

Heart Attack

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The heart, like all other organs and tissues in the body, requires a supply of blood. The blood supply to the heart is provided by blood vessels called the coronary arteries. The coronary arteries lie on the outside of the heart muscle before entering the heart muscle itself ([figure 1](#)).

Myocardial infarction, or MI (commonly known as a "heart attack"), is damage or death of part of the heart muscle. The damage is caused by lack of blood flow through the coronary arteries. For this reason, an MI is sometimes also called a "coronary." Almost all cases of MI occur in someone who has an underlying condition called coronary heart disease (CHD).

More detailed information about heart attack is available by subscription. (See "[Overview of the management of acute ST elevation myocardial infarction](#)" and "[Overview of the management of unstable angina and acute non-ST elevation myocardial infarction](#)".)

Coronary heart disease — In people with CHD, the coronary arteries become narrowed by fatty deposits called plaques ([figure 2](#)). The fatty plaques inside the coronary arteries limit blood flow to the heart muscle, which may cause pain or tightness in the chest. This pain or tightness is called angina pectoris, commonly referred to as "angina".

Plaque rupture and clot formation — Normally, plaques that have built up on the artery walls hold together and stay stuck there. Sometimes, however, plaques can develop cracks in their surface. If that happens, the body responds as though the blood vessel is injured and bleeding. As part of the body's "first aid" response, tiny blood elements called platelets travel to the site and begin sticking to one another to form a clot ([figure 3](#)).

Normally, clots like these are a good thing, because they stop you from bleeding. Unfortunately, when clots form inside the coronary arteries, they can get lodged there and partially or completely block the flow of blood. This is what happens during a heart attack.

When a blood clot forms within a coronary artery, the area of heart muscle fed by that artery no longer receives enough blood. This lack of blood supply is called "ischemia." As a result of ischemia, the heart muscle becomes damaged and may die. The death of heart muscle is termed "infarction."

HEART ATTACK SYMPTOMS

The "typical" symptoms of a heart attack include:

Chest pain

- Chest pain or discomfort (pressure, tightness, or squeezing)
- Pain spreads through the chest and other areas of the body, including the upper abdomen, shoulders, arms, neck and throat, or lower jaw and teeth
- Pain comes on gradually and lasts more than a few seconds

- Lying down may make chest pain worse, while sitting up may reduce pain

Other symptoms

- Shortness of breath
- Nausea, vomiting, or belching
- Sweating
- Palpitations (skipped heart beats)
- Lightheadedness
- Feeling tired
- Fainting

HEART ATTACK DIAGNOSIS

If you have chest pain that is new, severe, prolonged, or if chest pain causes concern, call 911 immediately. The emergency medical services (EMS) personnel in your community are prepared to respond rapidly, and will take you to the nearest hospital. For a patient having a heart attack, every minute is important. Remember, the faster you get to a hospital, the sooner you can receive treatment.

Although not everyone with chest pain is having a heart attack, you may be treated for a heart attack until testing can be done to determine the cause of your symptoms.

HEART ATTACK TREATMENT

You will be given oxygen through a flexible plastic tube that rests beneath the nose or by a face mask, and an electrocardiogram (EKG) will be measured as quickly as possible. The EKG gives a picture of the flow of electrical activity that causes the heart to beat. Damaged areas usually show an abnormal pattern ([figure 3](#)). The EKG may be repeated several times in the first few minutes to monitor for changes that may be occurring.

Blood is drawn and sent to the laboratory to look for substances in the blood that are released by damaged heart tissue (cardiac enzymes or proteins). An intravenous line (IV) is started so that medicines can be given directly into the veins. Nitroglycerin is given either through the IV or under the tongue to relieve chest pain. Morphine may also be given to help relieve chest pain and ease your anxiety. You will be given aspirin to chew and swallow to help stop new blood clots from forming.

There are different types of myocardial infarction (MI), based on what is seen on the EKG. The two main types are called ST elevation MI (STEMI) and non-ST elevation MI (NSTEMI). Your treatment will depend upon the type of MI you have.

Treatment of non-ST elevation heart attack — People with non-ST elevation MI are treated with intravenous heparin (a blood thinner) to help prevent new blood clots. A medication called a beta blocker is also given to slow the heart and decrease the heart's demand for oxygen.

Following this, two approaches to treatment are possible: intensive medical therapy and early catheterization.

Intensive medical therapy — Your condition will be stabilized with intravenous drugs. After several days, the drugs are stopped. If your symptoms do not return, exercise testing is performed. In this test, you exercise on a treadmill or bicycle, and the heart's response is examined with an EKG. The exercise test can indicate if your coronary arteries are narrowed or blocked.

Further treatment decisions are based upon the results of the exercise test.

- You may be discharged on medicines that control your symptoms
- You may need one or more procedures, including cardiac catheterization followed by angioplasty, coronary artery stenting, or surgery (explained below).

Early catheterization — With this approach, you are taken for a cardiac catheterization within the first hours or days of being in the hospital. A small plastic tube (catheter) is threaded through a blood vessel (artery), usually in the groin, to the coronary arteries. A dye is injected that allows the arteries to be seen on X-ray.

If blockages or narrowings are found, a procedure known as percutaneous coronary intervention (also known as angioplasty or stenting) may be done. With this procedure, a tiny catheter with a balloon at the end of it is advanced into the narrowed coronary artery. The balloon is then inflated, which helps open up the narrowed artery. A stent (an expandable metal tube) may be placed in the artery to prevent the narrowing from recurring. (See "[Patient information: Heart stents and angioplasty](#)".)

In some cases, the x-ray reveals that the blockages cannot be opened using angioplasty or stents. In these instances, coronary artery bypass graft surgery (CABG) may be an option. During the CABG operation (often pronounced "cabbage"), a blood vessel (vein or artery) is taken from the leg or the chest and used as a detour around the blocked coronary artery. (See "[Patient information: Coronary artery bypass graft surgery](#)".)

Treatment of ST elevation heart attack — If your EKG indicates that you are having an ST elevation heart attack, you will be given a medication called a beta blocker to decrease the heart's demand for oxygen, as well as aspirin.

You will then be given a treatment to open the blocked coronary artery. This is called "reperfusion therapy." The more quickly this therapy is given, the better the chance of saving areas of your heart that might otherwise be damaged. In general, the best outcome occurs when the artery is opened within four hours of your first heart attack symptoms, preferably within 90 to 120 minutes. (See "[Selecting a reperfusion strategy for acute ST elevation myocardial infarction](#)".)

Reperfusion therapy can occur in one of two ways. The preferred method is percutaneous coronary intervention, which is explained separately. (See "[Patient information: Heart stents and angioplasty](#)".)

However, not every hospital is equipped to do angioplasty in a timely manner. In this case an acceptable alternative treatment is to use a medicine that dissolve blood clots. The clot-busting drugs, called thrombolytic or fibrinolytic agents, must be given within 30 minutes of arrival at the hospital. However, these drugs cannot be given to certain patients, including those who have active bleeding, a high blood pressure reading, recent trauma, or a history of stroke. They are also not recommended in the treatment of non-ST elevation heart attack.

In some people with ST elevation heart attack, urgent bypass surgery is needed. (See "[Patient information: Coronary artery bypass graft surgery](#)".)

THE DISCHARGE PLAN

If there are no complications during or after your heart attack, you can usually leave the hospital after about two to five days. You will be given information about what medications to take (old and new), lifestyle changes such as stopping smoking cessation, and you will be referred to a cardiac rehabilitation/exercise program. (See "[Patient information: Heart attack recovery](#)".)

You should take your medications exactly as directed; if you have side effects or questions about your medications, call your doctor before stopping or changing your dose.