

Myocardial Infarction (aka “Heart Attack”)

ABOUT THE DISORDER

Acute myocardial infarction, commonly known as heart attack, occurs when the heart is starved of oxygen because blood flow through one or more of the coronary arteries — a group of vessels that surround and supply the heart — is blocked. The lack of oxygen causes chest pain and results in irreversible damage, eventually leading to the death of heart muscle (called myocardium).

Atherosclerosis, the progressive accumulation of fat, cholesterol, and other substances within the walls of the coronary arteries, is largely to blame. These waxy substances, together known as plaque, build up over time, narrowing the opening of the blood vessels. When a piece of plaque ruptures, a blood clot forms, completely obstructing blood flow and resulting in a heart attack. (This NHLBI [video](#) illustrates the biology behind a heart attack.)

Heart attack is a leading cause of death around the world. According to the World Health Organization, cardiovascular disease, including heart attack, is responsible for 10% of the disability-adjusted life years lost in low- and middle-income countries, and 18% in high-income countries. (Disability-adjusted life years, or DALYs, combine years of potential life lost due to premature death with years of productive life lost due to disability. They can be thought of as “healthy years of life lost.”) In the United States, someone suffers from a heart attack roughly every 34 seconds.



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SIGNS AND SYMPTOMS

The outward signs and symptoms of a heart attack can vary widely from person to person. Many people do not experience the crushing chest pain that has been dramatized on television and in movies.

The most common symptoms include:

- **CHEST PAIN OR DISCOMFORT**

Most heart attacks involve discomfort in the center or left side of the chest. It usually lasts for more than a few minutes or goes away and comes back. The discomfort can feel like pressure, squeezing, fullness, or pain. It also can feel like heartburn or indigestion, and can be mild or severe.

- **UPPER BODY DISCOMFORT**

Patients experiencing a heart attack may feel pain or discomfort in one or both arms, the back, shoulders, neck, jaw, or upper part of the stomach (above the belly button).

- **SHORTNESS OF BREATH**

This is sometimes a patient's only symptom, or it may occur before or along with chest pain or discomfort. It can occur when at rest or with mild physical activity.

DIAGNOSIS

There are several diagnostic tests physicians use to diagnose a heart attack. They include:

- **EKG (ELECTROCARDIOGRAM)**

An EKG is a simple, painless test that detects and records the heart's electrical activity. The test shows how fast the heart is beating and its rhythm. It also records the strength and timing of electrical signals as they pass through each part of the heart. An EKG can detect signs of heart damage due to coronary heart disease as well as signs of a previous or current heart attack.

- **BLOOD TESTS**

During a heart attack, heart muscle cells die and release proteins into the bloodstream. Blood tests can detect and measure the amount of these proteins: higher than normal levels suggest a heart attack. Commonly used blood tests include troponin tests, CK or CK-MB tests, and serum myoglobin tests. Blood tests often are repeated to check for changes over time.

- **CORONARY ANGIOGRAPHY**

Coronary angiography is a test that uses dye and special x-rays to highlight the insides of the coronary arteries. This test often is done during a heart attack to help find blockages in these blood vessels. To get the dye into the coronary arteries, doctors use a procedure called cardiac catheterization. A thin, flexible tube known as a catheter is put into a blood vessel in the arm, groin (upper thigh), or neck, and then threaded into the coronary arteries, where the dye is then released into the bloodstream. Special x-rays are taken while the dye is flowing through the coronary arteries. The dye lets doctors study the flow of blood through the heart and blood vessels.

TREATMENT

Early treatment for a heart attack is critical to prevent or limit damage to the heart muscle. Therefore, some treatments are given right away if a heart attack is suspected, even before the diagnosis is confirmed. These include:

- Oxygen therapy
- Aspirin to help thin the blood and prevent further blood clotting
- Nitroglycerin to reduce the heart's workload and improve blood flow through the coronary arteries
- Treatment for chest pain

Once the diagnosis of a heart attack is confirmed, doctors initiate treatments aimed at promptly restoring blood flow to the heart. The two main treatments are "clot-busting" medicines and percutaneous coronary intervention (PCI), sometimes referred to as [coronary angioplasty](#), a procedure used to open blocked coronary arteries.

- **CLOT-BUSTERS**

Thrombolytic medicines, also called "clot busters," are used to dissolve blood clots that are blocking the coronary arteries. To work best, these medicines must be given within several hours of the start of heart attack symptoms. Ideally, the medicine should be given as soon as possible.

- **PERCUTANEOUS CORONARY INTERVENTION**

Percutaneous coronary intervention (PCI) is a nonsurgical procedure that opens blocked or narrowed coronary arteries. This procedure also is called coronary angioplasty.

A thin, flexible tube with a balloon or other device on the end is threaded through a blood vessel, usually in the groin (upper thigh), to the narrowed or blocked coronary artery.

Once in place, the balloon is inflated to compress the plaque against the wall of the artery. This restores blood flow through the artery. During the procedure, the doctor may put a small mesh tube called a stent in the artery. The stent helps prevent blockages in the artery in the months or years after the procedure.

OTHER TREATMENTS FOR HEART ATTACK

- **BETA BLOCKERS**

Beta blockers decrease your heart's workload. These medicines also are used to relieve chest pain and discomfort and to help prevent repeat heart attacks. Beta blockers also are used to treat [arrhythmias](#) (irregular heartbeats).

- **ACE INHIBITORS**

ACE inhibitors lower blood pressure and reduce strain on your heart. They also help slow down further weakening of the heart muscle.

- **BLOOD THINNERS**

Anticoagulants, or "blood thinners," prevent blood clots from forming in your arteries. These medicines also keep existing clots from getting larger.

- **ANTICLOTTING MEDICINES**

Anticlotting medicines stop platelets from clumping together and forming unwanted blood clots. Examples of anticlotting medicines include aspirin and clopidogrel.

- **OTHER MEDICINES**

Medicines may also be given to relieve pain and anxiety, treat arrhythmias (which often occur during a heart attack), or lower blood cholesterol (these medicines are called statins).

- **MEDICAL PROCEDURES**

Coronary artery bypass grafting (CABG) also may be used to treat a heart attack. During CABG, a surgeon removes a healthy artery or vein from the body. The artery or vein is then connected, or grafted, to the blocked coronary artery. The grafted artery or vein bypasses – that is, goes around – the blocked portion of the coronary artery, providing a new route for blood to flow to the heart muscle.

CAUSES

Heart attacks most often stem from coronary heart disease (CHD), a condition in which a waxy buildup, called plaque, accumulates over many years in the walls of the coronary arteries. This accumulated plaque, known as atherosclerosis, greatly increases an individual's risk of heart attack.

Lifestyle choices, such as poor diet and physical inactivity, can hasten the progression of atherosclerosis. Smoking also raises the risk of CHD and heart attack.

Other medical conditions, such as high blood cholesterol, high blood pressure, and diabetes also contribute to an increased risk of these disorders.

One of the most significant advances in the field in the last several decades is the use of cholesterol-lowering drugs called statins. These drugs block the production of cholesterol in the liver and result in lower levels of LDL cholesterol, the so-called "bad cholesterol," which can lower the risk of heart attack.

While lifestyle factors play an important role in heart health, genes do too, particularly when heart attacks occur early in life (before age 50 in men and before 60 in women). It is well known that within individual families, rare mutations in genes associated with LDL cholesterol contribute to early heart attack. More common mutations also can play a role, and recent population-based studies have identified more than 45 regions of the genome associated with early heart attack risk. Genome-based studies continue to probe this question with the goal of uncovering new biological insights into coronary heart disease and heart attack risk and, hopefully, new avenues for prevention and therapy.

The material above is collected from the following sources:

- [Johns Hopkins Heart and Vascular Institute](#)
- [Cleveland Clinic](#)
- [American Heart Association](#)
- [National Heart, Lung, and Blood Institute](#)
- [World Health Organization, The Atlas of Heart Disease and Stroke](#)

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