The Heart is a muscle that pumps blood around the body. The vessels supplying blood to the heart are known as coronary arteries. If these become narrowed or blocked problems such as angina (chest discomfort) or heart attacks can occur.

Coronary Angiography is a test to check whether or not the heart arteries are healthy. Pictures of the heart arteries are taken using x-rays and special dye. Your doctor may have recommended this test because you have angina, or a suspected heart attack, or because you need heart surgery (e.g. valve replacement).

The angiogram pictures are used to plan your treatment, which may include continuing medication or in addition undergoing Coronary Intervention (see below) or Cardiac Surgery (Coronary Bypass Surgery or Heart Valve Surgery or both).

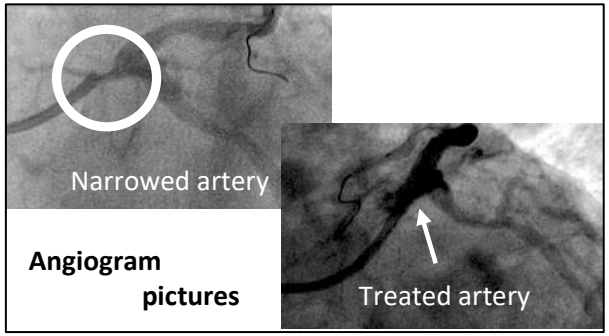
How is an angiogram performed? An angiogram is carried out in a specially designed x-ray facility known as a “Cath Lab”. It is usually done by a doctor assisted by nurses, a physiologist who monitors the heart rhythm and blood pressure and a radiographer who helps with the x-ray equipment.

Patients are usually awake but sedated, and local anaesthetic is used to numb the skin. A small tube is then inserted into an artery in the wrist or groin, and a long thin tube (catheter) is pushed along the arteries to the heart, under x-ray guidance. X-ray dye is injected into the heart arteries whilst an x-ray movie is recorded.

At the end of the test all the equipment is removed. It is very important to stop bleeding from the puncture site: we use a plastic bracelet with a pressure bubble at the wrist which is left in place for 1-2 hours. In the groin a ”plug” is inserted or the artery is compressed by hand for 10-15 minutes, followed by 4 hrs bed rest.

How are arteries treated? Narrowed or blocked arteries can be treated to improve the blood supply to the heart**.** This is called Percutaneous Coronary Intervention (PCI). It can often be undertaken at the same time as an angiogram, but this is not always possible.

The first step is to stretch the narrowed artery with balloons. Sometimes special balloons or drills may be required if the artery is very hardened. Once the artery has been successfully stretched a metallic stent is implanted. Most people do very well with this treatment, but a small proportion of stents can block or re-narrow in the future. We use Drug Eluting Stents (DES) which have a drug coating to reduce re-narrowing.



An alternative approach is to use Drug Coated Balloons (DCB), which avoids the permanent implantation of stents. After stretching the artery, a special balloon is used to deliver drug treatment, and then removed, leaving nothing behind. This is an established treatment where a stent has re-narrowed, or where the artery is small (< 3mm diameter). DCB treatment in larger arteries is currently outside international guidelines and is not standard practice in the UK. Specialists at NNUH and many other centres around the world are experienced in treating larger arteries with DCB, and studies demonstrate comparable outcomes compared to stents. If your specialist believes that treatment with a DCB outside guidelines may be a good alternative to stenting, this will be discussed with you in detail, and you will be asked to provide specific consent for this. You are of course free to decline consent for this.

What are the risks? Unfortunately, all medical procedures carry risks. The risk of a serious problem is small and should be balanced against the risk of doing nothing.

Steps are always taken to minimise risks where possible.

The figures quoted below are averages based on national audit data (2019-20).

You should be aware that:

- Risk varies between patients depending on their age, and other health conditions.
- **Your** risk may be different to the average.
- X-rays can lead to a very small increased lifetime risk of cancer.
- X-ray dye can cause a severe allergic reaction in about 1 in 2500 patients.
- X-ray dye can cause kidney damage, more commonly in patients with diabetes and those with impaired kidney function.
- Damage can occur to the artery used to reach the heart leading to a large bruise, blood loss or more serious complications requiring surgical repair. This is rare using the wrist artery (1 in 500) but is more common using the groin artery (1 in 67).
- Coronary angiography carries an average risk of stroke (1 in 5000), heart attack (1 in 5000) and death (1 in 2000).
- Elective PCI carries a risk of stroke (1 in 2500), heart attack (1 in 1700) and death (1 in 500).
- Urgent PCI for a patient with a heart attack carries a risk of stroke (1 in 1700), heart attack (1 in 1000) and death (1 in 140).

Research studies are important for developing new treatments, and you may be asked to consider participating in a trial. If this is the case you will be given detailed information about the risks and benefits and asked to give written informed consent. Studies led by cardiology researchers at NNUH in recent years have been funded by the Norfolk Heart Trust, the National Institute of Health Research and an unrestricted educational grant from B Braun (a manufacturer of DCBs).

Outcomes Data is collected for all PCI procedures and submitted to the National Institute of Cardiovascular Outcomes Research (NICOR) to monitor hospital and individual operator outcome statistics, (see https://www.bcis.org.uk/public-information/public-reports/). The PCI outcome data for patients treated at NNUH is very good. The Cardiology Department also conducts an internal audit of all procedures and holds regular meetings to review procedural outcomes and complications.

More information is available for at the British Heart Foundation website: www.bhf.org.uk/informationsupport

These videos may be of interest: www.youtube.com/watch?v=e3fgzcXu7LE and www.youtube.com/watch?v=6wGnLrLImto

Norfolk and Norwich University Hospitals NHS Foundation Trust

@CardioTeam NNUH

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Coronary Angiography and Percutaneous Coronary Intervention (PCI)

A guide for patients at the Norfolk and Norwich University Hospitals NHS Foundation Trust

Why do I need this procedure?

How is it done?

Where is it done?

What are the risks and benefits?

IN TRAN communication for all