

## Chapter 1 : Echo Stress Test

*A stress echocardiography, also called an echocardiography stress test or stress echo, is a procedure that determines how well your heart and blood vessels are working.*

Stress echocardiography Stress echocardiography Echocardiography stress test; Stress test - echocardiography  
Definition Stress echocardiography is a test that helps diagnose heart disease with the help of ultrasound images. A more routine exercise stress test does not use imaging. Following exercise or other stress to the heart, the images reveal parts of the heart that may not be receiving enough blood or oxygen because of blocked arteries. This test may be used to monitor your progress if you already have a known heart condition.  
How the Test is Performed The ultrasound portion of this test is performed in the same way as an echocardiogram. Ask your health care provider if you should take any of your routine medicines on the day of the test especially if you are taking heart medication. Wear loose, comfortable clothing. You will be asked to sign a consent form before the test.  
How the Test Will Feel A stress echocardiogram includes the following steps: A resting echocardiogram will be performed. You will exercise or be given medicine until you reach the target heart rate. Your blood pressure and heart rhythm ECG will be monitored throughout the procedure. A videotape of the ultrasound images will be taken during the procedure. Another echocardiogram will be taken immediately after your target heart rate has been achieved.  
Why the Test is Performed The test is performed to see whether your heart is getting enough blood flow and, therefore, enough oxygen when it is put under stress. The intent is to discover and treat any blockage or disease before serious or life-threatening problems develop.  
Risks The risks are very low, and health care professionals will monitor you during the entire procedure. Rare complications include abnormal heart rhythm, heart attack, and collapse.  
Considerations The main benefit is that a stress echocardiogram is a very effective, noninvasive test that can help determine whether you have blockages in your coronary arteries and if so, how serious the problem is. Early diagnosis and monitoring of heart disease allows treatment to begin early.

## Chapter 2 : Echocardiography | National Heart, Lung, and Blood Institute (NHLBI)

*Stress echocardiography is a test that uses ultrasound imaging to show how well your heart muscle is working to pump blood to your body. It is most often used to detect a decrease in blood flow to the heart from narrowing in the coronary arteries.*

Patients with coronary artery blockages may have minimal or no symptoms during rest. However, symptoms and signs of heart disease may be unmasked by exposing the heart to the stress of exercise. During exercise, healthy coronary arteries dilate develop a more open channel than an artery with a blockage. This unequal dilation causes more blood to be delivered to heart muscle supplied by the normal artery. This reduced flow causes the involved muscle to "starve" during exercise. The "starvation" may produce symptoms like chest discomfort or inappropriate shortness of breath , EKG abnormalities and reduced movement of the heart muscle. The latter can be recognized by examining the movement of the walls of the left ventricle the major pumping chamber of the heart by Echocardiography. In the animation shown above, the left hand panel, marked "Resting" shows normal movement of the septum the muscle partition between the right and left ventricles RV and LV, respectively while the patient is resting. The animated echo on the right "Exercise" shows that movement of the septum is markedly reduced immediately following stress. Such findings would indicate a blockage in the artery supplying the partition of the heart and the front portion of the left ventricle both these areas are supplied by the LAD or left anterior descending coronary artery. How is a Stress Echo performed? Imaging tests are generally obtained when a physician wishes to confirm or rule out the presence of coronary artery disease. A Stress Echo is also performed in patients who have disease involving the heart muscle or valve, or if a patient is having inappropriate shortness of breath and a cardiac cause is suspected. The patient is brought to the Echo laboratory where a "resting" study is performed. This provides a baseline examination and demonstrates the size and function of various chambers of the heart. Particular attention is paid to the movement of all walls of the left ventricle LV. Similar to a regular echo test , sticky patches or electrodes are attached to the chest and shoulders and connected to electrodes or wires to record the electrocardiogram EKG or ECG. The EKG helps in the timing of various cardiac events filling and emptying of chambers. A colorless gel is then applied to the chest and the echo transducer as described in the Echocardiogram section is placed on top of it. The echo technologist then makes recordings from different parts of the chest to obtain several views of the heart. You may be moved from laying on your back to turning over to your left side. You may also be requested to breathe slowly or to hold your breath. This helps to obtain higher quality pictures. The images are constantly viewed on the monitor. Exercise is then initiated using a treadmill most common or a stationary bicycle. In patients who are unable to complete a high level of exercise because of physical limitations, stress to the heart is provided by pharmaceutical or chemical stimulation of the heart. Stress Echo is made up of three parts: A resting Echo study, Stress test, and a repeat Echo while the heart is still beating fast. Exercise stress testing usually employs the "Bruce" or a similar protocol, as described in the Regular Stress Test section. Exercise is started at a slower "warm-up" speed. Exercise may be stopped earlier if the patient develops alarming symptoms chest discomfort, marked shortness of breath, weakness, dizziness, etc. Please remember that you have a physician in attendance although an experienced assistant may perform the test if the physician is tied up with an emergency. The above problems are uncommon and you are far safer if they occur in the presence of an experienced medical team rather than having them happen while you are exercising in a spa, jogging, or running up a flight of office stairs. EKG recordings are made during every minute of exercise and then again after exercise is stopped. The blood pressure is recorded at three minute intervals during exercise and then again at rest. Immediately after stopping the treadmill, the patient moves directly to the examination table and lays on the left side. The Echo examination is immediately repeated. Images are stored and then played back by the computer. A video clip of multiple views of the resting and exercise study are compared side-by-side. They are analyzed by the physician. Normally, one expects an increased EF or ejection fraction a measure of how well the heart is pumping. Also, the LV walls do not show any exercise-induced abnormal movement. Preparing for the Echo Stress Test: The following

recommendations are "generic" for all types of cardiac stress tests: Do not eat or drink for three hours prior to the procedure. This reduces the likelihood of nausea that may accompany strenuous exercise after a heavy meal. Specific heart medicines may need to be stopped one or two days prior to the test. Such instructions are generally provided when the test is scheduled. Wear comfortable clothing and shoes that are suitable for exercise. An explanation of the test is provided and the patient is asked to sign a consent form. How long does the entire test take? How safe is a Stress Echo test? There are no known adverse effects from the ultrasound used during Echo imaging. The risk of the stress portion of the test is rare and similar to what you would expect from any strenuous form of exercise jogging in your neighborhood, running up a flight of stairs, etc. As noted earlier, experienced medical staff is in attendance to manage the rare complications like sustained abnormal heart rhythm, unrelieved chest pain or even a heart attack. These problems could potentially have occurred if the same patient performed an equivalent level of exercise at home or on a jogging track. What is the reliability of Stress Echo? How quickly will I get the results and what will it mean? The physician conducting the test will be able to give you the preliminary results before you leave the Stress Echo laboratory. However, the official result may take a few days to complete. The results of the test may help confirm or rule out a diagnosis of heart disease. In patients with known coronary artery disease prior heart attack, known coronary blockages, previous treatment with angioplasty, stents or bypass surgery, etc. The panoramic view below shows a patient undergoing the treadmill and Echocardiography portions of the stress test combined into a single picture. You may also pan left and right by clicking and dragging your mouse within the panoramic picture.

## Chapter 3 : Stress echocardiography: MedlinePlus Medical Encyclopedia

*What is a dobutamine stress echocardiogram? An echocardiogram (echo) is a test used to assess the heart's function and structures. A stress echocardiogram is a test done to assess how well the heart works under stress. The "stress" can be triggered by either exercise on a treadmill or a medicine.*

URL of this page: It is most often used to detect a decrease in blood flow to the heart from narrowing in the coronary arteries. A resting echocardiogram will be done first. While you lie on your left side with your left arm out, a small device called a transducer is held against your chest. A special gel is used to help the ultrasound waves get to your heart. Most people will walk on a treadmill or pedal on an exercise bicycle. Slowly about every 3 minutes, you will be asked to walk or pedal faster and on an incline. It is like being asked to walk fast or jog up a hill. In most cases, you will need to walk or pedal for around 5 to 15 minutes, depending on your level of fitness and your age. Your provider will ask you to stop: When your heart is beating at the target rate When you are too tired to continue If you are having chest pain or a change in your blood pressure that worries the provider administering the test If you are not able to exercise, you will get a drug such as dobutamine through a vein intravenous line. This medicine will make your heart beat faster and harder, similar to when you exercise. Your blood pressure and heart rhythm ECG will be monitored throughout the procedure. More echocardiogram images will be taken while your heart rate is increasing, or when it reaches its peak. The images will show whether any parts of the heart muscle do not work as well when your heart rate increases. This is a sign that part of the heart may not be getting enough blood or oxygen because of narrowed or blocked arteries. How to Prepare for the Test Ask your provider if you should take any of your routine medicines on the day of the test. Some medicines may interfere with test results. Never stop taking any medicine without first talking to your doctor. It is important to tell your doctor if you have taken any of the following medicines within the past 24 hours 1 day: Wear loose, comfortable clothing. You will be asked to sign a consent form before the test. The blood pressure cuff on your arm will be inflated every few minutes, producing a squeezing sensation that may feel tight. Rarely, people feel chest discomfort, extra or skipped heartbeats, dizziness, headache, nausea or shortness of breath during the test. Why the Test is Performed The test is performed to see whether your heart muscle is getting enough blood flow and oxygen when it is working hard under stress. Your doctor may order this test if you: Have new symptoms of angina or chest pain Have angina that is getting worse Have recently had a heart attack Are going to have surgery or begin an exercise program, if you are at high risk for heart disease Have heart valve problems The results of this stress test can help your provider: Determine how well a heart treatment is working and change your treatment, if needed Determine how well your heart is pumping Diagnose coronary artery disease See whether your heart is too large Normal Results A normal test will most often mean that you were able to exercise as long as or longer than most people of your age and gender. You also did not have symptoms or concerning changes in blood pressure and your ECG. Your heart pictures show that all parts of your heart respond to increased stress by pumping harder. A normal result means that blood flow through the coronary arteries is probably normal. The meaning of your test results depends on the reason for the test, your age, and your history of heart and other medical problems. What Abnormal Results Mean Abnormal results may be due to: Reduced blood flow to a part of the heart. The most likely cause is a narrowing or blockage of the arteries that supply your heart muscle. Scarring of the heart muscle due to a past heart attack. After the test you may need:

## Chapter 4 : Stress Echocardiogram (Echo) | Cardiovascular Stress Test | Upstate SC, Greenville SC

*Stress echocardiography is a versatile tool that derives physiologic information about the presence, site, and extent of ischaemia from regional wall motion responses to stress, and has provided from these data diagnostic and prognostic information in a variety of disease states.*

An echocardiogram uses electrodes to check your heart rhythm and ultrasound technology to see how blood moves through your heart. An echocardiogram can help your doctor diagnose heart conditions. An echocardiogram uses sound waves to produce images of your heart. This common test allows your doctor to see your heart beating and pumping blood. Your doctor can use the images from an echocardiogram to identify heart disease. Depending on what information your doctor needs, you may have one of several types of echocardiograms. Each type of echocardiogram involves few, if any, risks. Check for problems with the valves or chambers of your heart. Check if heart problems are the cause of symptoms such as shortness of breath or chest pain. Detect congenital heart defects before birth fetal echocardiogram. The type of echocardiogram you have depends on the information your doctor needs. Transthoracic echocardiogram. In this standard type of echocardiogram: A technician sonographer spreads gel on a device transducer. The sonographer presses the transducer firmly against your skin, aiming an ultrasound beam through your chest to your heart. The transducer records the sound wave echoes from your heart. A computer converts the echoes into moving images on a monitor. If your lungs or ribs block the view, you may need a small amount of an enhancing agent injected through an intravenous IV line. A flexible tube containing a transducer is guided down your throat and into the tube connecting your mouth to your stomach esophagus. A computer converts the echoes into detailed moving images of your heart, which your doctor can view on a monitor. Doppler echocardiogram. Sound waves change pitch when they bounce off blood cells moving through your heart and blood vessels. These changes Doppler signals can help your doctor measure the speed and direction of the blood flow in your heart. Doppler techniques are generally used in transthoracic and transesophageal echocardiograms. Doppler techniques can also be used to check blood flow problems and blood pressure in the arteries of your heart – which traditional ultrasound might not detect. The blood flow shown on the monitor is colorized to help your doctor pinpoint any problems. Stress echocardiogram. Some heart problems – particularly those involving the arteries that supply blood to your heart muscle coronary arteries – occur only during physical activity. Your doctor might recommend a stress echocardiogram to check for coronary artery problems. In a stress echocardiogram: You may feel some discomfort from the transducer being held very firmly against your chest. The firmness is necessary to produce the best images of your heart. If you have a transesophageal echocardiogram, your throat may be sore for a few hours afterward. Rarely, the tube may scrape the inside of your throat. Your oxygen level will be monitored during the exam to check for any breathing problems caused by sedation medication. During a stress echocardiogram, exercise or medication – not the echocardiogram itself – may temporarily cause an irregular heartbeat. Serious complications, such as a heart attack, are rare. How you prepare. Food and medications. No special preparations are necessary for a standard transthoracic echocardiogram. You can eat, drink and take medications as you normally would. Be sure to arrange for a ride home. For a standard transthoracic echocardiogram: The technician will also apply a gel to the transducer that improves the conduction of sound waves. The technician will move the transducer back and forth over your chest to record images of sound-wave echoes from your heart. You may hear a pulsing "whoosh," which is the ultrasound recording the blood flowing through your heart. You may be asked to breathe in a certain way or to roll onto your left side. If you have a transesophageal echocardiogram: After the procedure. Most people can resume their normal daily activities after an echocardiogram. If your echocardiogram is normal, no further testing may be needed. If the results are concerning, you may be referred to a doctor trained in heart conditions cardiologist for more tests. Results. Information from the echocardiogram may show: Changes in your heart size. Weakened or damaged heart valves, high blood pressure or other diseases can cause the chambers of your heart to enlarge or the walls of your heart to be abnormally thickened. Damage to the heart muscle. Areas of heart wall that move weakly may have been

damaged during a heart attack, or be receiving too little oxygen. An echocardiogram can help your doctor determine if your heart valves open wide enough for adequate blood flow or close fully to prevent blood leakage. An echocardiogram can show problems with the heart chambers, abnormal connections between the heart and major blood vessels, and complex heart defects that are present at birth. Clinical trials Explore Mayo Clinic studies testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this disease.

## Chapter 5 : Stress Echocardiogram - What You Need to Know

*Two tests that are often misunderstood are the Echocardiogram (or echo) and the Stress Echocardiogram (commonly called a stress echo or stress test). Echocardiogram Explained An echocardiogram is a detailed static examination of the four chambers of the heart.*

What is a stress echocardiogram? A stress echocardiogram echo is an ultrasound used to see how your heart works under stress. Your heart may be put under stress with exercise or medicine. An echo shows your heart structures and how well your heart muscle is pumping. It also shows how blood flows through your heart. Why may I need a stress echo? Find the cause of symptoms such as chest pain or shortness of breath Monitor or diagnose a heart condition, such as coronary artery disease or a heart valve problem Find out how much exercise is safe for your heart Make sure your heart is strong enough for surgery How do I prepare for a stress echo? Caffeine and nicotine can affect your test results. Do not have caffeine for at least 24 hours before your test. This includes drinks, foods, and medicine with caffeine. Do not smoke 3 hours before your test or as directed. Your healthcare provider may tell you not to eat or drink anything 2 hours before your test. Your healthcare provider will tell you what medicines to take or not take on the day of your test. You may be told to stop taking medicine with theophylline 48 to 72 hours before your test. You may also be told to stop taking beta blocker medicine 24 hours before your test. Wear comfortable clothes and shoes if you will exercise during the test. If you have an inhaler, bring it with you to the test. What will happen during a stress echo? A healthcare provider will place electrodes sticky patches on your chest. Hair may be removed to help the patches stick to your skin. Your healthcare provider will attach a wire to each patch. The wires are connected to a monitor that will display the electrical activity of your heart. An echo will be done while you are resting. If you are going to get medicine during your test, a healthcare provider will insert an IV. You will exercise or receive medicine to stress your heart. Your heart rate, heart rhythm, and blood pressure will be monitored closely during the test. During a stress echo with exercise you will be asked to walk on a treadmill or pedal on a stationary bicycle. Instead you may lie down and pedal a bicycle. If you lie down to exercise, an echo will be taken while you exercise. The speed and resistance of the exercise machine may be increased over time. You will be asked to exercise for as long as you can. Your healthcare provider will tell you to stop exercising if you have shortness of breath, chest pain, or leg pain. Immediately after you stop exercising, another echo will be done. During a stress echo with medicine your healthcare provider will inject medicine through your IV. An echo will be taken while the medicine is given. The medicine will make your heart beat faster and work harder. The medicine may make you feel anxious, dizzy, nauseous, shaky, or short of breath. You may also have mild chest pain. These symptoms should stop when your healthcare provider stops giving you medicine. Tell your healthcare provider if you have severe chest pain or dizziness. Other medicine may be given to treat severe chest pain or dizziness. What will happen after a stress echo? Your IV will be removed if you had one. You can usually return to work and your normal activities right away. What are the risks of a stress echo? Medicine or exercise may cause chest pain, dizziness, or a heart attack. Care Agreement You have the right to help plan your care. Learn about your health condition and how it may be treated. Discuss treatment options with your healthcare providers to decide what care you want to receive. You always have the right to refuse treatment. The above information is an educational aid only. It is not intended as medical advice for individual conditions or treatments. Talk to your doctor, nurse or pharmacist before following any medical regimen to see if it is safe and effective for you.

**Chapter 6 : Dobutamine Stress Echocardiogram | Johns Hopkins Medicine Health Library**

*Stress echocardiography is the combination of 2D echocardiography with a physical, pharmacological or electrical stress. The diagnostic end point for the detection of myocardial ischemia is the induction of a.*

Extreme tiredness Heart attack rare There may be other risks depending on your specific medical condition. Be sure to discuss any concerns with your healthcare provider before the test. Certain factors or conditions may interfere with a DSE such as: Smoking or using any other form of tobacco within 3 hours of the test Ingesting caffeine within 3 hours of the test Taking beta-blocking medicines – these may make it hard to increase the heart rate to an appropriate level. How do I get ready for a dobutamine stress echocardiogram? Your doctor will explain the test to you and let you ask questions. You will be asked to sign a consent form that gives your permission to do the test. Read the form carefully and ask questions if anything is not clear. Tell the doctor if you are allergic to or sensitive to any medicines or latex. Fasting not eating may be required before the test. Your doctor will give you instructions on how long you should withhold food and liquids. Tobacco use and caffeinated beverages, such as coffee, tea, and soda, may be restricted several hours before testing. Tell your doctor of all medicines prescription and over-the-counter , vitamins, herbs, and supplements that you are taking. You may be instructed to hold certain medicines before the test, such as beta-blockers. Your doctor will give you specific instructions Tell your doctor if you are pregnant or think you could be. Tell your doctor if you have a pacemaker. Based on your medical condition, your doctor may request other specific preparation. What happens during a dobutamine stress echocardiogram? A dobutamine stress echocardiogram DSE may be done on an outpatient basis or as part of your hospital stay. Generally, a DSE follows this process: You will be asked to remove any jewelry or other objects that may interfere with the test. You may wear your glasses, dentures, or hearing aids if you use any of these. You will be asked to remove clothing from the waist up and will be given a gown to wear. You will be asked to empty your bladder before the test. An intravenous IV line will be started in your hand or arm before the test. You will lie on your left side on a table or bed, but may be asked to change position during the test. You will be connected to an electrocardiogram ECG monitor that records the electrical activity of your heart and monitors your heart during the test using small electrodes that stick to your skin. Your vital signs heart rate, blood pressure, breathing rate, and oxygen level will be monitored during the test. The ECG tracing that records the electrical activity of your heart will be compared to the images displayed on the echocardiogram monitor. The room will be darkened so that the images on the echo monitor can be seen by the technologist. The technologist will place warmed gel on your chest and then place the transducer on the gel. You will feel a slight pressure as the technologist positions the transducer to get the best image of your heart. The dobutamine infusion will begin at a rate determined by your weight. The rate of the infusion will be increased every few minutes until you have reached your target heart rate determined by the doctor based on your age and physical condition , or until the maximum dose of dobutamine has been reached. After the dobutamine is started and after each increase in the dobutamine, your blood pressure will be checked, an ECG tracing will be done, and echocardiogram images will be recorded. The technologist will move the transducer around on your chest so that all areas and structures of your heart can be seen. Once you have reached your target heart rate or the maximum amount of the dobutamine, the medicine will be stopped. Your heart rate, blood pressure, and ECG will continue to be monitored for 10 to 15 minutes until they have returned to the baseline state. Final echocardiogram pictures will be taken. Tell the technologist if you feel any chest pain, trouble breathing, sweating, or heart palpitations at any time during the test. Once all the images have been taken, the technologist will wipe the gel from your chest, remove the ECG pads, and take out the IV line. You may then put on your clothes. What happens after a dobutamine stress echocardiogram? You may go back your usual diet and activities unless your doctor tells you differently. Generally, there is no special type of care following a dobutamine stress echocardiogram. However, your doctor may give you other instructions after the test, depending on your particular situation.

### Chapter 7 : Echocardiogram vs. Stress Echo: Discerning The Differences | Virginia Cardiovascular Special

*Stress Echo is made up of three parts: A resting Echo study, Stress test, and a repeat Echo while the heart is still beating fast. Exercise stress testing usually employs the "Bruce" or a similar protocol, as described in the Regular Stress Test section.*

Bunda Cardiologist often order diagnostic tests to better understand the interworkings of your heart. Understanding why the test was ordered along with proper test preparation are important to eliminate potential cancellation or rescheduling for patients. Two tests that are often misunderstood are the Echocardiogram or echo and the Stress Echocardiogram commonly called a stress echo or stress test. Echocardiogram Explained An echocardiogram is a detailed static examination of the four chambers of the heart. Doppler can be used during the test to assess blood flow through the heart. Blood flow is often seen as color images flowing through the heart on the monitor. Patients are commonly referred for an echocardiogram for the following: Chest pain Experiencing shortness of breath often referred to as dyspnea A new heart murmur is identified during a physical exam A general practitioner may ask you to have an echo regardless of whether the symptom is cardiac in origin because it allows them to rule out certain conditions. This test does not require an NPO status, which is a medical term for withholding food, fluids, or medication prior to a test. A patient can wear regular clothing and shoes. The test typically takes 1 hour. After the echocardiogram, if the patient is diagnosed with CHD coronary heart disease or if the doctor determines that further examination is needed to make a diagnosis, he or she might recommend a stress echo test. Stress Echocardiogram Explained A stress echo is a more dynamic test that examines the heart in action. It combines an ultrasound of the heart with a stress test. A stress echo test has 3 phases. First, the patient lies on the exam table and the technician performs an echocardiogram as a baseline reading of the LV left ventricular function at rest. Step two the patient undergoes a standard treadmill test, where the speed and grade of the treadmill are increased every three minutes. At each interval, the technician checks the patient for a change in symptoms, usually pain or shortness of breath. The patient remains on the treadmill until they become symptomatic or they reach their target heart rate. Step three, the patient quickly returns to the exam table and receives another echocardiogram for the tech to assess LV function for changes. The stress echo test might be ordered if coronary artery disease is suspected, or if abnormalities are found during a baseline electrocardiogram or echocardiogram and require further examination. Preparing For a Stress Echo The exam requires NPO status - patients are asked to refrain from eating or drinking anything but water for hours prior to the test. Patients on beta-blockers a treatment for hypertension and coronary artery disease are asked to not take their medication the day of the procedure. Beta-blockers often diminish the heart rate response. A person taking this medication will have a slower at rest heart rate, and may have a hard time reaching ideal heart rate during the treadmill portion of the exam. Finally, the patient should wear comfortable clothing and shoes, appropriate for exercise. The stress echo typically takes 90 minutes. Detailed patient instructions for echocardiogram and stress echocardiogram are available for patients on our website.

**Chapter 8 : Exercise Stress Echocardiogram**

*A stress echocardiogram, non-exercise, combines a stress test and the echocardiogram but is used for patients who are unable to exercise. In lieu of exercise on a treadmill, the medication Dobutamine is administered, which simulates the treadmill exercise test by raising the heart rate.*

Why is this test performed? The test is used to: Determine how well your heart tolerates activity Evaluate the function of your heart and valves Determine your likelihood of having coronary artery disease Evaluate the effectiveness of your cardiac treatment plan Can I eat or drink on the day of the test? Avoid all products that contain caffeine for 24 hours before the test. In general, caffeine is found in coffee, tea, colas and other soft drinks, most chocolate products, as well as strawberries these contain a small amount of caffeine , as caffeine will interfere with the results of the test. Also avoid decaffeinated or caffeine-free products for 24 hours before the test, as these product contain trace amounts of caffeine. Should I take my medications the day of the test? Ask your physician, pharmacist or nurse if you have questions about other medications that may contain caffeine. **DO NOT** take the following heart medications on the day of your test unless your physician tells you otherwise or if it is needed to treat chest discomfort the day of the test: If you have any questions about your medications, ask your physician. If you use an inhaler for your breathing, please bring it to the test. Do not discontinue any medication without first talking with your physician. Guidelines for People with Diabetes If you take insulin to control your blood sugar, ask your physician what amount of your medication you should take the day of the test. Often, your physician will tell you to take only half of your usual morning dose and to eat a light meal four hours before the test. If you take pills to control your blood sugar, do not take your medication until after the test is complete. Do not take your diabetes medication and skip a meal before the test. If you own a glucose monitor, bring it with you to check your blood sugar levels before and after your test. If you think your blood sugar is low, tell the lab personnel immediately. Plan to eat and take your diabetes medication following your test. What should I wear on the day of the test? Please wear or bring comfortable clothes and shoes suitable for walking. Please do not bring valuables. You will be given a locker to store your belongings during the test. What happens during the test? Your test will take place in the Echo Lab. The testing area is supervised by a physician. First, a cardiac sonographer will gently rub 10 small areas on your chest and place electrodes small, flat, sticky patches on these areas. Before you start exercising, the sonographer will perform a resting EKG, measure your resting heart rate and take your blood pressure. After the echo test, you will exercise on a treadmill or stationary cycle. The lab personnel will ask you to start exercising and will gradually increase the intensity of exercise. You will be asked to continue exercising until you are exhausted. At regular intervals, the lab personnel will ask how you are feeling. Please tell them if you feel chest, arm or jaw pain or discomfort; short of breath, dizzy, lightheaded or if you have any other unusual symptoms. The lab personnel will watch for any changes on the EKG monitor that suggest the test should be stopped. You may be asked to quickly return to the exam table for another echocardiogram after exercising. Your heart rate, blood pressure and EKG will continue to be monitored until the levels are returning to normal. How will I feel during the test? You will be encouraged to exercise until you are exhausted. It is normal for your heart rate, blood pressure, breathing rate and perspiration to increase. As you stop exercising suddenly, it is normal to feel a little unsteady when getting off the treadmill and onto the exam table for the echocardiogram. How long does the test take? The appointment will take about 60 minutes. The actual exercise time is usually between seven and 12 minutes. How do I get the results of my test? After a cardiologist has reviewed your test, the results will be entered into your electronic medical record. Your physician will have access to the results and will discuss them with you. Please consult your physician for information pertaining to your testing. Cleveland Clinic is a non-profit academic medical center. Advertising on our site helps support our mission. We do not endorse non-Cleveland Clinic products or services. Policy 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.

**Chapter 9 : Cardiac stress test - Wikipedia**

*An echocardiogram is a graphic outline of the heart's movement created from ultrasound vibrations echoed from the heart's structures. The sonographer will place a wand (called a transducer) on your chest to view an outline of the heart's movement.*

General description of procedure, equipment, technique Stress echocardiogram, when performed to diagnose coronary artery disease CAD , aims at documenting inducible left ventricular wall motion abnormalities. It should be ordered only if the test results are expected to significantly affect patient management. To decrease the number of false-positive test results, stress echocardiogram should not be performed in patients with low probability of coronary artery disease, such as young patients without significant risk factors for coronary artery disease with non-anginal chest pain. Before the test is started, the patient should be interviewed and examined for any signs of acute or chronic illnesses, which may preclude stress testing. Vital signs and examination should be normal, without heart failure or uncontrolled arrhythmia. Stress testing should not be performed in patients with acute illnesses, such as evolving myocardial infarction or unstable angina, pneumonia, pneumothorax, gastro-intestinal bleeding, etc. Chest pain with normal baseline LV systolic function and normal ECG does not necessarily preclude stress testing. However, the causes of the chest pain should be sought and targeted physical examination is required. The patient should present in fasting state. Ability to walk on the treadmill should be assessed. In non-ambulatory patients and those unable to perform the desired level of upright exercise, treadmill testing should be changed to supine bicycle with or without dobutamine infusion. Alternatively, dobutamine infusion may be used alone. Following the patient interview, physical examination, and consent, a baseline 12 lead electrocardiogram and 2 dimensional echocardiographic images of the left ventricle are acquired. Echocardiographic images include parasternal long axis, parasternal short axis, apical 4 chamber and apical 2 chamber views of the left ventricle. The images are QRS gated and displayed in a quad format in a continuous cine loop. If baseline images have wall motion abnormalities, these may be attributed to coronary artery disease, and previous myocardial infarction should be considered. The proper exercise equipment for a stress echocardiogram includes treadmill or supine bicycle with software allowing for the administration of a graded level of resistance, run by a trained technician. When dobutamine infusion is used instead of walking on the treadmill or pedaling the bicycle, a trained nurse administers escalating doses of dobutamine, using a commercially available infusion pump. During the test, continuous ECG monitoring is performed and blood pressure is periodically recorded. Upon reaching the target heart rate or test termination for any reason, the patient is transferred to the imaging position and 2 dimensional echocardiographic images are acquired. Echocardiographic images are obtained with commercially available sonographic equipment by experienced sonographers capable of acquiring cardiac images within 1 minute, preferably during the initial 30 seconds after the completion of the exercise. While the patient remains in the supine position, intermittent blood pressure is taken, and continuous ECG monitoring is performed. The test is completed when the heart rate and blood pressure return to baseline values. Stress test interpretation should be performed by an experienced echocardiographer. Immediate post-exercise peak heart rate images are compared to the baseline images to identify new left ventricular LV wall motion abnormalities. If new LV wall motion abnormalities are present, the test result is considered to be consistent with ischemia. If no wall motion abnormalities are present and target heart rate has been achieved, the test result is considered negative for ischemia. If no wall motion abnormalities are present, but the target heart rate has not been achieved, the test is considered non-diagnostic for the presence of ischemia. Indications and patient selection Before the test is ordered, the pre-test probability of coronary artery disease needs to be assessed. To simplify the pre-test probability assessment, patients with typical angina, regardless of age and gender, are considered to have high pre-test probability. Patients with non-anginal pain younger than 35 years old are considered to have low pre-test probability. The rest of the patients, depending on co-morbidities, can have intermediate or high pre-test probability. Risk of coronary artery disease event and pre-test probability of coronary artery disease can be stratified using nomograms and tables correlating pain quality, age, and gender. Stress

echocardiography is considered appropriate in the evaluation of those with chest pain or anginal equivalents when the resting ECG is uninterpretable, when there is intermediate or high pre-test probability of coronary artery disease, regardless of the ability to exercise, with ventricular tachycardia, with new onset heart failure and normal baseline LV systolic function, and before intermediate or higher risk surgery in patients with low exercise capacity with at least intermediate pre-test probability of coronary artery disease. Stress echocardiography is considered inappropriate in patients with the following: Contraindications Stress testing should not be performed in patients with acute illnesses, i. Chest pain with normal baseline LV systolic function and normal ECG should not preclude stress testing. Details of how the procedure is performed The patient should be instructed to fast and abstain from drinking fluid or smoking for 3 hours before the test. No unusual physical efforts should be performed within 12 hours before the test. When feasible, anti-anginal medications and phosphodiesterase inhibitors should be stopped for hours prior to the test. A baseline 12 lead ECG is done after vital signs have been obtained. A standard 12 lead ECG is performed and analyzed. Subsequently, ECG leads are repositioned to ensure optimal echocardiographic windows. After the 12 lead ECG, 2 dimensional echocardiographic images of the left ventricle are acquired. These images include parasternal long axis, parasternal short axis, apical 4 chamber, and apical 2 chamber views of the left ventricle. Images are QRS gated and displayed in a quad screen format in a continuous cine-loop. Most commonly, a Bruce protocol treadmill test is performed, which consists of graded exercise at progressively increasing speed with 3 minute stages. Stage 0 is at 1. Modified Bruce protocol may be used in patients with decreased exercise capacity, aiming to increase the length of exercise to minutes. In patients unable to exercise, intravenous dobutamine infusion is performed. When supine bicycle exercise is used, pedaling resistance is increased in 25 Watt increments, typically with 3 minutes on each stage. Dobutamine infusion may be combined with supine bicycle exercise. If the increase in heart rate is inadequate, atropine may be given provided there are no contraindications. Atropine is usually administered intravenously at 0. Heart rate may not increase despite all of the above in pacemaker-dependent patients. Pacing rate can be increased until the target heart is achieved. Typical pacing protocol starts at 10 bpm above the baseline heart rate. Continuous ECG monitoring is performed. Blood pressure is recorded, typically at the end of each exercise stage. Stress testing is continued until test endpoints are achieved. Test endpoints include reaching the target heart rate or the development of significant arrhythmia or moderate angina. The test may be stopped if significant ST segment changes or complications develop. Upon termination of the test, the patient is transferred to the imaging position. Immediate post-exercise peak heart rate images and 12 lead electrocardiogram are acquired. The patient remains in the supine position while intermittent blood pressure readings are taken, and continuous ECG monitoring is performed until the ECG, heart rate, and blood pressure return to baseline values. Post-exercise images include parasternal long axis, parasternal short axis, apical 4 chamber, and apical 2 chamber views of the left ventricle. Post-exercise and baseline images are compared to identify new or worsening LV wall motion abnormalities. Interpretation of results Interpretation of the exercise stress test should include exercise capacity and clinical, hemodynamic, and electrocardiographic response. Exercise capacity of less than 5 METS is associated with poor prognosis. Exercise capacity of 13 METs or greater is associated with a good prognosis. Clinical assessment includes documentation of anginal pain or the pain syndrome that prompted the stress test. Signs of systemic hypoperfusion, e. Blood pressure should not decrease with exercise. The most commonly used electrocardiographic findings consistent with ischemia are ST depressions or elevation equal or greater than 1 mm 0. From the echocardiographic perspective, the test is considered to be consistent with ischemia if new global LV dysfunction or LV wall motion abnormalities are present, or if pre-existing LV dysfunction worsens in post-exercise images. If no wall motion abnormalities are present, but the target heart rate has not been achieved, the test is considered non-diagnostic for the presence of ischemia. Physicians interpreting the test should have formal training in supervision and interpretation of the stress echocardiography. It is recommended that at least supervised procedures should be performed and interpreted during training. For physicians without formal training, a minimum of procedures during 3 years are recommended. At least 25 procedures per year are recommended for maintenance of skill. Excluding non-diagnostic tests due to low peak heart rate, false-negative results are more common in patients with a

single vessel or circumflex disease, concentric left ventricular remodeling, and significant aortic or mitral valve regurgitation. Poor acoustic windows may preclude adequate segmental wall motion analysis, in which case imaging with an echo-contrast agent is recommended. False-positive results are possible with non-ischemic causes of abnormal wall motion response to exercise or pharmacological stress. Examples include severe hypertension during the test, microvascular disease, myocarditis, or idiopathic cardiomyopathy. Mitral valve annular tethering may lead to a reduction in motion of adjacent basal segments. In many cases, dyssynchrony can be differentiated from ischemia by preserved segmental wall thickening. In addition, stress echocardiography provides valuable information about exercise capacity and details cardiac structures and function. Echo-contrast agents have largely eliminated poor acoustic windows as a limitation of the stress echocardiography. Nowadays, a lack of the local expertise is the main reason that alternative imaging stress testing may be considered. The diagnostic endpoint of the MPI is perfusion reduction after stress or perfusion imbalance after vasodilatation. MPI image quality is inferior in overweight patients and in women with large breasts. Balanced hypoperfusion in triple vessel or equivalent coronary artery disease may result in an underestimation of the ischemic burden. The diagnostic endpoint of the CMR is the wall motion abnormalities with cine CMR or perfusion abnormality after vasodilatation. In some centers, gadolinium enhancement is also used to delineate scarred myocardium. Overall, experience with CMR is limited. The cost of CMR, length of the test, and advanced expertise requirements are major limiting factors. Additional non-stress testing for coronary artery disease includes calcium scoring and cardiac computed tomography angiography CCTA. Calcium score, calculated as a product of calcified plaque area by maximal plaque density, can be measured with an electron beam or regular computed tomography. Utility of calcium scoring is questionable in young patients, in patients with soft plaques, and when calcium plaque deposits are minimal.