

Heart Attack and Acute Coronary Syndrome

What is a heart attack and acute coronary syndrome?

The heart is a muscular organ that pumps blood throughout the body via a system of veins and arteries. Blood flows from the lungs, where it picks up oxygen via the pulmonary veins into the heart, and gets pumped out to the body, delivering oxygen to the tissues. The blood returns to the heart via the veins and gets pumped back to the lungs once again. In order to perform these tasks, the heart requires large amounts of oxygen that it obtains from blood.

An acute myocardial infarct (AMI) - also called a heart attack - is caused by a blockage in the heart's arteries that reduces or completely cuts off the blood supply to a portion of the heart. This blockage is usually caused by a blood clot that gets stuck in an artery, usually developing in an area of thickening inside the wall of an artery that restricts the flow of blood. The thickening is usually caused by a build-up of **plaque** and is called **atherosclerosis**. The **acute** blockage of blood flow caused by the clot, if present for more than an hour, can cause death of the heart muscle cells (infarct) and lead to scarring of the affected area of the heart.

Acute coronary syndrome (ACS) is the term used for **signs** and **symptoms** that result from insufficient blood flow to the heart. Symptoms may include sudden onset of chest pain, often radiating into the jaw, arm or shoulder; in persons who have **angina**, these symptoms may be more severe or longer-lasting than normal. Some patients may exhibit other symptoms, such as rapid pulse, nausea, vomiting, sweating, sudden onset of shortness of breath, or difficulty breathing; in some cases, these symptoms may occur without chest pain (particularly in older individuals and in those with **diabetes**). These symptoms may also be accompanied by a change in blood pressure. In women, symptoms are often less dramatic and more likely to be misinterpreted as due to another cause than in men.

Tests

When a person presents with ACS, it is usually not clear whether the symptoms indicate that the patient is having an AMI or whether the blockage is only temporary. A number of tests are available to help evaluate whether AMI has occurred or not.

The diagnosis of a heart attack may be made by changes seen on an **electrocardiogram (ECG or EKG)** and by a number of blood tests. An ECG is performed within the first few minutes after a person with ACS arrives in the emergency room. It can recognize changes that prove that a severe heart attack has occurred, but this diagnostic change is only seen in the most severe AMI's. More commonly, the ECG only confirms that the heart is not getting enough blood or has non-specific changes that do not prove that an AMI has occurred. Those with the most severe ECG changes (termed ST elevation, referring to increase in the height of the line on the ECG linking the S and T

parts of the ECG tracing) usually have a major clot in an artery supplying the heart and should be treated rapidly with either drugs or cardiac catheterization to remove the clot.

In the remaining majority of patients with ACS, blood tests are needed to tell whether an AMI has occurred. The blood tests provide a measure of heart muscle damage. When some of the muscle dies, the dead cells release chemicals into the blood. These tests include **CK-MB**, **myoglobin**, and **troponin**. Measuring the levels of these **cardiac biomarkers** can detect a heart attack and provide a rough measure of how much muscle has been damaged. They are also used in the diagnosis, evaluation, and monitoring of patients with suspected ACS.

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