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Myocardial Infarction

Other names: Heart Attack

What is myocardial infarction?

Myocardial infarction (MI) is another name for a heart attack. The coronary arteries supply the heart muscle (myocardium) with blood. When one of these arteries become blocked and the blood supply is cut off from the heart muscle, an MI can occur.

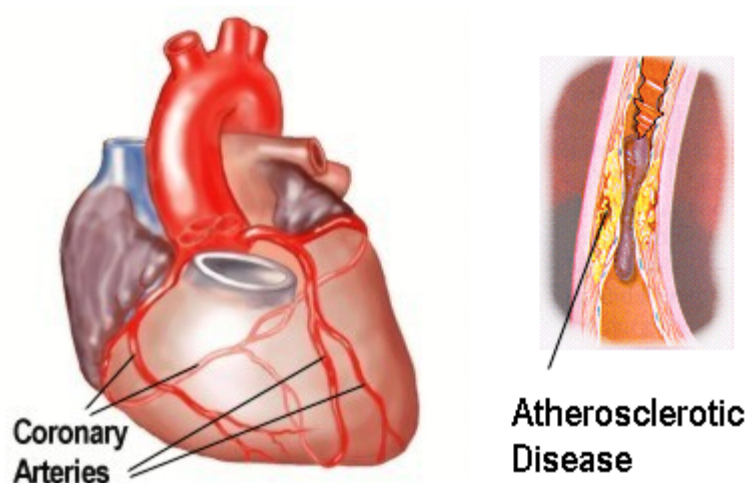
Heart attack means that some of the cells in your heart tissue have died because their supply of oxygen (provided by the blood from the coronary arteries) is cut off. Cell death does not occur immediately once the artery is blocked. It takes several minutes to start the injury process and this continues for several hours unless the artery is opened up and blood flow is restored.

What causes the blockage in a coronary artery?

The reason for the blockage is usually a buildup of plaque (deposits of fat-like substances) in the walls of the coronary arteries. The plaque buildup narrows the walls of the artery and can cause blood clots to occur. Plaque buildup is caused by a disease known as atherosclerosis (hardening of the arteries).

An atherosclerotic plaque is made up of cells, cholesterol, and other fatty substances. The plaque develops in the wall of the coronary artery and over time becomes large enough to start narrowing the channel through which the blood travels. The pool of lipid (the fat) within the plaque is covered by a thin fibrous cap. This cap may split or fracture, exposing the blood to elements within the plaque that cause blood clot formation. This clotting process may be controlled by the body, which contains substances to dissolve clots, or may lead to complete blockage of the artery. When the artery is blocked acutely for more than a few minutes, cell death starts to occur.

Coronary heart disease is a very common disease and is the leading cause of death in the United States. More than 500,000 men and women suffer a heart attack each year.



Are all heart attacks the same?

No. A small heart attack means only a small amount of heart muscle tissue died. Recovery in such cases is typically fast, and complications are few. Larger heart attacks that involve a large portion of heart tissue can cause problems like: low blood pressure, shock, or heart failure because the heart's ability to pump blood is reduced. Recovery is typically longer in such cases, and complications or death can occur. Until the area of damage heals, the dead heart muscle is soft and weak, and rupture of the heart wall can occur. This usually results in death. The normal rhythm of your heartbeat can change during a heart attack. These "rhythm abnormalities" can be very serious and cause death if not treated promptly.

With prompt and effective treatment of myocardial infarction, most potential complications can be avoided, and the mortality rate can be reduced dramatically.

What is recovery from a heart attack like?

In days past, hospitalization was often prolonged, lasting 3 to 4 weeks. Today, hospitalization following a heart attack is usually brief in the absence of complications. Often patients are home within 4 to 5 days. Activities will be restricted for a few weeks to allow healing to occur. The damage to the heart tissue will usually heal in 4 to 8 weeks. The heart forms scar tissue, just like what would happen if any other tissue of the body suffered damage.

Many patients will participate in a formal cardiac rehabilitation program. These programs typically focus on exercise and other lifestyle changes in order to speed recovery, and to fight the coronary artery disease that originally caused the heart attack. Cardiac rehabilitation helps people to resume normal activity as quickly as possible.

What are the risk factors for myocardial infarction?

People who are at risk for the development of coronary artery disease and myocardial

infarction include those who fall into any of the categories listed below:

- people with a history of heart disease
- males
- smokers
- people with high cholesterol
- people with high blood pressure
- obese people
- people with diabetes
- people who suffer stress
- people who live a sedentary life style

Heredity is a powerful factor that contributes to early heart disease. Being male is a risk factor, but the incidence of heart disease in women increases dramatically after menopause.

The risk factors to concentrate upon are those that can be modified. These include cigarette smoking, high blood pressure, cholesterol, obesity, sedentary life style and stress. Cigarette smoking causes many deaths from myocardial infarction and other heart diseases. Smoking contributes to almost half of the heart attacks of women under age 55. Stopping smoking can greatly reduce your chances of having a heart attack. Controlling blood pressure can reduce your risk of heart attack. Lowering cholesterol to safe levels through diet and medications can reduce your risk and may even lead to some regression of the plaques already present. Lean body weight and a regular exercise program are helpful. If you are diabetic, precise control of your diabetes will help reduce your risk of blood vessel damage due to diabetes. Stress is a risk factor that is common, difficult to quantify and difficult to control effectively over time. Methods of stress reduction include meditation, regular exercise, time management and a supportive environment.

How is a heart attack diagnosed?

Chest pain is the most common symptom of heart attack. The chest pain is usually a burning or pressure sensation beneath the mid or upper breast bone. The pain may radiate into the upper mid back, neck, jaw or arms. The pain may be severe but often is only moderate in severity. There may be associated shortness of breath or sweating. If patients have had angina previously, the heart attack pain will feel the same as their usual angina only stronger and more prolonged. If you have a pain like this that lasts longer than 15 minutes, it is best to be evaluated immediately. Calling your medic unit is the fastest and safest way to ask for help. If you have symptoms like this that wax and wane, this is often a warning sign that a heart attack is about to occur and prompt medical attention is needed.

Once you are in an emergency room or a doctor's office, an electrocardiogram (ECG) will be obtained. The ECG is often helpful in diagnosing a heart attack. Sometimes, however, the ECG is normal even when heart injury is present. When heart cells die, certain enzymes present in heart cells are released into the blood stream that serve as a marker of heart injury. These enzymes can be measured by blood tests. The amount of enzyme released into the blood stream can also help assess how much heart damage

has occurred.

How are heart attacks treated?

The best way to limit the size of a heart attack is to restore the flow of blood to the heart muscle as fast as possible. There are two basic methods to do this. Because most heart attacks are caused by clots forming within the coronary artery, dissolving the clot quickly will restore blood flow. Drugs called thrombolytics are quite effective. The sooner these drugs are given, the quicker the blood flow will be restored. An alternative method involves the use of balloon angioplasty. This involves taking the heart attack victim promptly to the cardiac cath lab in the hospital. An angiogram is performed to show the blocked blood vessel leading to the heart attack. Then a balloon catheter is placed across the blockage and flow is restored. Sometimes a stent (a device that assists in holding the blood vessel open) is placed to create a large channel.

Smaller heart attacks, often those not producing significant abnormalities on the ECG are often treated with bed rest and blood thinners such as heparin as well as drugs to reduce the work the heart does. These heart attacks are called non-transmural myocardial infarctions. Before discharge, x-ray studies of the heart arteries are often carried out to see if angioplasty or surgery will be necessary.

Following thrombolytic (clot reducing) therapy, angiograms are often performed to outline the coronary anatomy to help determine if additional therapy such as angioplasty or bypass surgery is indicated. This may be done during the initial hospitalization or later as an outpatient procedure.

You will be hospitalized after a heart attack for 3 to 5 days, longer if there are complications or if heart surgery is necessary. A variety of medications are used. Beta blockers reduce the work your heart does and are usually prescribed. ACE inhibitors may help the heart work better. Aspirin is usually given as a blood thinner. Heparin, an intravenous blood thinner, is usually given early. If you receive a stent, medication is often given to help prevent clotting within the stent. Before your discharge from the hospital, a low level exercise test on a treadmill may be performed. The cardiac rehabilitation program often starts in the hospital with a progressive exercise program and counseling about any lifestyle or diet changes that need to be made.

When can I return to work?

Your return to work depends on how much your heart was damaged, if there were complications with your heart attack, the need for further therapy such as angioplasty or bypass surgery and the type of work you do. Patients with uncomplicated heart attacks who do office-type work may often return to work within 2 to 3 weeks. More vigorous work demands may require you to be off work for 6 to 8 weeks.

How can I prevent further heart attacks?

Following your heart attack, it is very important to modify your risk factors. If you are a smoker, you must stop. Your cholesterol level will be checked and your doctor will give you advice about how to lower your cholesterol. This will require a low cholesterol, low fat diet, and often medications are required. A sensible exercise program is important and is often started through a formal cardiac rehabilitation program. Periodic

examinations by your physician are important. This may include periodic testing to assess your heart blood flow.