

EAT LIKE YOU'RE IN CRETE:

Teach Your Clients the Benefits of the Mediterranean Diet

by Janet Bond Brill, Ph.D., R.D.

LEARNING OBJECTIVE

- To provide health/fitness professionals with a three-part, heart-healthy eating strategy to recommend to their clients: 1. identify which foods are most harmful (cholesterol-raising) and need to be subtracted from the diet, 2. identify which low-density lipoprotein-lowering functional foods can be substituted into the diet, and 3. identify the ingredients of the Mediterranean style of eating, an eating plan that has numerous beneficial health effects including a significantly reduced risk of coronary artery disease.

Key words:

Coronary Artery Disease, Cholesterol, Risk Factors, Saturated Fat, Trans-Fat

According to the most recent 2007 American Heart Association (AHA) statistics (1), coronary artery disease (CAD) remains the leading cause of death in the United States. With over 105 million American adults with elevated total cholesterol levels (a major risk factor for CAD), it is imperative that health/fitness professionals familiarize themselves and their clients with dietary measures that lower the most atherogenic type of cholesterol, low-density lipoprotein (LDL) cholesterol, and protect the cardiovascular system. Three dietary interventions have been shown to effectively reduce

LDL cholesterol and promote cardiovascular health; therefore, an ideal heart-healthy eating strategy would combine and incorporate all three:

- identifying and subtracting out cholesterol-raising foods (saturated fat, trans-fat, and dietary cholesterol)
- adding into the diet a combination of scientifically proven cholesterol-lowering functional foods such as soy protein, plant sterols, and foods high in viscous soluble fiber
- making these changes using the Mediterranean style of eating as a background diet or as a basis for making more general dietary choices.

Before delving into this three-part, heart-healthy eating regimen, let's begin by reviewing the biochemistry of dietary fat which, as you will soon see, has a marked effect on serum cholesterol levels and the health of the cardiovascular system.



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FATS 101, A QUICK LESSON IN FAT CHEMISTRY

Not all fats are created equal, so it's important to understand the good from the bad. The chemistry of fats is complicated, but the message isn't. Basically, unsaturated fat is more heart-healthy, and saturated fat promotes heart disease.

Unsaturated fats are “good” or “protective” fats found in plant oils, nuts, seeds, and fish. Whether they are mostly monounsaturated (olive oil, canola oil, almonds, avocados) or polyunsaturated (safflower oil, sunflower oil, cottonseed oil, corn oil), unsaturated fats, especially the omega-3-rich fats (flaxseeds, salmon, tuna, mackerel), are beneficial in the diet, particularly when they replace saturated fats.

Saturated fats are found in butter, meats, full-fat dairy products, coconut oil, and palm oil. They don't have double bonds, so they are more rigid. Once consumed, they are incorporated into LDL particles, making the LDL more atherogenic (2). This compositional change impedes the liver from clearing LDL from the bloodstream. When that happens, LDL builds up in the bloodstream, and potential trouble ensues.

The skinny on fats

When we eat fat (butter, cream, olive oil, etc.), we consume a large number of the main constituent of fats and oils, triglyceride (also known as triacylglycerol) molecules. A fat is considered saturated or unsaturated on the basis of the chemistry of the three chains of fatty acids attached to the triglyceride backbone, glycerol (Figure 1).

There are three types of fatty acid chains: saturated, monounsaturated, and polyunsaturated. If the chain is short

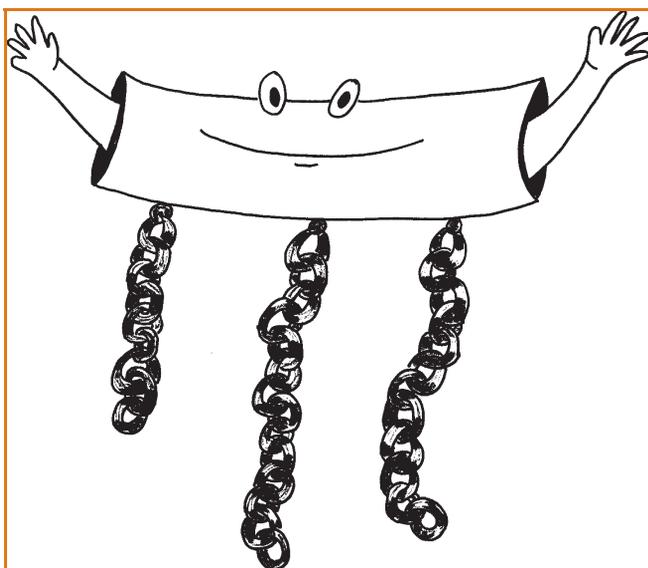


Figure 1. Most of the fat you eat is in the form of triglycerides. Note the difference between saturated and unsaturated fatty acid chains attached to the glycerol backbone; each chain depicts a different type of fatty acid (saturated, monounsaturated, and polyunsaturated). Illustration by Eileen Eskin Brill.

Make monos your main fat

All oils contain a combination of the three types of fatty acids: saturated, monounsaturated, and polyunsaturated. *It is the percentage of each type of fat in the oil that confers the health label to some oils but not others.*

Another strategy you can use to get your omega-6 intake down is to make monounsaturated fat the main fat in your diet (olive oil is the dominant fat source in the Mediterranean diet). Monounsaturated fats keep LDL cholesterol low while boosting the “good” high-density lipoprotein (HDL) cholesterol. Nuts (especially almonds), avocado, and olives are all excellent sources of monounsaturated fats, plus they provide you with healthful amounts of fiber, vitamins, minerals, and plant chemicals. The following are some fat (and oil) facts that you should know:

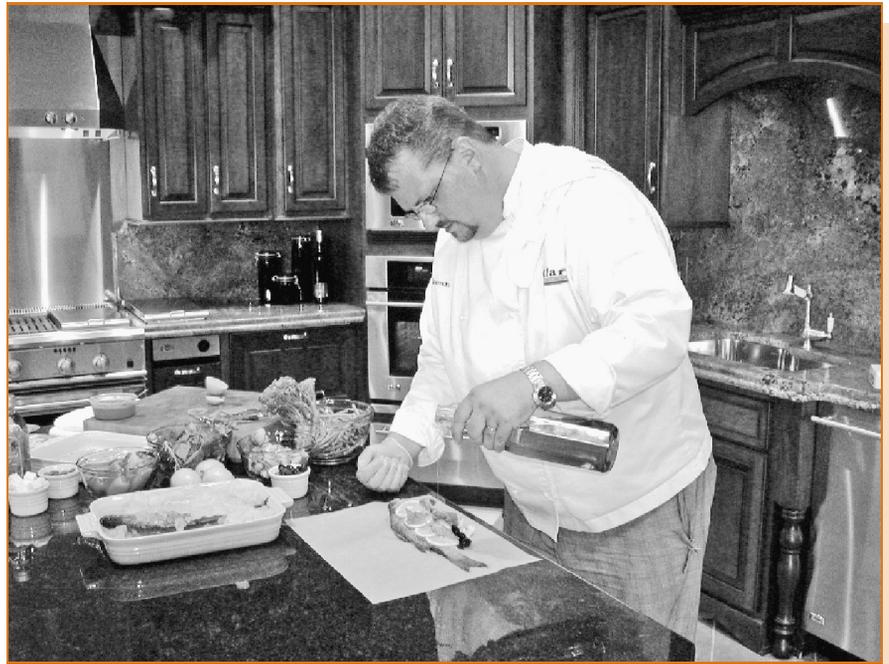
- Tropical oils are not sold on supermarket shelves but are hidden in processed foods. Unlike most other plant oils, they are highly *saturated*: coconut oil (85%), palm kernel oil (78%), and palm oil (51%).
- Other fats and oils containing a large amount of *saturated* fat are butterfat (54%), beef fat (51%), and lard (41%).
- Olive oil has the largest percentage (77%) of *monounsaturated* fat (the omega-9 monounsaturated fatty acid, oleic acid).
- Safflower oil has the largest percentage (78%) of *polyunsaturated* fat (the omega-6 polyunsaturated fatty acid, linoleic acid).

and straight and there are no double bonds (meaning the carbon atoms are fully saturated with hydrogen atoms), then the fatty acid is saturated. Saturated fat usually appears solid at room temperature and often is referred to as “fats” or “butter.”

Unsaturated fatty acids are longer chains that have either one double bond (meaning there is one spot on the chain that is missing two hydrogen atoms), hence “monounsaturated”; or several double bonds (where there are several spots on the chain where the carbon atoms are missing hydrogen atoms), hence “polyunsaturated.” If the fat is liquid at room temperature, it's a sure bet that a large percentage of the chains on the triglyceride molecules is unsaturated. These fats often are referred to as “oils” and are most likely better for your heart health.

Polyunsaturated fatty acids also are known as essential fatty acids; “essential” because humans lack the enzymes needed to synthesize them internally; hence, we must eat them in our diet.

There are two types of essential fatty acids: omega-6 and omega-3. There is some concern among nutritionists that Americans eat far too many omega-6's and not enough omega-3's, an imbalance that can adversely affect our health. Specifically, with regard to heart disease, a high intake of omega-6 fatty acids (primarily linoleic acid) stimulates an inflammatory environment in the endothelial cells and the intima layer that constitute the inner arterial wall. Increasing omega-3 fatty acid consumption (e.g., by eating fatty cold water fish) will not only reduce inflammation, but it also will strengthen your immune system (hence the potential use of omega-3's in treating immune dysfunction conditions such as lupus, arthritis, and allergies). Omega-3 fatty acids also help keep your arteries more flexible and reduce the potential for blood to clot, two key factors that lessen your chances of a fatal heart attack.



HEART-HEALTHY EATING STRATEGIES

Strategy #1: Cut back on the three dietary evils

If your diet is high in the three evils—saturated fat, dietary cholesterol, and trans-fat—you will most likely have limited success in lowering your LDL cholesterol level. This is because these types of dietary lipids all raise your level of circulating LDL.

Saturated fat, the first dietary evil.

Saturated fat is the worst offender in terms of raising LDL levels. Not to be confused with dietary cholesterol (coming only from animals), saturated fat is found in *both* animal and plant products. However, animal foods provide most of the saturated fat in the American diet (Figure 2).

Why does saturated fat cause LDL to go up? Saturated fatty acids raise LDL by decreasing the activity of cholesterol receptors on liver cells (3). LDL receptors are proteins located on liver cell membranes that remove circulating LDL cholesterol. A reduction in intake of saturated fatty acids lowers LDL cholesterol levels by increasing LDL receptor activity.

Saturated fat not only raises LDL cholesterol, but also promotes insulin secretion from the pancreas, a potential contributing factor for insulin resistance, a disorder thought to precede the development of diabetes. By the way, just like cholesterol, some saturated fat is required by your cells for good health, but your body can manufacture all the saturated fat it needs, so don't worry about cutting way back!

Maximum daily intake. To maximize LDL cholesterol lowering, you should consume less than 7% of your total daily caloric intake from saturated fat (or <15 g of saturated fat per 2,000 cal) (4). (a fast food double quarter pound burger with cheese contains 19 g of saturated fat; 4 g more than the daily maximum!)

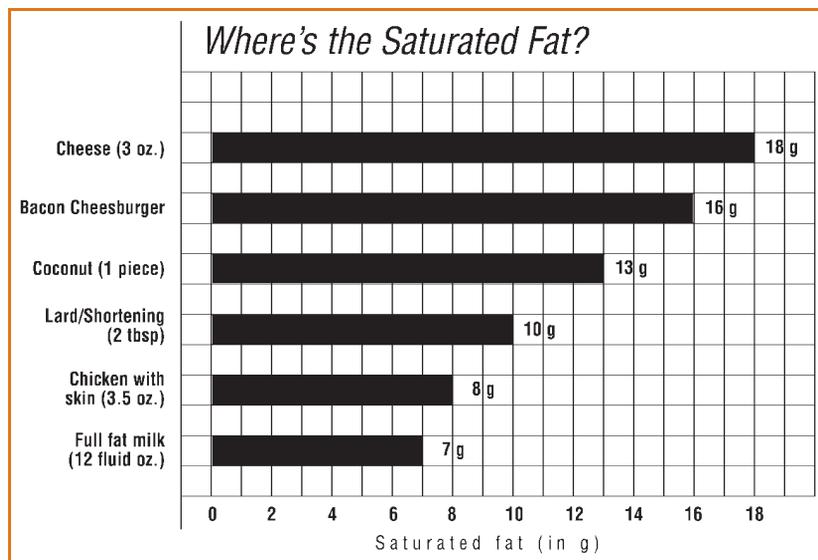


Figure 2. Saturated fat is found in foods of animal origin and in tropical plant oils (foods with fat that hardens at room temperature). Saturated fat is the most potent LDL cholesterol-raising substance.

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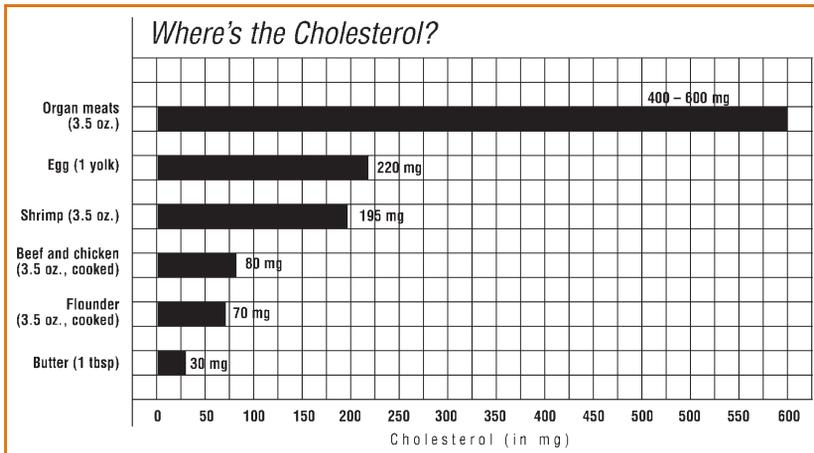


Figure 3. Cholesterol is found solely in foods of animal origin. Eating dietary cholesterol can raise your LDL cholesterol level.

Cholesterol, the second dietary evil.

Cholesterol is found only in the cells of animals. That means that foods such as meat, chicken, fish, milk products, and eggs contain cholesterol. Forget the pâté, an extreme amount of cholesterol is found in organ meats such as liver (just 3 oz of chicken liver contains an astounding 537 mg) (Figure 3).

It has been known for some time that diets high in cholesterol raise LDL levels, with most studies showing an increase of 100 mg/day in dietary cholesterol associated with an increase in plasma total cholesterol of 10 mg/dL (5). You should know, however, that if you compare eating cholesterol to eating saturated fat, it is saturated fat that is more potent in terms of its cholesterol-raising effect. Plus, we tend to consume much more saturated fat (measured in grams) than cholesterol (measured in milligrams). That said, controlling the intake of both dietary cholesterol and saturated fat is important for keeping LDL cholesterol at a safe level.

Is it okay to eat eggs? Whether eggs really raise cholesterol has been a topic of contention in the nutrition world for years. Recent research has shown that there is a wide variation in the LDL-raising response of ingesting dietary cholesterol. In one study, some individuals fed eggs (high in dietary cholesterol) did not experience a rise in LDL cholesterol (termed “hypo-responders”), whereas others showed a significant elevation in LDL cholesterol (termed “hyperresponders”). The results led the researchers to conclude that there may be a strong

Europe leads the way in policing food manufacturers. In 2003, Denmark instituted a ban on all products containing more than 2% trans-fat for every 100 g of fat. Here in the United States, bans on trans-fat are still in their infancy. Trans-fat continues to be used in thousands of restaurants and food products from sea to shining sea.

genetic component regarding an individual’s serum cholesterol response to eating dietary cholesterol (6).

Eggs are a highly nutritious food, low in saturated fat and full of healthy nutrients such as protein, iron, zinc, B vitamins, and vitamins D and E. Unfortunately, eggs also are a concentrated source of dietary cholesterol, albeit newer studies have found that eggs contain less cholesterol than previously thought. Keep in mind that all the cholesterol is found in the yolk. Egg whites contain high-quality protein and are very low in calories (one large egg white contains 17 cal and 4 g of protein) and can pretty much be eaten with abandon.

So, if your client’s goal is to lower elevated LDL cholesterol, should you recommend limiting egg consumption? Absolutely! The reason is that most of us are unaware of whether we are hyperresponders or hyporesponders to dietary cholesterol. In addition, more recent research found that egg consumption, in particular, adversely affects the lipid profile by raising the ratio of total cholesterol to HDL cholesterol (7). Keep in mind too that the National Cholesterol Education Program (NCEP) recommends a maximum intake of just 200 mg of cholesterol per day for those individuals trying to lower LDL cholesterol through dietary means. Therefore, if you eat just one egg yolk (which contains between 213 and 220 mg of cholesterol), you’re over the top. Another problem with eggs is that they are hidden in many foods that we typically consume such as pancakes, breads, sauces, and desserts. Combine those foods with the one or two eggs you consciously consume, and it’s easy to go way over your egg limit. Considering that eggs contribute approximately one third of the cholesterol in our food supply (8), cutting way down on yolk intake would appear prudent.



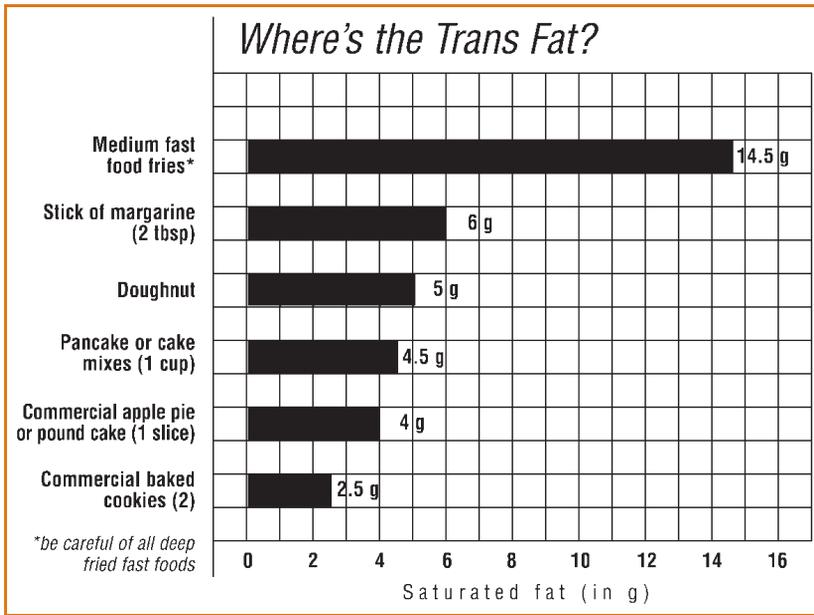


Figure 4. Food manufacturers use the process of hydrogenation to turn plant oils into butterlike fats. The end result is trans-fat—bad news for your heart and arteries. Think deep-fried fast foods and commercial packaged foods for high amounts of trans-fat.

I recommend to my patients that they chuck the yolks whenever possible and replace them with egg whites and egg substitutes.

Maximum daily intake. The NCEP recommends that individuals trying to lower LDL through dietary means should consume no more than 200 mg of cholesterol per day (4).

Trans fat, the third dietary evil.

Trans-fat is an insidious threat to public health. Found in countless processed foods, this manmade mutant fat not only raises LDL, but also lowers “good” HDL cholesterol. In 2004, a U.S. Food and Drug Administration advisory panel concluded that consumption of trans-fatty acids raises LDL (“bad”) cholesterol levels, which increase the risk of CAD (9). What’s more, a high level of trans-fat consumption has been linked to inflammation in the blood vessels (a risk factor for heart disease) (10) and can even morph the makeup of the LDL particle from fat and fluffy to small and dense (the dangerous kind) (11).

The main source of trans-fat in most Americans’ diets is commercial baked goods, such as cakes, pies, doughnuts, sweet rolls, biscuits, muffins, pancakes, quick breads, cookies, and crackers. French fries, chips, and popcorn also are generally high in trans-fat. Trans-fats are derived from vegetable oils, which are liquid in their natural state. Faced with the problem that cheap vegetable oils do not keep well, food manufacturers found a way to change the chemical structure of these liquid vegetable oils by adding hydrogen, a process called hydrogenation. The new partially solidified fat makes margarine and peanut butter easier to spread and extends the shelf life of

cookies and other packaged baked goods. Good for the food manufacturers, bad for the consumer (Figure 4).

Maximum daily intake. None! Clear and to the point, a 2002 Institute of Medicine/National Academy of Sciences report states that “trans-fatty acids...have no known beneficial role in preventing chronic disease and are not required at any level in the diet” (12). The U.S. Department of Agriculture’s recently released *Dietary Guidelines for Americans 2005* recommends that consumers “keep trans-fatty acid consumption as low as possible” (13). The latest 2006 AHA updated diet and lifestyle recommendations (14) set a goal for trans-fatty acids of less than 1% of total calories.

Food manufacturers are now required to list trans-fat on the Nutrition Facts panel (directly underneath the saturated fat line), so make sure to be vigilant about reading those labels for partially hydrogenated vegetable oils!

Strategy #2: Eat a combination of LDL-lowering functional foods

Both the AHA (15) and the NCEP Adult Treatment Panel III (4) recommend the inclusion of a multitude of functional foods, each scientifically proven to reduce LDL cholesterol, as a means to enhance the effectiveness of cholesterol-lowering diets. These functional foods include plant sterols, soy protein, nuts, and viscous fibers such as the beta-glucan in oatmeal.

Scientists out of Toronto, Canada, were the first to show that the combination of several functional foods into one

If a client has already been diagnosed with heart disease...

Will switching to a Mediterranean-type diet help prevent someone already diagnosed with CAD from succumbing to a fatal heart attack? That question is precisely what the classic and long-running French Lyon Diet Heart Study (19) has tried to answer. Without question, and compared with a typical Western diet, the Mediterranean diet provided a striking protective effect, with those high-risk patients following the Mediterranean pattern of eating, exhibiting a 50% to 70% lower risk of a recurrent event.

Researchers in the Netherlands also have experimented with just this question, and the results concur. When heart disease patients were put on a Cretan-style diet, the study authors reported a 70% lower death rate in those following the Mediterranean diet as compared with those adhering to a control diet (20).

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Figure 5. Learn to eat like you're in Crete! Plenty of fish, olives and olive oil, nuts, fruit, green leafy vegetables, and whole grains are the key to heart health and longevity.

diet is highly effective in promoting a significant reduction in LDL cholesterol (16). The four primary components of the diet included plant sterols (in the form of plant sterol-enriched margarine), viscous fiber (from oats, barley, psyllium, okra, and eggplant), soy protein (from soy milk and soy meat analogues), and almonds—all added into a plant-based diet (high in fiber, vegetable proteins, and unsaturated fat).

Eat more plants and fewer animals for better cholesterol reduction.

Research out of Stanford University compared the LDL cholesterol-lowering potential of a low-fat diet high in plant foods (fruit, vegetables, whole grains, fresh garlic, legumes, and soy protein) to a traditional low-fat diet without many plant foods (refined grains, lean animal protein, processed low-fat food products) (17). After a mere 4 weeks, the plant-based, low-fat diet group reduced LDL by 9.3%, twice that of the 4.6% reduction seen in the traditional low-fat group. The low-fat plant food diet contained a greater quantity of vitamins and minerals and four times the dietary fiber of the traditional low-fat diet. Thus, simply eating a low-fat diet without making it plant based is not as effective a strategy for significantly reducing LDL cholesterol.

Strategy #3: Change to the Mediterranean style of eating

Pioneer nutrition researcher Ancel Keys (he died in November 2004 at the age of 100) showed in his landmark *Seven Countries Study* just how powerful the connection is between diet, cholesterol, and heart disease (18). So *avant-garde* was his thinking (that good health was related to what was routinely served on the dinner table) that he was awarded the distinction of a *Time* magazine cover in 1961.

Tips to eat like you're in Crete are as follows:

- Cook with olive oil (use it for sautéing, in salad dressing, and as a coating for grilled vegetables and fish) and use flaxseed oil (great in salad dressing) whenever possible (high in omega-3's).
- Routinely eat a variety of oily fish high in omega-3's (tuna, salmon, mackerel, herring, anchovies, and sardines) in place of meat and poultry.
- Eat whole-grain foods at every meal (such as oatmeal for breakfast, a whole-wheat pita sandwich for lunch, and whole-grain pasta for dinner).
- Eat dark leafy greens frequently, such as spinach, arugula, and kale.
- Eat legumes such as lentils, peas, and beans (soups such as lentil or minestrone are a delicious way to get in legumes).
- Eat a few pieces of fresh fruit every day.
- Use generous amounts of garlic and onion to flavor food.
- Eat a handful of nuts every day.
- If you drink alcohol, have a glass of red wine with dinner.

The *Seven Countries Study* (conducted from 1958 to 1970) analyzed and compared the diet and lifestyles of thousands of people living in Finland, Italy, Greece, the Netherlands, Japan, the United States, and Yugoslavia. The data revealed that in countries where people consumed a diet high in saturated fat, there was a corresponding high level of blood cholesterol and a significantly higher rate of heart attack and stroke. In fact, the death rate for heart disease in southern Europe was half that of northern Europe and the United States!

Eat the Mediterranean way: Live longer

Scientists studied the dietary habits of 22,043 inhabitants of Greece to investigate if the Mediterranean diet would affect longevity (24). After scrupulous analysis of participants' dietary intake, it was determined after a 44-month follow-up that a higher degree of adherence to the Mediterranean diet was associated with a 75% reduction in all-cause mortality as well as an inverse association between adherence to the Mediterranean diet and death from both CAD and cancer.

Keys paid particular attention to the traditional diet of the people living on the small Greek island of Crete. Inhabitants of Crete were found to have one of the lowest rates of heart disease in the world and an unusually long life expectancy. Keys noted that the long-lived islanders' diet was filled with fish, olives, olive oil, fruits, whole grains, fresh wild vegetables, little red meat, and an abundance of red wine with meals. This eating pattern is very low in saturated fat and high in monounsaturated fat (olive oil), omega-3 fats (fish), vitamins, minerals, antioxidants, and fiber. Thus, Keys' novel findings revealed to the world for the first time that risk of death from cardiovascular disease is strongly related to both the level of saturated fat in the diet and the amount of blood cholesterol. The concept of the Mediterranean diet was born (Figure 5).

Eat fish for heart health. Omega-3 fats come in two types: the short-chain variety (found in plant foods such as flaxseeds, canola oil, and walnuts) and the long-chain variety (found in high concentration in fatty fish such as salmon, mackerel, sardines, albacore tuna, lake trout, and herring).

A large amount of scientific evidence supports the role fish consumption plays in promoting heart health—so much so that the AHA recommends that all Americans consume at least two servings of fish per week. In Harvard Medical School's Nurses Health Study (21), the risk for stroke was significantly less in those women consuming fish at least twice per week compared with those eating fish less than once per month. Consistent with this, scientists in Greece found that regular fish eaters (consuming more than 300 g/week—which is approximately 11 oz, or about a 4-oz serving of fish three times a week) showed suppressed markers of unhealthy inflammation compared with the nonfish eaters (22). Interestingly, the researchers noted that taking omega-3 fat in the form of a supplement has a much less pronounced anti-inflammatory effect than getting it from eating fish. In addition, high dosages of fish oil supplements have been shown to raise LDL cholesterol by as much as 31% (23).

In summary, omega-3 fats are prized for their ability to suppress the occurrence of fatal heart arrhythmias (a disorder of the electrical conductivity of the heart) and “sudden death” as well as their triglyceride-lowering and HDL-boosting power. Furthermore, omega-3 fatty acids are cardioprotective because of their potent ability to fight inflammation by directly increasing the production of anti-inflammatory substances as well as favorably modifying the fatty acid composition of phospholipids and cholesterol esters circulating in the bloodstream. However, take note that the Mediterranean diet is high in both omega-3 polyunsaturated fatty acids and monounsaturated fat (such as oleic acid found in olive oil). Monounsaturated fats have a different cardioprotective mechanism than omega-3's. Ingesting a diet high in olive oil, for example, has a direct LDL-lowering effect in addition to significantly reducing the production of a precursor of several highly proinflammatory

substances. What's more, LDL particles enriched with monounsaturated fat are less susceptible to oxidation, a key factor in the progression of the atherosclerotic process (25). The take-away message here is that both omega-3 and monounsaturated fatty acids are beneficial to heart health. Eating a Mediterranean-style diet high in *both* monounsaturated fat (olive oil, almonds, and avocado) and omega-3's (fatty fish and flaxseeds) and low in saturated fat is the ideal eating strategy for preventing heart disease.

SUMMARY

Millions of Americans have high cholesterol, a major risk factor for CAD, the single largest killer of men and women in this country. Health/fitness professionals should advise clients to monitor their LDL cholesterol and encourage them to control cholesterol and protect their hearts by exercising, maintaining a healthy weight, and following this three-part, heart-healthy eating strategy: 1. decrease intake of the three dietary evils: saturated fat, cholesterol, and trans-fat; 2. add in a combination of cholesterol-lowering functional foods; and 3. utilize the Mediterranean style of eating as a general guideline for making healthful dietary choices.

To reap the health benefits of a Mediterranean diet, teach your clients to eat the Mediterranean way—adding in an abundance of fish, olives and olive oil, fresh fruit, dark green leafy vegetables, nuts, garlic, whole grains, and red wine. Indeed, the Mediterranean pattern of food consumption is a culinary delight. This age-old, healthful approach to eating is a tasty and an easy-to-follow way to help keep heart and blood vessels healthy, and LDL cholesterol down.



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CONDENSED VERSION AND BOTTOM LINE

High cholesterol, specifically LDL cholesterol is a major risk factor for CAD. Health/fitness professionals should teach their hypercholesterolemic clients the necessity of monitoring LDL cholesterol and encourage them to incorporate a three-part, cholesterol-lowering, heart-healthy eating strategy that includes cutting down on saturated fat, cholesterol, and trans-fat intake, consuming a combination of scientifically proven cholesterol-lowering functional foods, and following a Mediterranean-style diet filled with phytochemical-rich fruits and vegetables, olive oil, whole grains, legumes, fiber, and omega-3 fatty acids.