

# Cholesterol and Heart Disease

PHYSICIANS COMMITTEE FOR RESPONSIBLE MEDICINE

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Nearly 2,200 Americans die of cardiovascular disease daily, with an average of one death occurring every 40 seconds. An estimated 7.1 million Americans have experienced a heart attack during their lifetimes. Those who survive a heart attack often go on to have another. More than 7 percent of Americans have some type of cardiovascular disease, and one out of every six deaths in the United States is due to coronary heart disease alone.<sup>1</sup> Eating habits and other lifestyle factors play a large role in determining the risk of heart disease and may prevent or even reverse this condition.

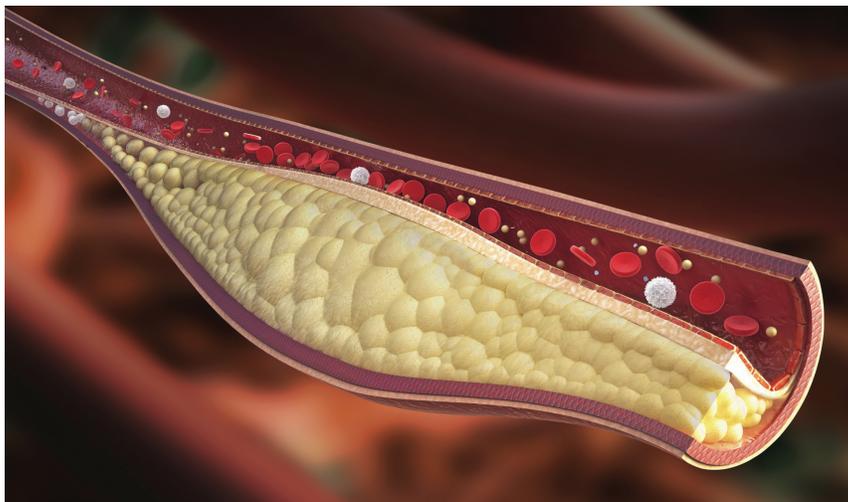
## Atherosclerosis

Atherosclerosis is a common form of heart disease, in which plaques of cholesterol and other substances (similar to small tumors) form in the artery walls and eventually restrict blood flow. This constricted circulation leads to less oxygen for the heart muscle, resulting in chest pain (angina), usually following exercise or excitement. It also stresses the heart muscle to the point of failure, which is what happens during a heart attack.

### What Is Atherosclerosis?

Atherosclerosis is not caused by old age. Examination of American casualties during the Korean and Vietnam wars showed significant atherosclerosis by age 18 or 20.<sup>2</sup> Their Asian counterparts, raised on diets consisting mainly of rice and vegetables, had much healthier arteries. The elderly are more likely to have heart conditions not because of genetics, but because they may have indulged in unhealthy habits, like smoking and poor diet, for longer periods of time. Your doctor can tell you if you are one of only about 5 percent of the population with a genetic tendency toward heart disease. Many studies show the connection between lifestyle choices and heart health. An article published by Caldwell Esselstyn Jr., M.D., in the *American Journal of Cardiology* explains that stenting and bypass surgeries may only be a solution for a minority of patients, while a transition to a plant-based diet free of cholesterol proves to be a more effective treatment.<sup>3</sup>

In 1948, William Castelli, M.D., began to monitor the population of Framingham, Mass., to study what factors influenced the rate of heart disease.<sup>4</sup> Castelli's study showed that a cholesterol level exists, below where coronary artery disease does not occur. Framingham data show that only patients with cholesterol levels of less than 150 milligrams per deciliter (mg/dl) achieve the lowest coronary artery disease risk. In the first 50 years of the Framingham Heart Study, only five subjects with cholesterol levels of less than 150 mg/dl developed coronary artery disease. Rural residents



in Asia, Africa, and Latin America typically have total cholesterol levels of about 125-140 mg/dl.<sup>4</sup>

## Cholesterol

### What Is Cholesterol?

Cholesterol is not the same as fat. If you had a bit of cholesterol on the end of your finger, it would look like wax. The liver manufactures cholesterol and sends it out to other parts of the body for the production of hormones and cell membranes. Based on the results of the Framingham Heart Study and other research, the ideal cholesterol level is below 150 mg/dl. At that point, coronary artery disease is very unlikely. Unfortunately, nearly 107 million Americans have cholesterol levels more than 200 mg/dl,1 dangerously close to 225 mg/dl, which is the average cholesterol level of coronary artery disease victims.<sup>5</sup>

According to the 2010 USDA Dietary Guidelines, the federal government's recommended maximum for dietary cholesterol intake is still as high as 300 mg. Both the American Heart Association and the National Cholesterol Education Program recommend less than 200 mg per day for people at risk for cardiovascular disease.<sup>6</sup> The amount of cholesterol in one egg exceeds this recommended maximum amount.

### Different Types of Cholesterol

When cholesterol is transported in the bloodstream, it is packed into low-density lipoproteins (LDL), sometimes called the "bad cholesterol." Although LDL is necessary in limited quantities (LDL delivers cholesterol to various parts of the body), a high LDL cholesterol level can dramatically increase your risk of a heart attack. The Centers for Disease Control and Prevention analyzed data from 2005-2008 that examined prevalence, control, and treatment of high LDL levels. Around 71 million American adults (33.5 percent) had high LDL levels, while only 34 million (48.1 percent)

received treatment. Twenty-three million (33.2 percent) had their LDL controlled.<sup>7</sup> When cholesterol is released from dead cells it is picked up for disposal by high-density lipoproteins (HDL), the “good cholesterol.” When doctors measure cholesterol levels, they first look at total cholesterol as a quick way to assess a person’s risk. For a more exact guide, they divide the total level by the HDL level. Heart attack risk is minimized by having a lower total cholesterol and a higher proportion of HDL cholesterol. The ratio of total cholesterol to HDL should be less than 4 to 1. Unfortunately, the average American male’s ratio is much higher than that, at 5 to 1. Vegetarians, on the other hand, average only about 2.8 to 1.3.

Smoking and obesity lower HDL; however, vigorous exercise and foods rich in vitamin C may increase it.<sup>8</sup>

## How to Lower Your Cholesterol

### Decrease Cholesterol Intake

Since our bodies make plenty of cholesterol for our needs, we do not need to add any in our diet. Cholesterol is found in all foods that come from animals: red meat, poultry, fish, chicken, eggs, milk, cheese, yogurt, and other dairy products. Choosing lean cuts of meat is not enough; the cholesterol is mainly in the lean portion. Many people are surprised to learn that chicken contains as much cholesterol as beef, 25 mg per ounce.<sup>9</sup> Every 4-ounce serving of beef or chicken contains 100 mg of cholesterol. Most shellfish are also very high in cholesterol. All animal products should be avoided for this reason. No foods from plants contain cholesterol, since plants do not have a liver to produce it. Every 100 mg of cholesterol in your daily diet adds roughly five points to your cholesterol level, although this varies from person to person. In practical terms, 100 mg of cholesterol is contained in 4 ounces of beef or chicken, half an egg, or three cups of milk. People can reduce their cholesterol levels dramatically by changing the foods they eat. For every 1 percent you reduce your cholesterol level, you reduce your risk of heart disease by 2 percent.<sup>10</sup> For example, a reduction from 300 mg/dl to 200 mg/dl (i.e., a one-third reduction) will yield a two-thirds reduction in the risk of a heart attack. For some people, the benefits are even greater.

### Decrease Fat Intake, Especially Saturated Fats

Keeping total fat intake low is an important way to lower cholesterol and reduce the risk of other chronic diseases. Animal products, including meat and dairy products, as well as fried food and vegetable oils are all loaded with fat. The food industry reports the fat content by weight, which allows the water content to throw off the measurements and make these products look more healthful than they actually are. The most important piece of information to look for is the percentage of calories from fat. In the leanest cuts of beef, about 30 percent of the calories come from fat. Skinless chicken is nearly as high at 23 percent. Even without the skin, chicken is never truly a low-fat food. Most cheeses contain 60 to 80 percent of calories from fat, and ice creams often contain 45 to 65 percent. Butter, margarine, and oils of all types typically contain 95 to 100 percent of calories from fat. Grains, beans, vegetables, and fruits have less than 10 percent of their calories coming from fat. Animal products also contain saturated fat, which causes the liver to produce more cholesterol. Unsaturated fats do not have this effect. Saturated fats are easy to spot because they are solid at room temperature, whereas unsaturated fats are liquid. Beef, chicken,

and most other animal products contain substantial amounts of saturated fat. This is another good reason to avoid these foods. A few vegetable oils are also high in saturated fats. These are known as tropical oils: palm oil, palm kernel oil, and coconut oil. Many packaged foods contain hydrogenated oils. These are both high in saturated fat and chemically hardened to make them solid at room temperature to increase their shelf life. While liquid vegetable oils are much better than animal fats and tropical oils, all fats and oils are natural mixtures of saturated and unsaturated fats. Therefore, none of them will do your coronary arteries any good, and consumption should be kept to a minimum.

The following chart shows the percentages of saturated fat in different kinds of fat:

Animal Fats	Tropical Oils	Vegetable Oils
Beef Tallow 50%	Coconut Oil 87%	Canola Oil 12%
Chicken Fat 30%	Palm Oil 49%	Corn Oil 13%
Pork Fat (lard) 39%	Palm Kernel Oil 82%	Cottonseed Oil 26%
		Olive Oil 13%
		Peanut Oil 17%
		Safflower Oil 9%
		Sesame Oil 14%
		Soybean Oil 15%
		Sunflower Oil 10%

While the saturated fat in oil increases your cholesterol level, the unsaturated fats cause other health problems, including increased free-radical production, an impaired immune system, and increased body weight.

### Go Vegan

A diet based on plant foods—grains, beans, vegetables, and fruits—is the best way to keep saturated fat intake low and to avoid cholesterol completely. A vegan diet is free of all animal products and yields the lowest risk of heart disease.

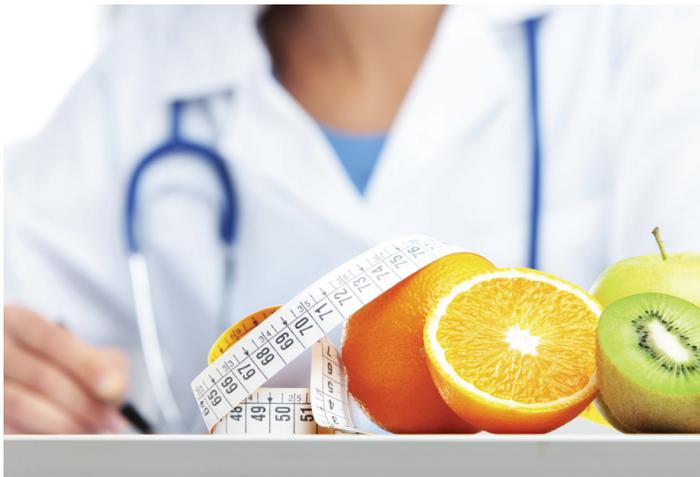
Two large cohort studies and one meta-analysis found that vegetarians had a much lower risk of dying from heart disease than nonvegetarians.<sup>11</sup> A study from 2007 in the *Journal of Nutrition* found that a single fatty meal can cause the heart to beat harder and raise blood pressure. A high-fat, fast-food meal usually has 42 grams of fat, while a typical healthful meal would have around 1.3 grams of fat.<sup>12</sup> One study showed that people who adopt a vegetarian diet reduce their saturated fat intake by 26 percent and significantly lower cholesterol levels in just six weeks. A more recent study revealed that when participants switched to a strict low-fat vegetarian diet for about two weeks, they lowered their total serum cholesterol and blood pressure by 11 percent and 6 percent respectively, and men lost an average of 5.5 pounds and women an average of 2.2 pounds.<sup>13</sup>

In addition to the very low levels of fat in a typical vegetarian diet, vegetable protein helps decrease the risk for heart disease. Researchers in a 2014 study put 198 patients with cardiovascular disease on a diet without fish, meat, dairy, or added oils. Eighty-nine percent of the participants adhered to the diet, and of that group, 81 percent improved their symptoms and experienced fewer complications from heart disease. In addition, they lost an average of 18 pounds,<sup>14</sup> while 22 percent saw a complete reversal of their

condition.<sup>15</sup> Studies show that replacing animal protein with soy protein reduces blood cholesterol levels even when the total amount of fat and saturated fat in the diet remains the same.<sup>16</sup>

### Fiber: The Added Advantage of a Vegetarian Diet

Soluble fiber slows the absorption of some food components, such as cholesterol, and reduces the amount of cholesterol the liver produces. Every 10 grams of fiber per day reduces the risk of dying by 10 percent.<sup>17</sup> Oats, barley, beans, and some fruits and vegetables are all good sources of soluble fiber. There is no fiber in any animal product.<sup>18</sup> An average American eats 10 to 15 grams of fiber per day. The recommended daily amount is 20-35 grams per day. Eating a vegetarian diet would allow you to consume more fiber from foods including cereals, dried beans and peas, fruits, vegetables, and whole grains.



### Maintain Your Ideal Weight

Carrying excess weight can increase the risk for heart disease. People who are thick around the middle (“apple-shaped”) are at a higher risk than those who carry excess weight around the hips and buttocks (“pear-shaped”).<sup>19</sup> “Apple-shaped” people can lose weight through a low-fat diet and aerobic exercise. Visceral fat surrounds the organs and can release dangerous chemicals, some of which increase the risk of heart disease. Subcutaneous fat is found under the skin and is not as hazardous. In 2008, a study in the journal *Obesity* determined that if obesity rates continue unchanged through 2030, 86.3 percent of adults will be overweight or obese, the prevalence of childhood obesity will double, and one out of every six health care dollars will go toward overweight and obesity-related costs.<sup>20</sup>

### Blood Pressure

High blood pressure is also a risk factor for heart disease and can lead to strokes and other serious health problems. Fortunately, this is another area where we can benefit by controlling our eating habits. Salt has an effect on blood pressure and should be kept to a minimum. The Dietary Guidelines state that daily sodium intake should be less than 2,300 mg; people over age 51 (about half of the U.S. population) should reduce their intake even more to 1,500 mg. On average, Americans consume around 3,400 mg/day. Numerous studies have shown that vegetarians have lower blood pressure than nonvegetarians. A low-fat, high-fiber vegetarian diet, even without reduced salt intake, can lower blood pressure by as much as 10 percent. While the biological explanation for this has never

been clear, vegetarian diets are lower in fat and sodium and may have other blood pressure-lowering effects.

Some of these factors include the potassium, magnesium, antioxidants, and fiber found in plant-based foods. The National Heart, Lung and Blood and Institute performed a study in which people consumed a low-fat diet rich in fruits and vegetables. The results showed a drop in blood pressure, possibly due to the increased dietary levels of potassium and magnesium.<sup>21</sup> Additional studies report that consuming 5-10 servings per day of fruits and vegetables also reduces blood pressure.<sup>22</sup>

An additional benefit is reduced iron storage in vegetarians. Studies have shown strong links between iron and heart disease and hypertension.<sup>23</sup>

### Other Factors

Other factors can have as great an effect on the heart as diet. A healthful meal is not enough if it is followed by a cigarette. People who smoke have a much higher risk of heart disease when compared to nonsmokers. Moderation is not good enough—it is essential to quit. A study done in 2013 showed that cigarette smokers also tend to have more risky eating behaviors, such as eating less fruits and vegetables, while consuming more fried or processed foods.<sup>24</sup> Physical activity is also important. Regular light exercise, such as a daily half-hour walk, can cut death rates dramatically. The American Heart Association recommends at least 30 minutes of moderate-intensity aerobic activity at least five days per week for a total of 150 minutes. If you enjoy more vigorous exercise, the recommendation is only 75 minutes per week, averaging 25 minutes for at least three days a week.

Here are some popular activities and the number of calories they burn per hour for a 150-pound adult:

Activity	Calories Burned Per Hour
Bicycling	400
Canoeing	180
Cooking	180
Dancing, Ballroom	240
Gardening	480
Golf	345
Jumping Rope	570

Finally, stress takes a toll on the heart. Daily life is full of events that cause our hearts to beat a bit faster and drive up our blood pressure.<sup>25</sup> Reducing stress means keeping your challenges within a range you can manage. Adequate rest and techniques for stress reduction, meditation, or yoga can be very helpful. That being said, taking control of the other factors cannot undo the effects of a bad diet. A study done in 2006 showed that overweight women who exercise are at a greater risk for heart disease than women who do not exercise at all but are at a normal weight. The overweight women had an 87 percent increased risk for higher LDL cholesterol as opposed to the 14 percent increased risk for normal BMI in active women.<sup>26</sup>

The only way to maintain a healthy heart is an all-encompassing healthful lifestyle that incorporates a varied, low-fat, vegetarian diet, daily physical activity, and stress reduction. The American Public Health Association conference in 2009 found that omni-

vores who cut out meat from their diets experienced great improvements in their moods.<sup>27</sup>

### And Now the Good News: Reversing Heart Disease



On July 21, 1990, *The Lancet* published the findings of Dean Ornish, M.D., who demonstrated that heart disease can actually be reversed without medications.<sup>28</sup> Until then, most doctors did not attempt to reverse heart disease, despite its ubiquity. Most believed that plaques of cholesterol and other substances that clogged arteries would not go away. The traditional method of removal was to wait until they became severe enough to warrant a bypass or angioplasty. At the University of California in San Francisco, Dr. Ornish tested the theory that a more potent diet, along with other lifestyle changes, might actually reverse this condition. He selected patients who had plaques that were clearly visible on angiograms and divided the patients into two groups. Half received the standard care prescribed for heart patients. The other half began a vegetarian diet with less than 10 percent of calories from fat. They also began a program of modest exercise, avoided smoking, and managed stress through a variety of simple techniques.

Dr. Ornish's patients improved immediately, and they continued to improve over the course of the year. While most of the patients previously experienced the crushing chest pain of heart disease, "most of them became essentially pain-free," Dr. Ornish said, "even though they were doing more activities, going back to work, and doing things that they hadn't been able to do, in some cases, for years." Not only did their cholesterol levels drop dramatically, but, after a year, 82 percent of the patients who followed Dr. Ornish's program showed measurable reversal of their coronary artery blockages. The plaques dissolved without medications or surgery and had no side effects.

The control group, following the more traditional medical routine, did not do as well. For most patients, chest pain did not go away, but continued to get worse, and their plaques continued to grow, cutting off blood flow to the heart more each day. Many doctors still recommend "chicken and fish" diets, even though a number of studies show that, in general, heart patients who make such moderate dietary changes tend worsen over time. Those who adopt a low-fat, vegetarian diet, get daily physical activity, avoid tobacco, and manage stress, stand the best chance of reversing heart disease. We now have the most powerful tools yet for gaining control over the health of our hearts.

### Suggested Reading

For more information on lowering cholesterol and other benefits of a low-fat vegetarian diet, the Physicians Committee recommends:

- *Power Foods for the Brain* by Neal Barnard, M.D.
- *Eat Right, Live Longer* by Neal Barnard, M.D.
- *Food for Life* by Neal Barnard, M.D.
- *Dr. Dean Ornish's Program for Reversing Heart Disease* by Dean Ornish, M.D.

- *Prevent and Reverse Heart Disease* by Caldwell Esselstyn Jr., M.D.
- *The McDougall Plan* by John McDougall, M.D.

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