**What is a cardiac catheterisation?**

A cardiac catheterisation, or coronary angiogram, is a test to find out if you have any problems with the coronary arteries (blood vessels that supply your heart muscle with oxygen), and how well the pumping chambers and valves in your heart are working. It is performed by a cardiologist (heart specialist).

Your doctor has recommended a cardiac catheterisation. However, it is your decision to go ahead with the procedure or not.

This document will give you information about the benefits and risks to help you to make an informed decision. If you have any questions that this document does not answer, ask your doctor or the healthcare team.

**What are the benefits of a cardiac catheterisation?**

A cardiac catheterisation will give your doctor information about your heart that they cannot always get from other tests.

Your doctor may be concerned that you have one of the following problems.

• Narrowed or blocked coronary arteries – This can cause angina or a heart attack (where part of the heart muscle dies). The narrowing of the coronary arteries is caused by atherosclerosis, where abnormal fatty material coats the inside of the artery (see figure 1). Your cardiologist may be able to treat a narrowed or blocked artery during the procedure. This is called a percutaneous coronary intervention (PCI). If it is likely that you will benefit from a PCI, your doctor will give you further written information to help you to decide.

• Damaged or faulty heart valves – The valves control the flow of blood through your heart. Sometimes the valves can narrow or leak, putting strain on your heart.

• Weak heart muscle – This can cause you to feel breathless or have swollen legs. The weakness can be caused by a problem with your heart arteries or valves, or with the muscle itself.

The procedure should help your doctor to decide on the best treatment for you.

**Are there any alternatives to a cardiac catheterisation?**

You can have exercise tests and scans, which have fewer risks. However, they may not give your doctor enough information to decide on the best treatment for you.

**What will happen if I decide not to have a cardiac catheterisation?**

Your doctor may recommend other tests and scans that can give some information about your coronary arteries and how well your heart is working.

If your doctor has recommended a bypass operation, heart-valve surgery or a coronary intervention such as angioplasty (widening an artery using a small inflatable balloon) or stenting, you will usually first need to have a cardiac catheterisation. So, if you decide not to have a cardiac catheterisation, you should discuss this carefully with your doctor.

**What does the procedure involve?**

**Before the procedure**

You may be asked to have other tests before you come to the hospital such as blood tests, an ECG (electrocardiogram) or a chest x-ray.

If you are female, the healthcare team may ask you to have a pregnancy test because x-rays are harmful to unborn babies. Sometimes the test does not show an early-stage pregnancy so let the healthcare team know if you could be pregnant.

If you take warfarin, clopidogrel or other blood-thinning medication, let your cardiologist know at least 7 days before the procedure. Do not stop taking your medication unless a cardiologist tells you to.

If you have diabetes and take medication containing metformin, let the healthcare team know as soon as possible. You may need to stop taking it on the day of the procedure and for the next 2 days. You may need to have a blood test after the procedure before continuing with your medication.

You will be admitted to hospital. The healthcare team will carry out a number of checks to make sure you have the procedure you came in for. You can help by confirming to your cardiologist and the healthcare team your name and the procedure you are having.

The healthcare team will ask you to sign the consent form once you have read this document and they have answered your questions.

The healthcare team may ask you to not eat in the 4 hours before the procedure. If you have diabetes, you will need special advice depending on the treatment you receive for your diabetes.

You may drink some water up to 2 hours before the procedure.

**the x-ray room**

A cardiac catheterisation usually takes about 30 minutes.

Your cardiologist will ask you to lie on your back. They may offer you a sedative or painkiller which they can give you through a small needle in your

arm or the back of your hand. If you have the sedative you will be able to ask and answer questions but you will feel relaxed.

The healthcare team may monitor your oxygen levels using a finger or toe clip. If you need oxygen, they will give it to you through a mask or small tube under your nostrils.

The healthcare team will place sticky pads on your chest or arms so they can monitor your heart during the procedure.

Your cardiologist will keep everything as clean as possible and will wear a theatre gown and operating gloves. They will use antiseptic to clean the area where the sheath will be inserted and most of your body will be covered with a sterile sheet.

The sheath is usually inserted in your radial artery near your wrist or your femoral artery near your groin.

Your cardiologist will inject local anaesthetic into the area over the artery. This stings for a moment but will make the area numb, allowing your cardiologist to insert the sheath into your artery with much less discomfort for you.

When your cardiologist is satisfied that the sheath is in the right position, they will insert a catheter (long, narrow plastic tube) through the sheath and

into your artery. Your cardiologist may inject medication through the sheath to widen your artery. You may feel warm for a few seconds where the sheath was inserted.

Your cardiologist will pass the catheter along your artery to your heart. They will use x-rays to help them guide the catheter to the right position.

The x-ray equipment will move around the table and come close to your chest but it will not actually touch you.

Your cardiologist will inject dye (colourless contrast fluid) into the catheter so they can take x-rays to find out exactly where your coronary arteries have narrowed (see figure 2).

During most of the test you will not feel anything different. Your cardiologist may ask you to hold your breath while they take the x-rays.

During one part of the test, they may inject a larger amount of dye into your heart and you will feel warm and flushed for a few seconds. You may feel this all over your body or only in some areas. You may feel as if you are passing urine but do not worry as this is not the case. It is normal for your heart to beat a few extra times (palpitations).

You may sometimes feel faint or have some discomfort during the procedure. If you have angina, you may get your usual pain. If you feel unwell, let your cardiologist know.

When your cardiologist has got all the information they need and any blood samples, they will remove the catheter and sheath. Your cardiologist or a nurse will press firmly for a few minutes where the sheath was inserted, to help the hole to heal. They may use a mechanical clamp or plug to close the hole.

Your cardiologist may ask you to rest on a bed in the recovery area for up to 4 hours to reduce the risk of bruising.

**What complications can happen?**

The healthcare team will try to reduce the risk of complications.

Any numbers which relate to risk are from studies of people who have had this procedure. Your doctor may be able to tell you if the risk of a complication is higher or lower for you.

Some complications can be serious and can even cause death (overall risk: less than 1 in 1,000).

You should ask your doctor if there is anything you do not understand.

• Bleeding a little after the procedure. This is easily treated by your cardiologist or a nurse simply pressing firmly for a few minutes where the sheath was inserted.

• More serious bleeding, including internal bleeding (risk: less than 1 in 1,000). You may need a blood transfusion and, rarely, further surgery.

• Bruising where the sheath was inserted. This is common and usually fades in about 3 weeks.

• Developing a collection of blood (haematoma) (risk: 1 in 20). Small haematomas causing bruising are common but are not serious. If you get a large haematoma, it will take longer to settle. Rarely, it

may press on a nerve, causing weakness or numbness. This usually gets better within a few weeks.

• Infection, where the needle was inserted in your arm or the back of your hand, or in your groin (risk: 1 in 250).

• Kidney damage, as your kidneys need to filter the colourless dye from your bloodstream (risk of serious damage: less than 1 in 100, risk of needing dialysis: less than 1 in 500). The risk is higher if you already have problems with your kidneys or have diabetes.

• False aneurysm (lump that connects to the artery) or arteriovenous fistula (abnormal connection between an artery and vein) where the sheath was inserted (risk: 1 in 100 if the femoral artery is used, 1 in 500 if the radial artery is used). If the problem is small it should heal. If the problem is large, you may need further treatment. An aneurysm or fistula can take a few days to appear. If you notice a tender lump, let your doctor know.

• Radiation exposure (the extra risk of developing cancer over a lifetime: on average 1 in 3,000 – this is a small increase). The risk increases the younger you are. Your cardiologist will keep the number of x-rays as low as possible.

• Allergic reaction to the equipment, materials, medication or dye (risk of a serious reaction: less than 1 in 2,500). This usually causes a skin rash which settles with time. The healthcare team is trained to detect and treat any reactions that might happen. Let your cardiologist know if you have any allergies or if you have reacted to any medication or tests in the past.

• Blood clot (thrombosis) in the artery where the sheath was inserted, which can reduce the flow of blood to the rest of your leg or arm. This can cause discomfort. The risk is higher if your cardiologist

uses the radial artery (risk: up to 5 in 100). Often this does not cause any symptoms but you may need treatment with blood-thinning medication.

• Losing your limb if a thrombosis is not noticed or treated early (risk: less than 1 in 1,000).

• Change in heart rhythm (risk: 1 in 250). A faster heartbeat is usually caused by the procedure itself and is easily treated but you may need a cardioversion (shock to your heart). A slow heartbeat will usually improve but you may need medication or a temporary pacemaker (a device that treats a slow heart rhythm). If you feel faint or unwell during the procedure, let your cardiologist know.

• Blood leaking into the sac that surrounds your heart (cardiac tamponade) (risk: less than 1 in 1,000). This is serious and can usually be treated by draining the fluid using a small tube.

• Heart attack, if the catheter damages a heart artery, or if the catheter dislodges a clot that travels down the artery to your heart (risk: less than 1 in 1,000). You may need medication, another procedure to treat the problem or an emergency bypass operation (risk: 1 in 2,000).

• Stroke (loss of brain function resulting from an interruption of the blood supply to your brain) (risk: less than 1 in 1,000).

• Drop in blood pressure (risk: 3 in 100). This can cause you to feel faint.

• Radial artery spasm (risk: up to 1 in 10). If the radial artery is used, the artery can go into a spasm, causing pain during the procedure or when the sheath is being removed. Special coated sheaths or medication can be used to help prevent this from happening. The spasm may cause damage to the artery or reduce the blood flow in the artery, which usually improves with medication.

• Death (overall risk: less than 1 in 1,000). The risk is less the fitter you are.

**How soon will I recover?**

**In hospital**

After the procedure you will be transferred to the recovery area where you can rest.

The healthcare team will monitor your heart rate and blood pressure to check for any problems. They will check the area where the sheath was inserted for any bleeding. If you notice any bleeding or swelling, let the healthcare team know straightaway.

You should be able to go home the same day. However, if you need more treatment or are going to be on your own at home, your doctor may recommend that you stay overnight.

If you do go home the same day, a responsible adult should take you home in a car or taxi and stay with you for at least 24 hours. Be near a telephone in case of an emergency.

**Returning to normal activities**

Do not drive, operate machinery or do any potentially dangerous activities (this includes cooking) for at least 24 hours and not until you have fully recovered feeling, movement and co-ordination. If the sheath was inserted in your groin, do not drive for 2 days. If you were given a sedative, you should also not sign legal documents or drink alcohol for at least 24 hours.

Do not have a hot bath for 2 to 3 days.

You can remove the plaster over the hole after the first day. There is a small risk of bleeding. If this happens, lie flat on your back and ask someone to press firmly on your wound for 15 to 20 minutes and then gradually release the pressure. If the bleeding continues, do not use a tourniquet (a tight strap). Keep on pressing firmly on your wound and call an ambulance or go immediately to your nearest Emergency department.

**Lifestyle changes**

If you smoke, stopping smoking will improve your long-term health.

Try to maintain a healthy weight. You have a higher risk of developing complications if you are overweight.

Regular exercise should improve your long-term health. Before you start exercising, ask the healthcare team or your GP for advice.

**The future**

The results of the x-rays and blood samples should be available the same day. Your doctor may

arrange for you to come back to the clinic to tell you the results and to discuss any treatment or

follow-up you need.

**Summary**

A cardiac catheterisation is usually a safe and effective way of finding out about the problems

you are having with your heart. However, complications can happen. You need to know

about them to help you to make an informed decision about the procedure. Knowing about them

will also help to detect and treat any problems

early.