

CHEST DISCOMFORT: WHEN IS STRESS TESTING NECESSARY?

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Chest Discomfort: When Is Stress Testing Necessary?

What causes chest pain?

Chest discomfort can be a symptom of many conditions, some less serious, some life-threatening. Doctors often refer to chest discomfort as being the result of a cardiac or non-cardiac condition. Cardiac chest discomfort can be further divided into ischemic and non-ischemic pain.

Ischemic chest discomfort, or angina, is typically the result of impaired blood flow to an area of heart muscle resulting from a blockage in a coronary artery. This is known as coronary artery disease (CAD). When this happens, the area of heart muscle downstream from the blockage does not receive adequate oxygen and nutrients to function normally, causing nerve endings in the area to signal the problem to the brain. A person perceives this signal as chest discomfort, often described as tightness, squeezing, burning, aching, pressure, heaviness, heartburn or indigestion. Angina is typically located in the chest, but its effects can be felt in the arms, back, neck, or throat. Other symptoms that might accompany angina include shortness of breath, sweating, nausea, vomiting, palpitations, dizziness, and weakness. This sensation typically gets worse with exertion or emotional stress, and improves with rest or prescribed nitroglycerin.

Sources of non-ischemic, cardiac chest discomfort include pericarditis, aortic aneurysm, mitral valve prolapse, or arrhythmias.

Pericarditis refers to inflammation of the thin sac that surrounds the heart. This is most commonly the result of an inflammatory process caused by a virus. The sensation is typically a very severe, sharp, localized chest discomfort or pain that is made worse by laying back, deep breathing, or coughing. Sitting up and leaning forward often relieve the discomfort.

The presence of a “silent” **aortic aneurysm**, unknown to the patient, is usually not a source of any discomfort for a patient. The aneurysm is an abnormally dilated (widened) section of the aorta where the wall of the aorta can be weakened. This area can rupture suddenly, leak slowly, or the innermost layer of the aorta can tear, allowing blood to enter between the layers of the wall of the aorta (aortic dissection).

Pressure associated with the pulse-like flow of blood causes the layers to separate further causing the aneurysm to enlarge or rupture. A ruptured aneurysm is rare but is catastrophic when it occurs. It results in a sudden drop in blood pressure and frequently sudden death unless the rupture results only in a slow leak of blood from the aorta. A leaking aneurysm or aortic dissection often results in a sudden, severe, tearing

chest pain that is usually felt between the shoulder blades, abdomen, or flank (side).

Mitral valve prolapse, representing the displacement of the mitral valve leaflets into the left atrium (left upper heart chamber) during cardiac contraction (systole) does not usually cause symptoms. However, it can be associated with chest discomfort syndromes that are not typical of an ischemic cardiac cause. The discomfort can be sharp and stabbing, and persist for long periods of time. It usually does not become worse with activity. In mitral valve prolapse “syndrome,” no definite cause of the pain has been identified.

Abnormal rapid heart rhythms, called **arrhythmias**, can also result in chest discomfort that is usually described as a pressure, heaviness, or pounding. This can occur in the absence of blockages in the coronary arteries and is usually caused by the sensation of the heart beating very rapidly at inappropriately high rates for the level of activity.

Non-cardiac chest discomfort can result from many conditions, including pneumonia, pleurisy (an inflammation of the membrane that surrounds the lungs), muscle strains in the chest wall, inflammation of the cartilage that attaches the ribs to the breastbone or from the gastrointestinal tract. Gastrointestinal sources of chest discomfort include ulcers of the stomach or esophagus, reflux of acid from the stomach to the esophagus — called gastroesophageal reflux disease (GERD) — or a spasm of the esophagus. Occasionally, gallbladder abnormalities such as stones and inflammation can be perceived as chest discomfort. Finally, anxiety and panic attacks can produce chest discomfort that can resemble ischemic cardiac chest pain.

How do doctors determine if chest discomfort is from your heart?

A careful medical history and physical examination by your doctor are the first and most important parts of an evaluation. Your doctor might ask you questions about your symptoms including:

- What does it feel like?
- Where is it located?
- Does it stay in one spot or does it radiate to another spot?
- When do you notice it? What brings it on?
- Is it associated with exertion, meals, or certain body positions?
- How long does it last?
- How severe is it?
- When was the last episode?
- Have you found anything that makes it feel better?
- Have you found anything that makes it feel worse?
- Can you reproduce it by pushing on your chest wall?

An EKG and chest X-ray are very important diagnostic tests that your doctor might perform, although normal results do not rule out coronary artery disease.

Based on your history, examination, ECG, and chest X-ray, your doctor will be able to determine the likelihood that your chest discomfort is related to your heart. If your doctor decides that it is necessary, a stress test might be scheduled to help more definitively determine if coronary

artery disease is present. Occasionally, your doctor might recommend a cardiac catheterization to visualize the coronary arteries if the likelihood of CAD seems very high.

What is a stress test?

A stress test is usually ordered to help determine your likelihood of having coronary artery disease (CAD). Stress tests can also be used to determine the effectiveness of your cardiac treatment plan. All stress tests involve either exercising on a treadmill or bike, or using a medicine to produce an effect similar to exercise. You are closely monitored during any type of stress test with continuous EKG monitoring and frequent blood pressure checks. A doctor is always present or immediately available during a stress test.

What are the different types of exercise stress tests?

The most common type of stress test is a simple exercise EKG where you exercise on a treadmill with continuous EKG monitoring and frequent blood pressure monitoring. This is good for patients with a normal resting EKG. Your doctor might order a stress test that uses imaging methods to increase the accuracy of the regular exercise EKG. The two imaging methods used include echocardiography and nuclear imaging.

Echocardiography allows visualization of the walls of your heart while nuclear imaging shows the relative blood flow to the different walls of your heart. With both types of stress test, a set of images is obtained at rest and another set after exercise. With stress echocardiography, if you have a significant blockage in a coronary artery, the wall that is supplied by that artery will not be contracting on the ultrasound images obtained immediately after exercise. With a stress test using nuclear imaging, an abnormality is detected when an area of heart muscle appears to have less blood flow compared to the rest of the heart at exercise and compared to the same area of heart muscle at rest.

An exercise stress test provides your doctor with much more information about your likelihood of having CAD and your prognosis than a non-exercise stress test. For this reason, it is always best to exercise if you can. For those who cannot exercise, however, there are medicines used to mimic exercise. The most common ones are dobutamine and regadenoson.

Do's And Don'ts About Stress Tests

- Don't eat or drink anything except water for four hours before a stress test. Follow the stress lab's specific instructions.
- Don't drink or eat any products containing caffeine for 24 hours before the test. Also avoid decaffeinated or caffeine-free products for 24 hours before the test, as these products contain trace amounts of caffeine. Ask your health care provider about over-the-counter medications containing caffeine that you should avoid before the test.
- Do talk to your doctor about which medicines you should take before the test, particularly if you have high blood pressure or diabetes.
- Don't stop taking any medicines without speaking to your doctor first.
- Do wear comfortable clothes and shoes suitable for walking if you are having an exercise stress test.
- Do bring your inhalers if you use them for your breathing.
- Do ask your doctor if you need to bring someone to drive you home after the test.

This information is provided by the Cleveland Clinic and is not intended to replace the medical advice of your doctor or healthcare provider. Please consult your healthcare provider for advice about a specific medical condition.

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