INSIDE RADIOLOGY

# MRI Heart (Cardiac MRI) - Stress Perfusion MRI (with contrast and adenosine)

**Consumer Information**

**Contributors:**

Dr Brett Lorraine

*MBBS, FRANZCR*

Dr Charles Lott, Ms Ann Revell, Dr Christine Walker, A/Prof Stacy Goergen

## What is a Cardiac Stress Perfusion MRI?

Magnetic resonance imaging (MRI) uses a high strength magnet and radiowaves to scan the body and produce pictures or images. MRI does not use radiation, required for many other types of imaging, and is not known to have any long term harmful effects.

A Stress Perfusion MRI involves the injection of a special dye (often called contrast medium or contrast agent) during the scan. The contrast highlights the heart muscle in areas receiving a good blood supply. Areas receiving relatively less blood do not highlight on the images as well with the contrast, which can be an indicator of ischaemic heart disease (undersupply of blood and oxygen to the heart).

The blood flow (perfusion) to the heart is assessed both at *rest* and under *stress*. The *stress* stage of the test is performed during the injection of a medication called adenosine. This drug has an effect on the heart that simulates or copies physical exercise and, combined with contrast that has been injected, can reveal parts of the heart muscle not receiving an adequate blood supply. The *rest* component of the test is usually performed afterwards, without adenosine, and is used for direct comparison with the *stress* images.

The test provides your doctor with an indication of what happens to blood supply to the heart when demand on the heart is increased. This information helps in identifying the presence of ischaemia, and can often indicate the actual blood vessel causing the problem.

## How do I prepare for a Cardiac Stress Perfusion MRI?

You will be asked to avoid caffeine for 24 to 48 hours before the test. Caffeine interferes with the action of adenosine on the heart. This includes tea, coffee, herbal teas, Milo, decaffeinated coffee and soft drinks such as cola. You may also be requested to fast for 6 hours.

You will be asked to complete a questionnaire prior to the test to ensure that it is safe for you to enter the MRI machine and be exposed to the magnet.

If you have a history of kidney disease your doctor may wish to do a blood test before the scan, to ensure that the contrast medium (known as gadolinium chelate) can be safely given, if required (see *Gadolinium Contrast Medium (MRI Contrast agents)*).

## What happens during a Cardiac Stress Perfusion MRI?

You can wear your normal clothing but may need to remove some clothing prior to the scan. This is to eliminate any metallic objects that may interfere with the magnets, and to allow easy access for leads that will be placed on your chest to monitor your heart beat. You will be offered a hospital gown.

You will be positioned on the scanner bed by a radiographer, who is specially trained to perform MRI scanning. The leads to monitor your heart beat will then be placed on your chest. If an injection of contrast medium (gadolinium chelate) is required, a small needle will be placed in a vein in your arm. A special set of detectors encased in plastic, which work in conjunction with the main magnet to receive the radiowave signal to produce the images, will be rested on your chest like a blanket.

Once ready you will be placed inside the MRI machine, which is like going into a short tunnel. You will be aware of humming and knocking noises going on around you, which indicates that the scanner is running. It is normal to feel a little warm during the scan. You will be asked to hold your breath from time to time during the scan, to help produce the best images possible.

The MRI machine can be noisy, so you will be provided with headphones and you can listen to music (you are welcome to bring your own CD) and speak with the radiographer performing the scan. You will also be given a squeeze ball to hold in your hand during the scan. Squeezing the ball will make the radiographer aware that you wish to speak. A microphone is located within the MRI machine.

Once you are comfortable and positioned, the radiographer will return to the control console, leaving you in the MRI machine. From here the radiographer will control the scanner to instruct the machine which part of the body to examine, and which views to perform to best investigate your particular condition. You will be able to communicate with the radiographer at all times.

Injection of both contrast and adenosine will be given during the scan. Many people experience flushing of the face during the adenosine injection, while others may feel a discomfort around the jaw and tightness in the chest. These effects are short lived and usually end soon after the injection is given.

The *rest* component of the scan is performed at the end of the study and requires a further contrast injection, but no adenosine.

## Are there any after effects of a Cardiac Stress Perfusion MRI?

Usually there are no after effects. You will be free to continue the day you have planned once the scan is complete.

## How long does a Cardiac Stress Perfusion MRI take?

The examination uses very different technology to a normal X-ray, and does take more time to perform. A Stress Perfusion MRI takes approximately 45 minutes.

## What are the risks of a Cardiac Stress Perfusion MRI?

**MRI machine**

Once you have completed the pre-scan questionnaire and have been assessed as safe to enter the MRI machine, there are no significant risks from the MRI machine itself (see *Magnetic Resonance Imaging (MRI)*).

Most people are suited to this examination, although there are some restrictions due to the strength of the magnet and its possible effects on devices or implants such as pacemakers.

**Contrast medium**

There is a very small risk of allergic reaction related to the contrast medium (gadolinium chelate) injection.

Recently, a condition called nephrogenic systemic fibrosis (NSF) has been identified as a rare but significant side effect of contrast injection. This complication is more likely to occur in those people with very poor kidney function, including people who are already on dialysis (a process that filters the blood of patients whose kidneys are not functioning properly using a kidney machine). This rare but serious reaction takes weeks to months to develop. For more information on NSF see the information item on Gadolinium Contrast Medium.

**Adenosine**

Adenosine given during the *stress* part of the test has a very short duration of action, and there are usually no lasting effects. However, this medication can have more serious side effects, including:

- The heart stops (asystole), requiring medication or a pacing wire (a special wire placed in the heart to deliver a tiny electric shock and cause the heart to beat)
- Rapid heart beat (ventricular tachycardia), which may require an electric shock
- Severe chest pain
- Heart attack
- Severe shortness of breath

These side effects occur in approximately 1 in 1500 cases. If they do occur, they are likely to be either during or immediately after the scan. The risk of death is approximately 1 in 10,000.

## What are the benefits of a Cardiac Stress Perfusion MRI?

MRI scans avoid the need for exposure to potentially harmful radiation (X-rays). This is of particular benefit for all patients who are assessed as able to have an MRI, especially young patients, and those who will require repeat scans through their life to monitor their condition.

MRI scans have an advantage over X-rays in their ability to show clear images of the soft tissues of the body, and the scan can be specifically tailored to show complex anatomy (areas of the body). The scan is unique in its ability to calculate blood flow through the arteries and blood vessels. Blurring of the image due to movement of the heart and blood vessels can be overcome by scanning in time with the heart beat.

The Stress Perfusion MRI can provide important information concerning whether or not there are parts of the heart muscle with inadequate blood supply. This can be used to guide your treatment. The study demonstrates the effect of stress on the heart and the way in which this affects blood supply.

## Who does the Cardiac Stress Perfusion MRI?

The scan is performed by a radiographer specially trained in MRI scanning, under the supervision of a radiologist (a specialist doctor). A cardiologist (heart specialist) may also be involved.

## Where is a Cardiac Stress Perfusion MRI done?

This is a highly specialised test, and is not available at all hospitals or radiology practices. Your doctor is likely to be able to refer you to the hospital or radiology practice nearest to you offering these scans.

## When can I expect the results of my Cardiac Stress Perfusion MRI?

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 radiologist
- 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 (in other words, email, fax or mail)

Please feel free to ask the private practice, clinic, or hospital where you are having your test or procedure when your doctor is likely to have the written report.

It is important that you discuss the results with the doctor who referred you, either in person or on the telephone, so that they can explain what the results mean for you.

**Please note:**

This information is of a general nature only and is not intended as a substitute for medical advice. It is designed to support, not replace, the relationship that exists between a patient and his/her doctor. It is recommended that any specific questions regarding your procedure be discussed with your family doctor or medical specialist

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