



# MDwise

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## Coronary Artery Disease

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### Topic Overview

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#### What is coronary artery disease?

Coronary artery disease is the most common type of heart disease. It's also the number one killer of both men and women in the United States.

When you have it, your heart muscle doesn't get enough blood. This can lead to serious problems, including heart attack.

It can be a shock to find out that you have coronary artery disease. Many people only find out when they have a heart attack. Whether or not you have had a heart attack, there are many things you can do to slow coronary artery disease and reduce your risk of future problems.

#### What causes coronary artery disease?

Coronary artery disease is caused by hardening of the arteries, or atherosclerosis (See figure 1 in appendix). This means that fatty deposits called plaque (say "plak") build up inside the arteries. Arteries are the blood vessels that carry oxygen-rich blood throughout your body.

Atherosclerosis can affect any arteries in the body. When it occurs in the ones that supply blood to the heart (the coronary arteries (See figure 2 in appendix)), it is called coronary artery disease.

When plaque builds up in the coronary arteries, the heart may not get the blood it needs to work well. Over time, this can weaken or damage the heart. If a plaque tears, the body tries to fix the tear by forming a blood clot around it. The clot can block blood flow to the heart and cause a heart attack (See figure 3 in appendix).

## What are the symptoms?

Symptoms can happen when the heart is working harder and needs more oxygen, such as during exercise. Symptoms include:

- Angina (say "ANN-juh-nuh" or "ann-JY-nuh"), which most often is chest pain or discomfort or a strange feeling in the chest.
- Shortness of breath.
- Heart attack. A heart attack is sometimes the first sign of coronary artery disease.

Less common symptoms include a fast heartbeat, feeling sick to your stomach, and increased sweating. Some people don't have any symptoms. In rare cases, a person can have a "silent" heart attack, without symptoms.

## How is coronary artery disease diagnosed?

Your doctor will do a physical exam and ask questions about your past health and your risk factors. Risk factors are things that increase the chance that you will have coronary artery disease.

Some common risk factors are being older than 65; smoking; having high cholesterol, high blood pressure, or diabetes; and having heart disease in your family.

If your doctor thinks that you have coronary artery disease, you may have tests to check how well your heart is working. These tests include an electrocardiogram (EKG or ECG), a chest X-ray, an exercise electrocardiogram, and blood tests. You may also have a coronary angiogram to check blood flow to the heart.

## How is it treated?

Treatment focuses on lowering your risk for heart attack and stroke and managing your symptoms. Lifestyle changes, medicine, and procedures are used.

- Lifestyle changes include quitting smoking (if you smoke), eating heart-healthy foods, getting regular exercise, staying at a healthy weight, lowering your stress level, and limiting how much alcohol you drink. A cardiac rehab program can help you make these changes.
- Medicines can help you lower high cholesterol and high blood pressure, manage angina, and lower your risk of having a blood clot.
- Procedures that improve blood flow to the heart include angioplasty (See figure 4 in appendix) and bypass surgery (See figure 5 in appendix).

## Credits

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## Appendix

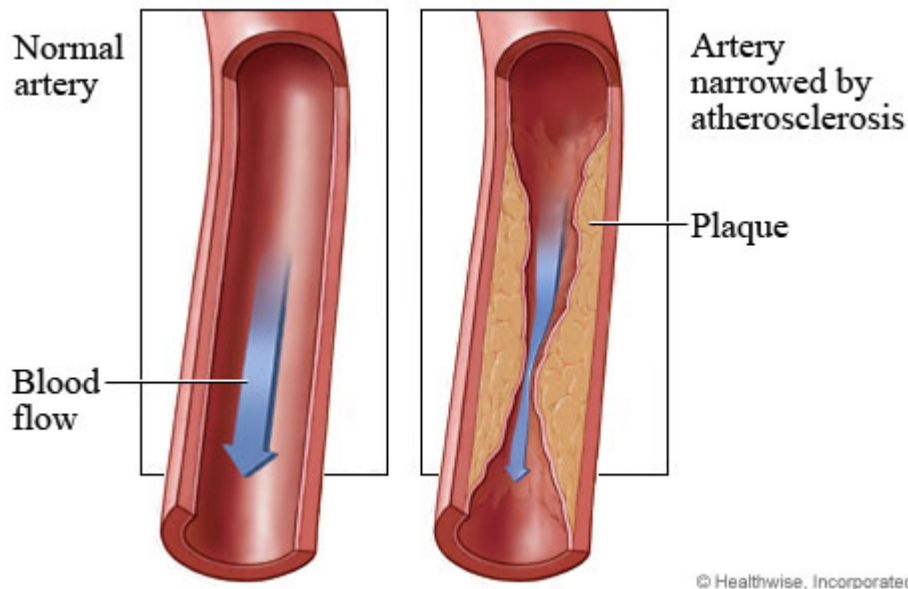
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## Topic Images

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Figure 1

### Atherosclerosis



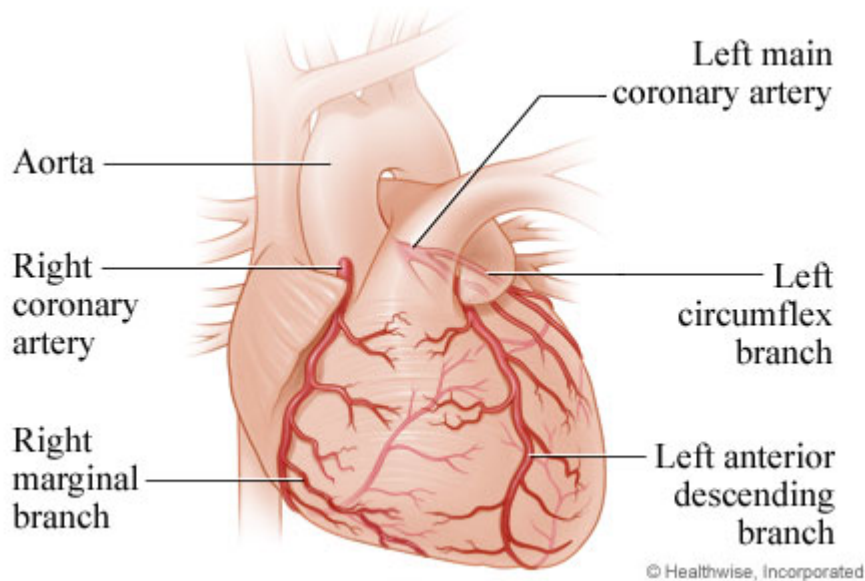
Atherosclerosis, sometimes called "hardening of the arteries," occurs when cholesterol, calcium, and other substances build up in the inner lining of the arteries, forming a material called plaque. Over time, plaque buildup may narrow the artery and limit blood flow through it.

Coronary artery disease is atherosclerosis in the heart (coronary) arteries. Peripheral arterial disease of the legs is atherosclerosis in the leg arteries. If atherosclerosis affects the brain arteries (carotid or cerebral arteries), a stroke can occur.

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Figure 2

### The heart and the coronary arteries



Coronary arteries are blood vessels that provide oxygen-rich blood and other nutrients to the heart muscle. The coronary arteries attach to and wrap around the heart's surface.

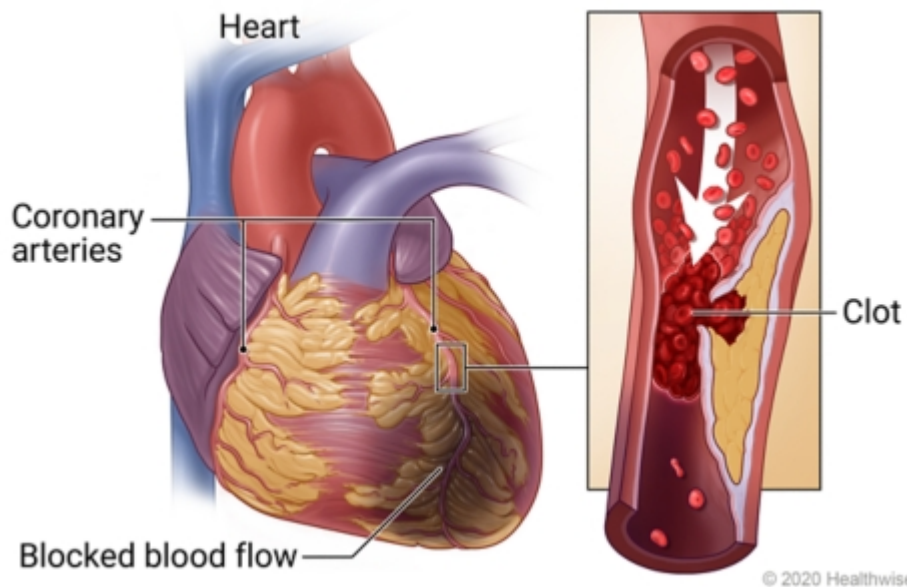
The left coronary artery branches off into smaller arteries. The most prominent ones are the:

- Left anterior descending artery, which supplies blood to the front of the heart.
- Left circumflex artery, which encircles the heart muscle, supplying blood to the back of the heart.

The right coronary artery supplies the back of the heart. The right marginal branch usually extends from the right coronary artery and supplies blood to the lower right side of the heart.

**Figure 3**

### How a heart attack happens



A heart attack is caused when not enough blood and oxygen reach part of the heart muscle. The heart muscle starts to die. This lack of blood and oxygen is most often caused by a blockage in one or more of the coronary

arteries.

This blockage is usually the result of coronary artery disease, in which fatty deposits called plaque (say "plak") build up inside the coronary arteries. Plaques are covered by a fibrous cap. If the cap breaks open or ruptures, the body will try to repair the injured artery lining. A blood clot may form and block blood flow.

Sometimes a blood clot that forms over a ruptured plaque may not completely block the artery. But the clot may block blood flow enough to cause angina symptoms. These symptoms may happen with rest and may not go away with rest or nitroglycerin. These symptoms are an emergency, because the blood clot can quickly grow and block the artery. If the blood clot dissolves and an immediate heart attack is avoided, the body will try again over time to repair the tear on the surface of the plaque. But this newly repaired plaque can also be very unstable. It is more likely to rupture again, putting you at even greater risk of a heart attack.

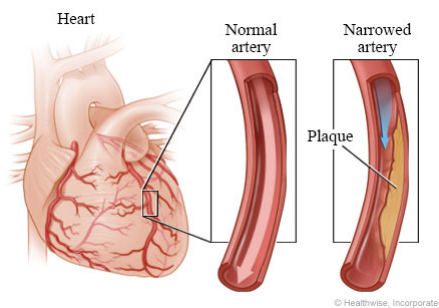
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**Figure 4**

## **Coronary angioplasty**

### **Narrowed or blocked coronary artery**

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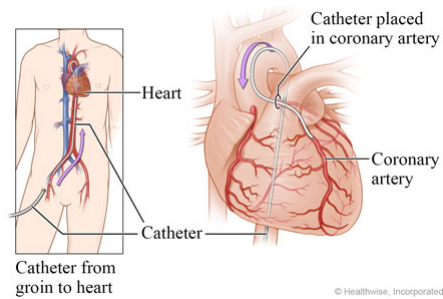
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Coronary arteries are the blood vessels that supply oxygen-rich blood to the heart muscle. Coronary artery disease can cause plaque to build up inside the walls of the coronary arteries. Plaque is made up of extra cholesterol, calcium, and other substances that float in blood.

This plaque buildup may narrow the artery and reduce the blood flow to the heart muscle. This narrowing can cause angina symptoms such as chest pain or pressure. Sometimes the plaque can tear or rupture. The body tries to repair the tear by forming a blood clot over it. The blood clot can completely block blood flow and cause a heart attack. A procedure called angioplasty can widen a narrowed or blocked coronary artery.

## Step 1: During an angioplasty, a catheter is moved into the coronary artery

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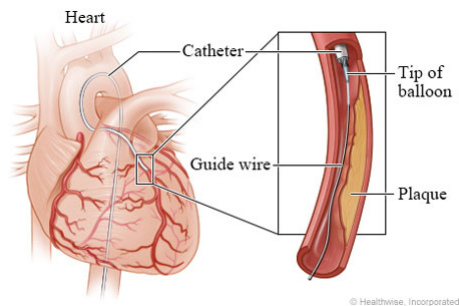


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An angioplasty is done using a thin, soft tube called a catheter. The catheter is guided into the blood vessels of the heart. First, your doctor inserts the catheter into a blood vessel in the groin, arm, or wrist. A very thin guide wire is inside the catheter. Your doctor carefully guides the catheter through blood vessels to the narrowed or blocked portion of the coronary artery. Your doctor watches the movement of the catheter in the blood vessels on an X-ray screen.

## Step 2: A guide wire and balloon are placed in the coronary artery

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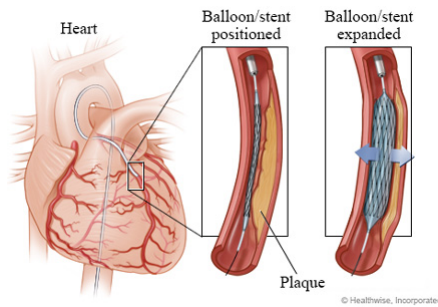


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After the catheter reaches the artery, your doctor will move the guide wire farther into the narrowed or blocked portion. A small balloon is slid along the guide wire. In most cases, a small, expandable stent is placed in the artery with the balloon.

### Step 3: The balloon is inflated

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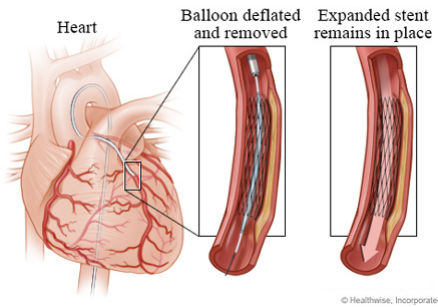


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The small balloon is inflated. The balloon may stay inflated for a short time. The pressure from the inflated balloon presses the plaque against the wall of the artery, creating more room for blood to flow. The inflated balloon also expands the stent.

### Step 4: The balloon, guide wire, and catheter are removed

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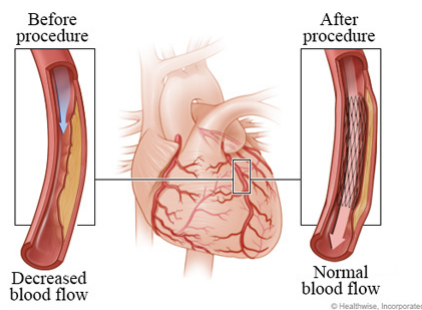


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Next, the balloon is deflated. But the stent stays expanded. The stent presses against the walls of the artery and keeps the artery open. Your doctor removes the balloon, guide wire, and catheter. The stent remains in the blood vessel, allowing the blood to flow normally again.

### Improved blood flow

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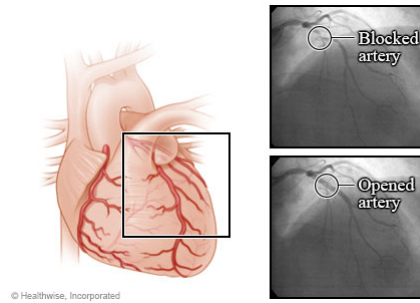


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After an angioplasty, the narrowed or blocked artery is opened up and oxygen- and nutrient-rich blood flows more normally into the heart muscle.

## Arteries before and after an angioplasty

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These X-rays show a blocked coronary artery before and after an angioplasty procedure. Before angioplasty, the blood flow is blocked by a narrowed artery. After the angioplasty, blood is flowing better through the newly opened artery. These X-rays are from an angiogram. An angiogram is a test that uses a special dye and camera to take X-ray pictures of the blood flow in an artery.

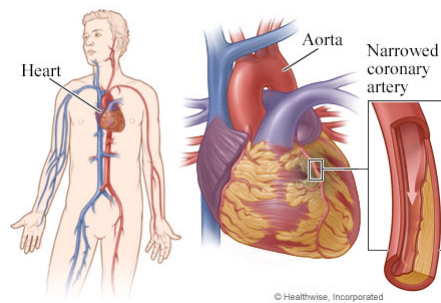
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### Figure 5

## Coronary artery bypass surgery for coronary artery disease

### A coronary artery is narrowed or blocked

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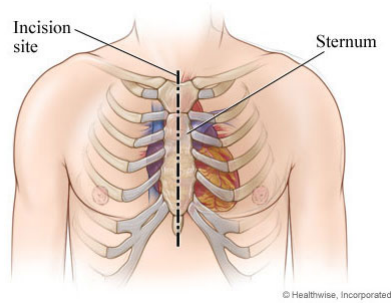
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Coronary artery bypass grafting (CABG) surgery reroutes blood around narrowed or blocked arteries, increasing blood flow to the heart muscle tissue.



## Incision in the middle of the chest for open-heart surgery

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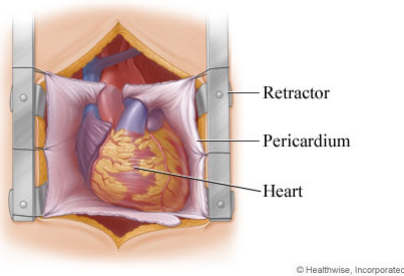


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Bypass surgery is most often done as an open-heart surgery. The surgeon makes a vertical incision in the skin and muscle in the middle of the chest and then cuts through the breastbone (sternum).

## The heart is exposed

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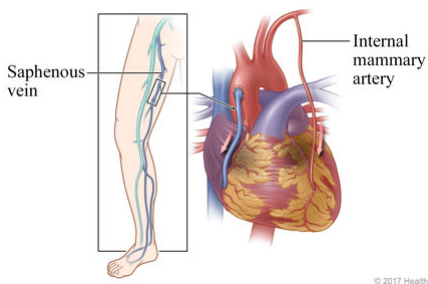


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The surgeon spreads the rib cage with a retractor to expose the heart and then cuts through the lining that protects the heart (pericardium).

## Blood flow is rerouted

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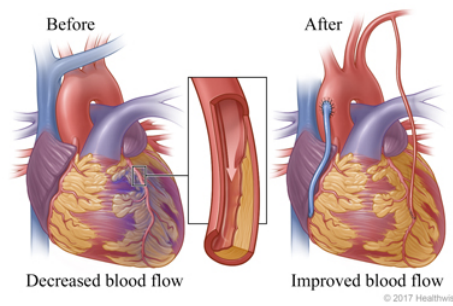


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To reroute blood flow around the diseased blood vessel, surgeons use a blood vessel taken from another part of your body. For example, the saphenous vein from the leg or an internal mammary artery from the chest may be used.

## Oxygen-rich blood flows to heart muscle

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Regardless of which type of blood vessel is used, oxygen-rich blood from the aorta is rerouted around the narrowed or blocked section of the coronary artery to improve blood flow to the heart muscle.

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Note: The "printer friendly" document will not contain all the information available in the online document. Some information (e.g. cross-references to other topics, definitions or medical illustrations) is only available in the online version.

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