¹⁶ Other adverse effects of *trans*-fatty acids include increasing the ratio of total cholesterol to HDL cholesterol, a predictor of cardiac disease, and raising blood triglyceride levels. A small amount of naturally occurring *trans*-fat is found in some animal-based foods, but the industrially produced *trans*-fats are the unhealthiest. Researchers from the Harvard School of Public Health estimate that between 72,000 and 228,000 myocardial infarctions could be prevented each year in

Table 2. Composite of Recommendations for Intake of Total Fat and Fat Subgroups for a 2,000-cal Meal Plan

Nutrient	Recommendation	For a 2,000-cal Meal Plan
Total fat	25%–35% of calories	55–75 g
Saturated fat	<7% of calories	<16 g
Polyunsaturated fat	Up to 10% of calories	≤22 g
Monounsaturated fat	Up to 20% of calories	≤44 g
<i>trans</i> -Fat	<1% of calories	<2 g

Sources: American Heart Association,¹ National Cholesterol Education Program,¹¹ Dietary Approaches to Stop Hypertension Eating Plan,¹² 2005 Dietary Guidelines for Americans,¹³ and MyPyramid.¹⁴

of *trans*-fats to less than 1% of total energy intake (see Table 2). This percentage translates into less than 2 g/d for a 2,000-cal meal plan. As of January 2006, manufacturers of most conventional foods were required by the FDA to list *trans*-fat content on the Nutrition Facts panel of packaged foods.¹⁷ Foods containing less than 0.5 g of *trans*-fat may be listed as 0 g. However, consuming multiple servings of a single food or a combination of several foods at one meal or throughout the day in which each has just under 0.5 g of *trans*-fat could easily surpass 1% of total calorie intake.

Keep daily consumption of *trans*-fats to less than 1% of total energy intake (<2 g for a 2,000-cal meal plan).

the United States if industrially produced *trans*-fats were removed from the diet.¹⁶

The AHA¹ and the 2005 Dietary Guidelines for Americans¹³ recommend keeping daily consumption

Trans-fats are typically found in stick margarines, vegetable shortenings, granola bars, microwave popcorn, commercial baked goods, french fries, and other deep-fried foods. In general, partially hydrogenated

Table 3. Composite of Recommendations for Number of Servings and Serving Sizes From Various Food Groups for a 2,000-cal Meal Plan

Food Group	Daily Servings	1 Serving Equals
Grains and grain products	6–8	1 slice of bread, ~1 c ready-to-eat cereal, ½ c cooked rice, pasta or cooked cereal (all 1-oz equivalents)
Whole grains	At least 3 oz	
Other grains	3 oz	
Fruits and veg	9 (4–5 fruits—2–2.5 c; 4–5 veg—2–2.5 c)	1 medium fruit; ½ c fresh, frozen, canned fruit or 100% juice; ¼ c dried fruit
Dark green veg	3 c/wk	½ c cut-up raw or cooked veg, ½ c juice, 1 c raw leafy
Orange veg	2 c/wk	
Legumes	3 c/wk	
Starchy veg	3 c/wk	
Other veg	6.5 c/wk	
Lean meats, poultry, fish	≤6	1 oz cooked
Eat fish, especially fatty fish, at least twice a week		Fatty fish such as salmon, sardines, herring, trout, mackerel
Organ meats, liver, etc	Maximum 3 oz/mo	1 oz cooked
Eggs	Up to 1/d (for healthy adults)	1 whole egg or 2 egg whites
Nuts, seeds, legumes (dried beans, peas, lentils)	4–5/wk	1/3 c (1½ oz) nuts 2 tbsp (½ oz) seeds ¼ c cooked lentils is a 1-oz meat equivalent
Milk and milk products	2–3	1 c milk or yogurt, 1½ oz cheese
Fat-free or low fat (1%)		

Abbreviation: veg, vegetable.

Sources: American Heart Association,¹ National Cholesterol Education Program,¹¹ Dietary Approaches to Stop Hypertension Eating Plan,¹² 2005 Dietary Guidelines for Americans,¹³ and MyPyramid.¹⁴

fats and oils contain large amounts of *trans*-fats, especially if they are 1 of the first 3 items in the ingredients list on food packages.

High in polyunsaturated fats. Two major families of polyunsaturated fatty acids (PFAs) exist: omega-6 and omega-3. Polyunsaturated oils remain liquid whether in the refrigerator or at room temperature. The parent fatty acid of omega-6 is linoleic acid (LA). It is present in high amounts in corn, soybean, safflower, and sunflower oils. Intakes of LA in the United States have increased from approximately 3% dietary energy in the 1930s to approximately 5% to 6% in the late 20th century.¹⁸

The parent fatty acid of omega-3 is α -linolenic acid (ALA). It comes only from plant sources, and high amounts are found in flaxseed, flaxseed oil, and canola oil, as well as in soybean oil and walnuts. Canola oil also has high amounts of monounsaturated fatty acids (MFAs). In humans, ALA is converted to the longer carbon chain eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), although the conversion is relatively slow and inefficient. Eicosapentaenoic acid and DHA are found primarily in fatty, cold-water fish, such as salmon, trout, sardines, herring, and mackerel. For individuals who are vegetarian, there are some foods enriched with DHA, but not EPA, from algal oil. The 2 longer chain omega-3 fatty acids, from marine sources, seem to provide the more significant cardioprotective benefits.¹⁹ Accumulating evidence, however, suggests that ALA may also provide benefits for heart health, especially if intake of fatty fish is low.^{20,21}

Both omega-3 and omega-6 fatty acids have unique roles to play in regard to cardiovascular health. The optimal balance between these 2 PFAs is still a matter of controversy. In the meantime, a suggested strategy is to increase omega-3 intake, from fish and plant sources, because intake tends to be low for most people, without necessarily reducing omega-6 LA intake.²

The NCEP¹¹ recommends a daily intake of PFA up to 10% of total energy intake (see Table 2). This percentage translates to 22 g or less per day for a 2,000-cal meal plan. For primary prevention of coronary heart disease (CHD), both the AHA¹ and the 2005 Dietary Guidelines for Americans¹³ recommend at least 2 servings (approximately 4 oz per serving) of fish per week, preferably fatty fish (see Table 3). Persons with known CHD are advised to consume about 1 g of EPA and DHA daily. The AHA suggests a total intake of approximately 1.5 to 3 g/d of ALA for heart-healthy benefits and encourages consumption of vegetable oils (eg, canola) and other food sources (eg, walnuts, flaxseeds) high in ALA as part of a healthy diet for the general population.

Omega-3 fats are being added to an increasing number of foods, including eggs, cereals, pastas, frozen waffles, peanut butter, mayonnaise, and other spreads.

When buying products containing flaxseed, select ones that state “ground” flaxseed in the ingredients list. Whole flaxseeds cannot be degraded in the human digestive track and so the body cannot access their nutritional benefits. Flaxseeds can be purchased already ground or as whole seeds to grind at home. Ground flaxseed can be used in many ways, including mixed into casseroles and batters (pancake, waffle, muffin, and bread) and added to hot and cold cereals. One tablespoon of ground flaxseed has approximately 1.3 g of ALA.

High in monounsaturated fats. Monounsaturated fatty acids present in the diet are mainly omega-9 fatty acids. Monounsaturated oils are liquid at room temperature but cloud and thicken when refrigerated. When warmed to room temperature, they become liquid again. They are found in certain vegetable, nut, and seed oils. The main dietary MFA is oleic acid, which is present in high amounts in olive oil, canola oil, mid- and high-oleic sunflower and safflower oils, other mid- and high-oleic vegetable oils, peanuts, pistachios, almonds, and avocados.

Oleic acid decreases total and LDL cholesterol concentrations when substituted for SFA.²² Other major heart-health benefits of MFA, when compared with carbohydrate, are decreased triglyceride and increased HDL cholesterol levels. The NCEP¹¹ recommends a daily intake of MFA up to a maximum of 20% of total energy intake (see Table 2). For a 2,000-cal meal plan, this translates to 44 g or less per day.

Extra virgin olive oil comes from the first pressing of olives and is unrefined, low in acidity, and full flavored. Virgin olive oil is also unrefined but of lesser quality and with higher acidity. Regular olive oil, sometimes called “pure” or “light,” is a refined olive oil or a blend of refined and unrefined oils. The refining process tends to diminish the oil’s flavor, color, and nutrient content. Unrefined olive oil was the predominant fat used in the traditional Mediterranean diet.

Canola oil (oil of Canada), developed from rapeseed (a mustard family member), is high in MFA but contains less than olive oil. Canola oil also contains a high amount of omega-3 fatty acids and has the lowest amount of saturated fat among common cooking oils. It has a mild flavor and can be used for sautéing and baking at higher temperatures than olive oil.

All fats and oils, saturated, *trans*, monounsaturated, and polyunsaturated, have approximately 120 cal and 13 to 14 g of fat per tablespoon. Both the AHA¹ and the NCEP¹¹ recommend a daily total fat intake of 25% to 35% of total energy intake (see Table 2). For a 2,000-cal meal plan, this percentage translates to 55 to 78 g of total fat per day. Consuming more than the current recommended amounts of any fat or oil will not likely confer any further health benefits and may increase adverse health effects, including unwanted weight gain.

Protein Intakes

Low in red meat and low to moderate in fish, poultry, and dairy products. Low red meat intake usually results in lower saturated fat intake. Consumption of saturated fat has been associated with increased incidence of heart disease. In addition, many of today's meats, unlike meats in a traditional Mediterranean diet, come from animals treated with hormones, antibiotics, or other substances that may negatively affect health. Vegetarian diets are usually lower in total and saturated fats and cholesterol than nonvegetarian diets are.¹ Substantial evidence indicates that plant-based diets have many healthful benefits and can play a significant role in preventing CVD, as well as other chronic diseases.^{23,24}

The AHA¹ recommends a daily intake of 6 oz or less of lean meats, poultry, and seafood (see Table 3). The DASH Eating Plan¹² also recommends 6 or fewer servings (1 serving is equal to 1 oz) of these same foods (see Table 3). Today, restaurant servings of meat, poultry, or fish may reach 8 or 12 oz or more. The terms *lean* and *extra lean* used on food labels describe the fat content of meats, poultry, and seafood.²⁵ To qualify as extra lean, the item must have less than 5 g of fat, less than 2 g of saturated fat, and less than 95 mg of cholesterol per serving (100 g, or approximately 3–3.5 oz). Ground beef is labeled differently and uses percentage, such as 90% lean, indicating that it contains 10% fat. Choose ground beef with as high a percentage of lean as possible to reduce intake of total and saturated fats. Intake of processed sandwich-type meats should be minimized and, when used, should be low in saturated and *trans*-fats and low in sodium and ideally contain no nitrites or nitrates as they are potential carcinogens.

Ground turkey can be a good substitute for ground beef if it comes from the white breast meat and contains no skin. Chicken, turkey, and other poultry can be baked or prepared with or without the skin, but the skin should be removed before eating to reduce intake of fat and saturated fat. Game birds, such as wild turkey, wild duck, pheasant, and quail, are generally much leaner than their domesticated counterparts. Ostrich and bison (American buffalo) are also low in total fat, saturated fat, and cholesterol.

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The cardioprotective benefits of fish consumption, especially fatty fish, have been well documented.¹⁹ Some concerns, however, have been raised in regard to certain individuals and in those consuming 5 or more servings a week, because of varying amounts of fish contaminants. Federal guidelines for pregnant women, women who could become pregnant, and young children emphasize the importance of avoiding consumption of shark, king mackerel, tilefish, and swordfish because of their higher mercury levels. The amounts of EPA and DHA found in commonly consumed fish, as well as amounts of contaminants, are highlighted in a 2006 study.²⁶ Including a variety of fish in the diet will maximize the health benefits associated with fish while reducing exposure to harmful substances. Fish that is breaded and fried or topped with a high-fat sauce was not part of the traditional Mediterranean diet. Healthier preparations include fish that is baked, broiled, or lightly sautéed in canola oil.

The association between egg consumption and risk of heart disease has been debated for many years. The issue centers on egg yolks and their high cholesterol level of approximately 213 mg per large egg. Dietary cholesterol, however, seems to have a less significant effect on serum cholesterol and heart health than do saturated fats and *trans*-fats. A large egg has approximately 1.6 g of saturated fat, all in the yolk, whereas the egg white is a source of high-quality protein. Both the yolk and the white contain small amounts of other important nutrients. In 2006, the AHA¹ okayed the consumption of up to 1 egg a day for healthy adults but emphasized taking into consideration total daily cholesterol intake (see Table 3). Two egg whites can be used in place of 1 whole egg to reduce consumption of saturated fat and cholesterol. Cholesterol-free and fat-free egg substitute products are also available.

Milk was seldom used as a beverage by itself in the traditional Mediterranean diet, but yogurt and cheese were frequently consumed in many Mediterranean regions. Most yogurt and cheese varieties are good to excellent sources of protein and calcium and contain other valuable vitamins and minerals. Choose yogurt that is labeled “contains active yogurt cultures” to be sure that the yogurt retains its beneficial bacterial cultures. Cheese in the traditional Mediterranean diet was natural, not processed, and usually consumed in small amounts. Full-fat cheese can be part of a healthy diet, but portion size needs to be limited. To reduce intake of saturated fat and cholesterol, choose low-fat yogurts and cheese. Lactose-free dairy products are available, as well as plant-based milk and cheese products, including soy and rice milks and soy cheese.

High in legumes. Legumes (dried beans, peas, lentils) are found in every Mediterranean country. Because legumes are inexpensive and rich in protein, they are frequently used as a meat substitute. Legumes are also high in fiber, especially soluble fiber, and contain vitamins, minerals, and beneficial phytochemicals. These special plant foods make nutritious additions to soups, stews, salads, and other dishes. MyPyramid¹⁴ considers one-fourth cup of cooked legumes as a 1-oz equivalent from the meat and beans group (see Table 3). Some of the more common Mediterranean legumes include black beans, white cannellini beans, chickpeas (garbanzo beans), green and red lentils, red kidney beans, and lima beans.

Cereal and Grain Intakes

High in whole grains and fiber. Breads, pastas, and other grain-based foods consumed in the traditional Mediterranean diet were made from whole-grain flours that are rich sources of nutrients vital to health. The entire grain kernel (bran, germ, and endosperm) is retained in whole grains and whole-grain products. Many of these nutrients are lost or reduced when flour is refined and processed. Only a few nutrients are added back after the refining process, hence the term *enriched flour*. Whole grains, along with fruits and vegetables, also contain varying amounts of fiber. The 2 types of fiber are classified as soluble (viscous) or insoluble. Both types are found only in plant foods, with one or the other type predominating. A high total dietary fiber intake is associated with a lower risk for heart disease, but soluble fiber seems to have a greater capacity to reduce serum LDL cholesterol levels than insoluble fiber does. Of all the grains, oats (oatmeal, rolled oats, oat bran, and oat flour) have the highest proportion of soluble fiber, derived from β -glucan. Whole-grain barley and psyllium also contain significant amounts of soluble fiber.

Evidence continues to accumulate regarding the health benefits of fiber and whole grains over refined grains.^{27,28} Consumers, however, need to be aware that food products carrying labels such as “multigrain,” “stone-ground,” or “100% wheat” are not necessarily whole-grain products, as they may contain only a small amount of whole grains, or none at all. A true whole-grain product must use language such as *whole wheat*, *stone-ground whole wheat*, or *100% whole-grain rye* as the first item in the ingredient list on the food package. The Whole Grains Council²⁹ has created 2 postagelike stamps for use on certain food packages to help consumers recognize whole-grain products. Both stamps (Figure 2) carry the message “Eat 48 g or more of whole grains daily.” This is the amount of whole grains in the 3 servings (1 serving is equivalent to 1 oz) recommended for adults.



Figure 2. Stamps created by the Whole Grains Council for appropriate food products. The Basic Stamp is for products with at least 8 g of whole grains per serving (half a serving of whole grains); the 100% Stamp is for products that contain only whole grains and have at least 16 g of whole grains per serving (one full serving of whole grains). Reprinted with permission from the Whole Grains Council.²⁹

A fat-modified diet that provides 25 to 30 g of fiber per day (7 to 13 g soluble fiber) is recommended for lowering lipid levels and reducing CVD risk.³⁰ The 2005 Dietary Guidelines for Americans¹³ advise that at least half of all grains consumed should be whole grains, with at least 3 oz of whole grains consumed daily (see Table 3). If from whole grains, 1 slice of bread; 1 cup of ready-to-eat cereal; or one-half cup of cooked pasta, rice, or cooked cereal is typically considered a 1-oz whole-grain equivalent.

At least half of all grains consumed should be whole grains, with at least 3 oz of whole grains consumed daily.

Fruit and Vegetable Intakes

High in fruits and vegetables. Fruits and vegetables, along with other plant foods, were the mainstay of the traditional Mediterranean diet. Amid ongoing debate over which dietary plan provides the most heart-healthy benefits, one common factor seems to stand out: a strong emphasis on fruit and vegetable intake. Plant foods contain hundreds, if not thousands, of health protective compounds, and the benefits for heart health likely result from the multiple effects of these diverse phytochemicals.³¹ The pigments that give fruits and vegetables their coloring provide many of the antioxidants that help the body ward off damage by

free radicals. In general, the deeper the color, the higher the antioxidant levels in these foods. Nevertheless, all fruits and vegetables, regardless of color, contain a variety of phytochemicals, and each offers unique health benefits. Fruit was typically used as a dessert in the traditional Mediterranean diet.

Numerous studies indicate that high fruit and vegetable consumption can have a positive effect on factors associated with CVD, including stroke, blood pressure, and diabetes.^{32–34} In 2007, the Centers for Disease Control and Prevention, Produce for Better Health Foundation, and their national partners replaced the longstanding “5 A Day” campaign with a new public health initiative: “Fruits & Veggies—More Matters™.”³⁵ This initiative is based on the 2005 Dietary Guidelines for Americans.¹³ MyPyramid,¹⁴ which carries the messages of the Dietary Guidelines, recommends 4 fruit servings (2 cups) and 5 vegetable servings (2.5 cups) daily for a reference 2,000-cal intake (see Table 3). A serving is approximately one-half cup. Exceptions include raw leafy vegetables (1 cup) and dried fruit (one-fourth cup). The DASH Eating Plan¹² also recommends at least 9 servings of fruits and vegetables daily (4–5 fruit servings and 4–5 vegetable servings) (see Table 3). A variety of fruits and vegetables are encouraged, especially dark green and orange vegetables and legumes. Fresh, frozen, canned, dried, and 100% juices are all acceptable forms. Juice, however, should be used in moderation as it can have more calories and less fiber than the actual fruit itself. When opting for canned vegetables, look for those labeled *low sodium*. Choose canned fruit in light syrup or its own juice rather than in heavy syrup.

Nut and Seed Intakes

Moderate in nuts and seeds. Nuts and seeds are high in calories and fat, but most of the fat is unsaturated. Nuts and seeds provide protein, many vitamins and minerals, fiber, plant sterols, and numerous other antioxidants and phytochemicals. Different nuts and seeds contain their own unique combination of nutrients, and some seem to offer special benefits for heart health, such as walnuts and almonds. Walnuts, especially the more commonly used Persian and English varieties, are the only nuts that contain significant amounts of the omega-3 fatty acid ALA. Almonds are high in MFAs and have more calcium and fiber than most other nuts do. They are also an excellent source of vitamin E. Sesame seeds are high in MFAs and are a good source of calcium, iron, and phosphorus. Other seeds with possible health benefits, such as pumpkin and sunflower seeds, were not likely part of a traditional Mediterranean diet as they were native to North and/or Central America.

Flaxseeds were previously discussed under “high in polyunsaturated fats.”

Findings from various studies indicate a fairly consistent inverse association with nut consumption and risk markers of CHD, including increased HDL cholesterol levels and reduced total cholesterol and reduced triglycerides.^{8,36} Consuming 0.75 to 1 oz of unsalted nuts daily or up to 5 oz weekly as part of a heart-healthy eating plan is suggested to provide cardiovascular benefits.³⁰ The DASH Eating Plan¹² suggests having 4 to 5 servings of nuts or seeds per week, or approximately 1.5 servings per day, based on a 2,000 daily calorie level (see Table 3). A serving is considered approximately one-third cup of nuts (1.5 oz) or 2 tablespoons of seeds (0.5 oz). MyPyramid¹⁴ states that 0.5 oz of nuts (~7 walnut halves or ~12 almonds) or 0.5 oz of seeds can be considered a 1-oz equivalent from the meat and beans group. Keep in mind that the number of nuts and seeds in a serving can vary depending on size. In general, a 1-oz serving of nuts provides between 150 and 200 cal, whereas a 1-oz serving of seeds may be slightly less.

Alcohol Intakes

Low to moderate in alcohol. Alcoholic beverage intake varies greatly among the different Mediterranean regions. When alcohol is used, it typically accompanies a meal. Many studies over the past several decades have examined alcohol consumption and its association with a reduced risk of heart disease.³⁷ One of the best-known effects of alcohol is a small increase in HDL cholesterol.³⁸ Alcohol also prolongs clot formation, a benefit for most adults.³⁷

The AHA¹ does not recommend drinking any alcoholic beverage to gain these potential benefits, especially if one does not already drink alcohol. Consuming alcohol, especially in large amounts, can have many adverse effects, and abstinence is warranted for certain individuals, including pregnant women and those at risk for alcoholism. If one does consume alcohol, the AHA and the 2005 Dietary Guidelines¹³ recommend no more than 1 drink per day for women and no more than 2 drinks per day for men as part of an overall heart-healthy eating plan. A drink is considered to be 4 to 5 oz of wine, 12 oz of beer, 1.5 oz of 80-proof spirits, or 1 oz of 100-proof spirits.

Wine, especially red wine, has been suggested to confer more health benefits than do other types of alcohol. Certain components in red wine, such as the antioxidant resveratrol, may also be present in red grapes and red grape juice. At present, however, little evidence has been published that one type of alcohol provides significantly greater benefits than another.

Other Dietary Components Not Part of the Traditional Mediterranean Diet That May Also Lower Heart Disease Risk

Phytosterols

Plant sterols and plant stanols, essential components of plant cell membranes, act to reduce cholesterol absorption in the human digestive tract. The amounts, however, are very small and are typically not consumed sufficiently to exert cholesterol-lowering effects. A food-processing technique of esterification helps to make these beneficial plant components easier to incorporate into foods with a relatively high fat content, such as margarines and salad dressings. Newer techniques have enabled plant sterol/stanol esters to be incorporated into low-fat foods, such as low-fat milk, yogurt, and some cereals and granola bars. Also, free, or “unesterified,” plant sterols/stanols are currently found in a few products, such as orange juice.

The AHA¹ notes that “plant stanols/sterols lower LDL cholesterol levels by up to 15%, and therefore are seen as a therapeutic option, in addition to diet and lifestyle modification, for individuals with elevated LDL cholesterol levels.” The AHA also reports that maximum cholesterol-lowering effects of plant stanols/sterols are observed at daily intakes of approximately 2 g. A similar supporting statement from the NCEP¹¹ says, “daily intakes of 2–3 g of plant stanol/sterol esters will reduce LDL cholesterol by 6%–15%.” Both esterified and unesterified sterols and stanols seem to provide similar cholesterol-lowering effects.³⁰

Soy

Earlier research suggested that soy protein had beneficial effects on LDL cholesterol and other CVD risk factors. Conflicting results of recent studies, however, have cast doubt on the purported heart-health benefits of soy consumption. The AHA¹ has modified its original position linking soy protein with reduced risk of CHD and currently says that any direct benefit of consuming soy protein on blood cholesterol levels is minimal, even with large daily amounts. The AHA further comments that soy isoflavones seem to have no effects on various lipid risk factors.³⁹

The AHA¹ states, however, that substituting soy protein for some animal protein may reduce overall dietary cholesterol and saturated fat intake.³⁹ Soy may thus play an indirect role in having a positive effect on coronary health. Including some soy protein in the diet may also provide other healthful benefits. Soy, a complete protein, contains all the amino acids required by the human body. In addition to being low in saturated fat and having no cholesterol, soy is a good source of fiber, potassium, folic acid, and other

essential vitamins and minerals. Soy also contains numerous phytochemicals with potential health benefits. Many soy products are available, including soy nuts, edamame (whole soybeans), soy flour, soymilk, tofu, and soy-based meat substitutes.

Conclusions

Evidence continues to accrue that the traditional Mediterranean-style dietary pattern helps reduce risks of CVDs. Each of the common foods and nutrients in this whole-diet approach makes unique contributions to cardiovascular health. Specific and practical recommendations for consumers on this general dietary pattern will facilitate dietary behavior change and adherence, leading to positive health benefits. A key component of this dietary approach is awareness and use of appropriate portion sizes. Along with diet, other healthy lifestyle behaviors, including regular physical activity, avoidance of smoking, maintenance of an appropriate weight, and stress management, may also help to reduce risks of CVDs, as well as other chronic diseases, such as certain cancers and type 2 diabetes.

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