



# Coronary artery disease

## Symptoms and causes

By Mayo Clinic Staff

### Symptoms

If your coronary arteries narrow, they can't supply enough oxygen-rich blood to your heart — especially when it's beating hard, such as during exercise. At first, the decreased blood flow may not cause any coronary artery disease symptoms. As plaque continues to build up in your coronary arteries, however, you may develop coronary artery disease signs and symptoms, including:

- **Chest pain (angina).** You may feel pressure or tightness in your chest, as if someone were standing on your chest. This pain, referred to as angina, usually occurs on the middle or left side of the chest. Angina is generally triggered by physical or emotional stress.

The pain usually goes away within minutes after stopping the stressful activity. In some people, especially women, this pain may be fleeting or sharp and felt in the neck, arm or back.

- **Shortness of breath.** If your heart can't pump enough blood to meet your body's needs, you may develop shortness of breath or extreme fatigue with exertion.
- **Heart attack.** A completely blocked coronary artery may cause a heart attack. The classic signs and symptoms of a heart attack include crushing pressure in your chest and pain in your shoulder or arm, sometimes with shortness of breath and sweating.

Women are somewhat more likely than men are to experience less typical signs and symptoms of a heart attack, such as neck or jaw pain. Sometimes a heart attack occurs without any apparent signs or symptoms.

### When to see a doctor

If you suspect you're having a heart attack, immediately call 911 or your local emergency number. If you don't have access to emergency medical services, have someone drive you to the nearest hospital. Drive yourself only as a last resort.

If you have risk factors for coronary artery disease — such as high blood pressure, high cholesterol, tobacco use, diabetes, a strong family history of heart disease or obesity — talk to your doctor. He or she may want to test you for the condition, especially if you have signs or symptoms of narrowed arteries.

## Causes

Coronary artery disease is thought to begin with damage or injury to the inner layer of a coronary artery, sometimes as early as childhood. The damage may be caused by various factors, including:

- Smoking
- High blood pressure
- High cholesterol
- Diabetes or insulin resistance
- Sedentary lifestyle

Once the inner wall of an artery is damaged, fatty deposits (plaque) made of cholesterol and other cellular waste products tend to accumulate at the site of injury in a process called atherosclerosis. If the surface of the plaque breaks or ruptures, blood cells called platelets will clump at the site to try to repair the artery. This clump can block the artery, leading to a heart attack.

## Risk factors

Risk factors for coronary artery disease include:

- **Age.** Simply getting older increases your risk of damaged and narrowed arteries.
- **Sex.** Men are generally at greater risk of coronary artery disease. However, the risk for women increases after menopause.
- **Family history.** A family history of heart disease is associated with a higher risk of coronary artery disease, especially if a close relative developed heart disease at an early age. Your risk is highest if your father or a brother was diagnosed with heart disease before age 55 or if your mother or a sister developed it before age 65.
- **Smoking.** People who smoke have a significantly increased risk of heart disease. Exposing others to your secondhand smoke also increases their risk of coronary artery disease.
- **High blood pressure.** Uncontrolled high blood pressure can result in hardening and thickening of your arteries, narrowing the channel through which blood can flow.
- **High blood cholesterol levels.** High levels of cholesterol in your blood can increase the risk of formation of plaques and atherosclerosis. High cholesterol can be caused by a high level of low-density lipoprotein (LDL), known as the "bad" cholesterol. A low level of high-

density lipoprotein (HDL), known as the "good" cholesterol, can be a sign of atherosclerosis.

- **Diabetes.** Diabetes is associated with an increased risk of coronary artery disease. Type 2 diabetes and coronary artery disease share similar risk factors, such as obesity and high blood pressure.
- **Overweight or obesity.** Excess weight typically worsens other risk factors.
- **Physical inactivity.** Lack of exercise also is associated with coronary artery disease and some of its risk factors, as well.
- **High stress.** Unrelieved stress in your life may damage your arteries as well as worsen other risk factors for coronary artery disease.

Risk factors often occur in clusters and may build on one another, such as obesity leading to type 2 diabetes and high blood pressure. When grouped together, certain risk factors put you at an even greater risk of coronary artery disease. For example, metabolic syndrome — a cluster of conditions that includes elevated blood pressure, high triglycerides, elevated insulin levels and excess body fat around the waist — increases the risk of coronary artery disease.

Sometimes coronary artery disease develops without any classic risk factors. Researchers are studying other possible factors, including:

- **Sleep apnea.** This disorder causes you to repeatedly stop and start breathing while you're sleeping. Sudden drops in blood oxygen levels that occur during sleep apnea increase blood pressure and strain the cardiovascular system, possibly leading to coronary artery disease.
- **High sensitivity C-reactive protein.** High sensitivity C-reactive protein (hs-CRP) is a normal protein that appears in higher amounts when there's inflammation somewhere in your body. High hs-CRP levels may be a risk factor for heart disease. It's thought that as coronary arteries narrow, you'll have more hs-CRP in your blood.
- **High triglycerides.** This is a type of fat (lipid) in your blood. High levels may raise the risk of coronary artery disease, especially for women.
- **Homocysteine.** Homocysteine is an amino acid your body uses to make protein and to build and maintain tissue. But high levels of homocysteine may increase your risk of coronary artery disease.

## Complications

Coronary artery disease can lead to:

- **Chest pain (angina).** When your coronary arteries narrow, your heart may not receive enough blood when demand is greatest — particularly during physical activity. This can cause chest pain (angina) or shortness of breath.
- **Heart attack.** If a cholesterol plaque ruptures and a blood clot forms, complete blockage of your heart artery may trigger a heart attack. The lack of blood flow to your heart may

damage your heart muscle. The amount of damage depends in part on how quickly you receive treatment.

- **Heart failure.** If some areas of your heart are chronically deprived of oxygen and nutrients because of reduced blood flow, or if your heart has been damaged by a heart attack, your heart may become too weak to pump enough blood to meet your body's needs. This condition is known as heart failure.
- **Abnormal heart rhythm (arrhythmia).** Inadequate blood supply to the heart or damage to heart tissue can interfere with your heart's electrical impulses, causing abnormal heart rhythms.