National Heart and Blood Institute

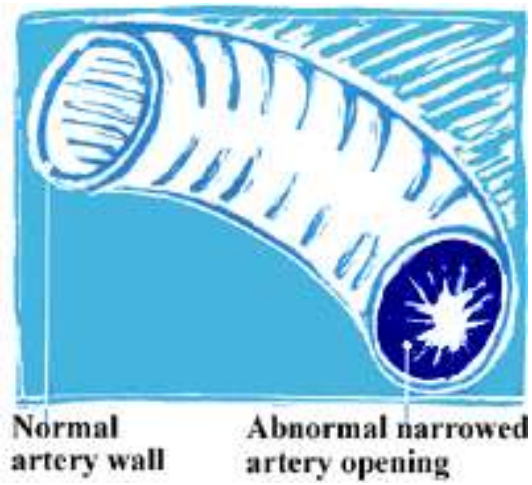
National Institutes of Health

National Cholesterol Education Program

What Is Coronary Heart Disease?

Heart disease is caused by narrowing of the coronary arteries that feed the heart. Like any muscle, the heart needs a constant supply of oxygen and nutrients, which are carried to it by the blood in the coronary arteries. When the coronary arteries become narrowed or clogged by cholesterol and fat deposits--a process called atherosclerosis--and cannot supply enough blood to the heart, the result is coronary heart disease (CHD). If not enough oxygen-carrying blood reaches the heart, you may experience chest pain called angina. If the blood supply to a portion of the heart is completely cut off by total blockage of a coronary artery, the result is a heart attack. This is usually due to a sudden closure from a blood clot forming on top of a previous narrowing.

Cholesterol is a waxy, fat-like substance that occurs naturally in all parts of the body and that your body needs to function normally. It is present in cell walls or membranes everywhere in the body, including the brain, nerves, muscle, skin, liver, intestines, and heart. Your body uses cholesterol to produce many hormones, vitamin D, and the bile acids that help to digest fat. It takes only a small amount of cholesterol in the blood to meet these needs. If you have too much cholesterol in your bloodstream, the excess is deposited in arteries, including the coronary arteries, where it contributes to the narrowing and blockages that cause the signs and symptoms of heart disease.



What does cholesterol have to do with heart disease?

The Framingham Heart Study established that high blood cholesterol is a risk factor for coronary heart disease (CHD). Results of the Framingham study showed that the higher the cholesterol level, the greater the CHD risk. On the other end of the spectrum, CHD is uncommon at total cholesterol levels below 150 milligrams per deciliter (mg/dL). A direct link between high blood cholesterol and CHD has been confirmed by the Lipid Research Clinics-Coronary Primary Prevention Trial (1984) which showed that lowering total and LDL ("bad") cholesterol levels significantly reduces CHD. A series of more recent trials of cholesterol lowering using statin drugs have demonstrated conclusively that lowering total cholesterol and LDL-cholesterol reduces the chance of having a heart attack, needing bypass surgery or angioplasty, and dying of CHD-related causes.

The Benefits of Cholesterol Lowering

Recent studies have shown that cholesterol lowering in people without heart disease greatly reduces their risk for developing CHD, including heart attacks and CHD-related death. This is true for those with high cholesterol levels and for those with average cholesterol levels.

A 1995 study called the West of Scotland Coronary Prevention Study (WOSCOPS) found that cholesterol lowering reduced the number of heart attacks and deaths from cardiovascular causes in men with high blood cholesterol levels who had not had a heart attack. For 5 years, more than 6500 men with total cholesterol levels of 249 milligrams per deciliter (mg/dL) to 295 mg/dL were given either a cholesterol-lowering drug or a placebo (a dummy pill that looks exactly like the medication), along with a cholesterol lowering diet. The drug that was given is known as a statin (pravastatin), and it reduced total cholesterol levels by 20 percent and LDL ("bad") cholesterol levels by 26 percent. The study found that in those receiving the statin, the overall risk of having a nonfatal heart attack or dying from CHD was reduced by 31 percent. The need for bypass surgery or angioplasty was reduced by 37 percent and deaths from all cardiovascular causes by 32 percent. A very important finding is that deaths from causes other than cardiovascular disease were not increased, and the overall deaths from all causes were reduced by 22 percent.

In 1998, the results of the Air Force/Texas Coronary Atherosclerosis Prevention Study (AFCAPS/TexCAPS) showed that cholesterol lowering in generally healthy people with average cholesterol levels reduced their risk for a first-time major coronary event by 37 percent. Study participants had no obvious evidence of CHD and relatively usual total cholesterol levels (average of 221 mg/dL) and LDL-cholesterol levels (average of 150 mg/dL) and lower than usual HDL ("good") cholesterol levels (average of 36 mg/dL for men and 40 mg/dL for women). This study used a statin drug (lovastatin) along with a low-saturated fat, low-cholesterol diet to lower cholesterol levels. Study participants who received a placebo followed the same low-saturated fat, low-cholesterol diet. After one year, total cholesterol levels in the treatment group were lowered by 18 percent and LDL-cholesterol levels by 25 percent. The risk for a heart attack was reduced 40 percent, unstable angina 32 percent, the need for bypass surgery or angioplasty 33 percent, and cardiovascular events 25 percent. The cholesterol-lowering benefits in this study extended to both men and women as well as older adults. There were no significant differences between treatment and placebo groups in non-cardiovascular disease deaths.

What Makes Your Cholesterol High or Low?

Your blood cholesterol level is affected not only by what you eat but also by how quickly your body makes LDL ("bad") cholesterol and disposes of it. In fact, your body makes all the cholesterol it needs, and it is not necessary to take in any additional cholesterol from the foods you eat. Many factors help determine whether your LDL-cholesterol level is high or low. The following factors are the most important:

- **Heredity**
- **What you eat**
- **Weight**
- **Physical activity/exercise**
- **Age and sex**
- **Alcohol**
- **Stress**

Heredity. Your genes influence how high your LDL ("bad") cholesterol is by affecting how fast LDL is made and removed from the blood. One specific form of inherited high cholesterol that affects 1 in 500 people is familial hypercholesterolemia, which often leads to early heart disease. But even if you do not have a specific genetic form of high cholesterol, genes play a role in influencing your LDL-cholesterol level.

What you eat. Two main nutrients in the foods you eat make your LDL ("bad") cholesterol level go up: saturated fat, a type of fat found mostly in foods that come from animals; and cholesterol, which comes only from animal products. Saturated fat raises your LDL-cholesterol level more than anything else in the diet. Eating too much saturated fat and cholesterol is the main reason for high levels of cholesterol and a high rate of heart attacks in the United States. Reducing the amount of saturated fat and cholesterol you eat is a very important step in reducing your blood cholesterol levels.

Weight. Excess weight tends to increase your LDL ("bad") cholesterol level. If you are overweight and have a high LDL-cholesterol level, losing weight may help you lower it. Weight loss also helps to lower triglycerides and raise HDL ("good") cholesterol levels.

Physical activity/exercise. Regular physical activity may lower LDL ("bad") cholesterol and raise HDL ("good") cholesterol levels.

Age and sex. Before the age of menopause, women usually have total cholesterol levels that are lower than those of men the same age. As women and men get older, their blood cholesterol levels rise until about 60 to 65 years of age. After the age of about 50, women often have higher total cholesterol levels than men of the same age.

Alcohol. Alcohol intake increases HDL ("good") cholesterol but does not lower LDL ("bad") cholesterol. Doctors don't know for certain whether alcohol also reduces the risk of heart disease. Drinking too much alcohol can damage the liver and heart muscle, lead to high blood pressure, and raise triglycerides. Because of the risks, alcoholic beverages should not be used as a way to prevent heart disease.

Stress. Stress over the long term has been shown in several studies to raise blood cholesterol levels. One way that stress may do this is by affecting your habits. For example, when some people are under stress, they console themselves by eating fatty foods. The saturated fat and cholesterol in these foods contribute to higher levels of blood cholesterol.