



SER Information Sheet: **Cardiac Stress Test or Myocardial Perfusion Scan**

What is a Cardiac Stress Test?

This is a nuclear medicine study which obtains and evaluates the blood supply to the heart, and some information about the heart function.

The study involves imaging the heart at rest and after the patient's heart is stressed. The stress is in the form of exercise on a treadmill or exercise bike, or by giving the patient a medication. The purpose of the stress test is to maximally increase the blood flow to the heart. Differences in blood flow to different parts of the heart are more obvious when the blood flow is increased.

To take the images, a radiopharmaceutical is injected into the patient. The radiopharmaceutical passes through the blood and is concentrated in the heart. A camera is then positioned in front of the heart to capture the images from the gamma rays emitted from the patient.

With the patient lying down, the scanner rotates around the chest and 3D images of the heart are constructed. In most cases the radiopharmaceutical ^{99m}Tc sestamibi, or ^{99m}Tc tetrafosmin is used. The stress and rest scans are then compared. Parts of the heart receiving blood from diseased arteries will show a reduction in radioactivity in the stress scan and improvement in the rest scan.

What are the benefits of a cardiac scan?

NM Cardiac Stress Test is a non-invasive (simple), low risk study that:

- has a higher accuracy in the detection of coronary artery disease than an exercise stress test;
- can be performed in patients who are unable to exercise on a treadmill or exercise bike;
- has a proven value in predicting the risk of a heart attack;
- is relevant for patients with known coronary artery disease and patients being assessed for their fitness before major surgery;
- allows determination of the viability of heart muscle after a previous or recent heart attack. This information can help decide whether to proceed to coronary artery bypass surgery, i.e. if the heart muscle is irreparably damaged, invasive surgery to improve the blood flow would not improve the heart function.



How do I prepare for a Cardiac stress test?

There are no preparations for the scanning or imaging component of the test. However, it is important that you let staff at the hospital or radiology practice where you are having the scan done know if you are (or think you could be) pregnant or if you are breast feeding.

Women who are breastfeeding and people who are the primary or sole carer for small children will need to make special preparations after the test to stop breastfeeding for a short time and to avoid close contact with young children due to the small amount of radioactivity released for a while after the test.

Patients should discuss this with their referring doctor or the nuclear medicine practice where they will have the test for details.

To prepare for the stress component of the test, it is recommended you dress appropriately for physical exercise, as the stress test may involve walking on a treadmill or riding an exercise bike.

There are some medications you may be taking which work by slowing the heart rate. These medications may need to be stopped prior to the stress test. Your doctor is usually consulted before you are asked to stop taking any medication.

The stress test may consist of using a medication to increase blood flow to the heart. All forms of beverages and foods containing caffeine (e.g. coffee, tea, colas, cocoa) should be avoided for 24 hours prior to the study, as they may interfere with the effect of a stress medication called dipyridamole (Persantin). Decaffeinated teas or coffee and herbal teas should also be avoided as there may still be traces of caffeine.

Some patients may be on a regular prescription dipyridamole or Persantin, which is also an agent used for preventing strokes. If this is the case then dipyridamole or Persantin should not be used to stress the heart for this study.

The nuclear medicine specialist who conducts the study will need to know what medications you are taking. It is a good idea to bring a list of medications with you on the day of the study.



Who does the cardiac stress scan?

The stress test is usually conducted by a nuclear medicine specialist, and often with the assistance of a nurse who is also trained in cardiac resuscitation. The imaging for the scan is performed by a nuclear medicine technologist. The images are interpreted by the nuclear medicine specialist, who provides a report to your referring doctor.

What happens during a cardiac stress test and how long will it take?

The study is performed in 2 parts.

Part 1: The doctor will need to assess your heart under “stress”. This is done by exercising on a treadmill or exercise bike. If you are unable to exercise sufficiently, a medication to mimic exercise will be used.

For the stress test an intravenous line (a thin plastic tube) will be put into a vein in your arm. You will also have electrocardiograph (ECG) leads placed on your chest, connected to a heart monitor. The doctor will closely monitor your heart with the ECG and regular blood pressure checks. The time it takes to achieve the target heart rate during the “stress” component of the test will vary depending on the patient. It usually takes no longer than 15 minutes.

When your heart has reached a target work capacity, you will be injected with a radiopharmaceutical into the intravenous line. You will then be asked to rest in the waiting room for approximately half an hour before the first set of heart images is taken. During this time, you may be given a drink of water or milk, or a small tub of ice cream to eat. This helps make the images of your heart clearer.

Imaging involves lying on a scanning bed of a gamma camera for about 20 minutes while the camera rotates around your heart. During this time 3 ECG leads will again be placed on your chest and connected to a monitor as the scan is timed according to the rhythm of your heart. ***When the waiting interval is included, the first scan should be completed in about 1 hour.***

You will then be given an appointment time to return in the afternoon for Part 2 (usually 3-4 hours after Part 1). In between Parts 1 and 2 you may have caffeine and a light lunch. During this interval, it is important that you avoid heavy physical activity as we need to assess your heart at “rest” in part 2, e.g. a slow 5 minute walk to the cafeteria is acceptable but a brisk 30 minute walk into the city is not. The tubing in your arm will remain in place during this time.



Part 2: You will be given a second dose of the same radiopharmaceutical through the same plastic tubing in your arm. The tubing is then removed. Again, you will be asked to sit in the waiting room for approximately half an hour and you will be given another drink or small tub of ice cream. Your second set of images is then taken.

This procedure is very similar to your scan in the morning and will take approximately the same time. The above scanning procedure applies for the use of the radioactive medication ^{99m}Tc sestamibi or ^{99m}Tc tetrafosmin which is usually the case in most nuclear medicine services.

In the event the radioactive medication used is ^{201}Tl Thallium, the scan is performed straight away after it has been administered without the half hour wait and you won't be given anything to eat or drink prior to the scan. Also, if ^{201}Tl Thallium is used you may be asked to return the next day for another set of images, but there will be no further injections involved.

Are there any after effects of a cardiac stress test?

You may feel tired after the stress test, but the radiopharmaceuticals do not cause any side effects. Patients having the medicine stress test instead of exercise sometimes experience side effects. These should disappear shortly after the stress test and before you leave the nuclear medicine department (see below).

What are the risks of a cardiac scan?

The main risks of the study relate to the stress component. If you are performing an exercise stress test, there is a small risk of sustaining a heart attack (myocardial infarction) if you do have significant coronary artery disease and you work too hard on the treadmill or exercise bike.

If you are unable to perform a stress test on a treadmill then one of 3 types of medications, dipyridamole (Persantin), adenosine or dobutamine, may be given intravenously to increase blood flow in your heart.

Dipyridamole works by causing the heart arteries to dilate (open fully). There are multiple potential side effects:

- headache;
- you may feel a warm sensation in your face;
- it may make asthma worse;
- in cases of significant coronary artery disease, it may induce a heart attack, although the risk of this adverse event is low.



If symptoms of headaches persist, a caffeinated beverage such as tea or coffee is recommended and should relieve the headache. You may be given another medication called aminophylline which acts to reverse the side effects of dipyridamole if they do not resolve quickly.

Adenosine works in a similar manner to dipyridamole. Side effects like dipyridamole may be experienced. Symptoms of chest pain or pressure may also occur, but these side effects go away quickly once the adenosine administration stops.

Dobutamine is a short acting medication that is designed to increase the pumping capacity of the heart, mainly by increasing the heart rate and to a lesser extent increasing the strength of the cardiac contractions.

It may result in the sensation of palpitations which is a normal phenomenon. Some patients may experience light headedness and nausea. There is a theoretical risk of inducing a fast and abnormal cardiac rhythm (e.g. atrial fibrillation, ventricular tachycardia, ventricular fibrillation) which could adversely affect heart function requiring urgent therapy. These cardiac rhythm disturbances are unlikely with the doses of dobutamine used. If you have significant coronary artery disease, there is also a small risk of inducing a heart attack (myocardial infarction).

Occasionally, the target heart rate cannot be achieved with the maximum allowable dose of dobutamine. You may then be given a second medication called atropine, again in small doses. Atropine may cause the symptom of dry mouth and may cause confusion in some patients. It is also not to be given if you have the eye condition glaucoma.

The overall risk of sustaining a heart attack from a stress test is about 2 to 4 in 10,000. There is no significant risk from the imaging or the radiopharmaceutical, and this risk is the same as for an Exercise ECG stress test as performed by a cardiologist.

When can I expect the results of my NM cardiac stress test?

The time that it takes your doctor to receive a written report on the test or procedure you have had will vary, depending on:

- the urgency with which the result is needed;
- the complexity of the examination;
- whether more information is needed from your doctor before the examination can be interpreted by the specialist;



- whether you have had previous X-rays or other medical imaging that needs to be compared with this new test or procedure (this is commonly the case if you have a disease or condition that is being followed to assess your progress);
- how the report is conveyed from the practice or hospital to your doctor (i.e. phone, email, fax or mail).

Please feel free to ask us when you are having your test or procedure when your doctor is likely to have the written report.