**Common diagnostic procedures**

X-rays are **a type of radiation called electromagnetic waves**. X-ray imaging creates pictures of the inside of your body. The images show the parts of your body in different shades of black and white. ... The most familiar use of x-rays is checking for fractures (broken bones), but x-rays are also used in other ways

**Barium Swallow X-ray**
A barium swallow x-ray is used to study your upper gastrointestinal (GI) tract, specifically your esophagus and the back of your mouth and throat. For the test, you will swallow liquid containing barium that will coat your upper GI tract and make it easier to see the lining, size, and shape of these body parts on an x-ray. After you drink the liquid, you will lie on an exam table while an x-ray machine takes pictures. The exam usually takes about 20 minutes.

**Chest X-ray**
Chest x-rays are one of the most commonly performed diagnostic medical tests. This test provides a black-and-white image of your lungs, heart, and chest wall. The test is non invasive, painless, and takes just a few minutes. You will stand in front of the x-ray machine and hold very still while an image is taken. X-rays, which are a form of radiation like light or radio waves, pass through your body and are absorbed in varying degrees. Your bones absorb more of the x-rays and appear white on the image. Muscle, fat, and organs (such as heart or lung tissue) absorb less radiation and will be dark on the image.

**Computed Tomography (CT) Scan**
Similar to x-rays, CT uses radiation to produce images of the inside of your body. Your internal organs, bones, soft tissue, and other body parts will show up light or dark on a computer screen depending on how much radiation is absorbed. While an x-ray is a two-dimensional picture, a CT scan can be a three-dimensional image that is much more detailed than an x-ray. For the test, you will lie on a table that will slide into the CT scanner, and the x-ray beam will rotate around your body. Depending on the reason for this test, you may be given a dye (contrast agent) to help areas of your body show up better on the image. The actual CT scanning takes less than 30 seconds, and the entire process is usually completed within 30 minutes.

**Esophageal pH Monitoring**
Esophageal pH monitoring measures how often, and for how long, stomach acid enters your esophagus. A tube is used to insert a small probe through your nostril and into the lower part of your esophagus. The probe is attached to a small monitor that you will wear on your belt or over your shoulder (some new devices operate wirelessly). The monitor records acid reflux activity for 24 hours.

**Magnetic Resonance Imaging (MRI)**
MRI uses a magnetic field, radio waves, and a computer to produce detailed images of the inside of your body. For the test, you will lie on a table that slides into a cylinder-shaped tube. Similar to computed tomography, you may be given a dye (contrast agent) for the test. MRIs are typically better than x-rays, computed tomography scans, and ultrasounds at displaying diseased tissue. The entire exam usually takes about 1 hour, but occasionally may take longer.

**Positron Emission Tomography (PET) Scan**
For a PET scan, you will be given a radioactive drug (radiotracer) that will collect in areas of your body that have high levels of chemical activity, such as disease areas. Unlike computed tomography (CT) scans and magnetic resonance imaging, which show important anatomic information, a PET scan measures important body functions, such as blood flow, oxygen use, and sugar metabolism. For a PET scan, you’ll lie on a table that will slide into a cylinder-shaped tube. The tracer will show up as bright spots on the computer screen as special cameras record energy emission from the radiotracer in your body. Typically, it takes about 50 minutes for the radiotracer to travel through your body and another 30 minutes for the PET scan. Sometimes, a PET scan is combined with a CT scan using one process.

**Pulse Oximetry**
During pulse oximetry, a small device is painlessly clipped onto part of your body (often your fingertip or ear lobe) and measures the oxygen level in your blood. The pulse oximeter may be left on briefly for a single reading, or you may need to wear it for a longer period of time. This is more important now due Covid -19 pandemic affecting lungs leading to low oxygen saturation

**Upper Endoscopy**
An upper endoscopy allows your doctor to directly examine your upper gastrointestinal (GI) tract. An endoscope—a long, flexible tube with a camera—will be inserted into your mouth, through your esophagus, and into your stomach. The camera transmits images of the inside of your GI tract to a television screen, giving your doctor a more detailed and accurate image than an x-ray. The process can take up to 20 minutes. In addition to diagnosing disease, an upper endoscopy can be used to treat certain conditions (for example, stretching narrowed sections of your esophagus or removing abnormal tissue growth in your stomach).

**Angiogram**

An angiogram is an X-ray procedure that can be both diagnostic and therapeutic.  It is considered the gold standard for evaluating blockages in the arterial system. An angiogram detects blockages using X-rays taken during the injection of a contrast agent (iodine dye). The procedure provides information that helps your vascular surgeon determine your best treatment options.

Angiograms are typically performed while you are sedated. The procedure may last 15-20 minutes or up to several hours, depending on how difficult the test is and how much treatment is given.

**Coronary Angiogram**

An angiogram is commonly performed under sedation with the use of local anesthesia.


* The procedure usually starts with a needle put into the femoral (groin) artery. From one treatment site, areas all over the body can be treated.
* After access is established, catheters (thin tubes) and wires are threaded through the arterial system to a specific area of interest or throughout the entire body.
* As a contrast agent (iodine dye) is injected, X-ray images are taken to let your vascular surgeon view the flow of the dye and identify blockages. The surgeon can then choose the best mode of therapy for you - whether during or following the angiogram. This decision depends on your symptoms and the severity and characteristics of the blockages.
* Two common therapies that can be provided during the angiogram are balloon angioplasty and stent placement.

Angioplasty can be used to open arterial blockages. Guided by X-ray, your vascular surgeon navigates through the blockage with a wire and introduces a special device equipped with an inflatable balloon. After positioning the balloon device across the blocked portion of the artery, the vascular surgeon inflates the balloon to expand the artery and compress the blockage. The balloon is then deflated and removed while keeping the wire in place across the area that has been treated. Next, contrast dye is injected to assess the result. Treatment is considered a success if blood flow is improved and less than 30% of the blockage remains. If the vessel is still considerably narrowed, placing a stent may be the next step.

Stents are used to prop open an artery at the site of a narrowing. Stents are generally placed after balloon angioplasty when there is residual narrowing or insufficient blood flow in a treated vessel. Stents are considered a permanent implant and cannot be used if you have a metal allergy. Stents that are used in the leg are constructed of a nickel-titanium alloy (Nitinol), a memory-shaped metal. This alloy has a predetermined size and shape at body temperature and expands to this size and shape after being introduced through a catheter. These stents resist kinking and are flexible so that damage from activities that involve your legs is minimized.

If surgery is felt to be a better option, your vascular surgeon will obtain any additional X-ray images needed to plan a [surgical bypass](https://vascular.org/patient-resources/vascular-treatments/surgical-bypass) of the blocked vessel/s and will then conclude the angiogram.

**Echocardiogram (Echo)**
Echocardiography uses sound waves (ultrasound) to create detailed pictures of your heart. For an echocardiogram, you will lie on an exam table, and a wand-like device called a transducer will be moved around on your chest. The transducer releases high-frequency ultrasound waves and then picks up the echoes of these sound waves as they bounce off your heart. The echocardiography machine converts the echoes into pictures of your heart. The test typically takes less than an hour.

**Electrocardiogram (EKG)**
An EKG records the electrical impulses that trigger your heartbeats. Soft, sticky patches called electrodes will be attached to your chest to pick up these impulses, which will be translated into lines on paper. The pattern of these impulses can show your doctor whether there are any problems with your heart function. Usually, the test takes only a few minutes once the electrodes are attached.

**Transesophageal Echocardiogram (TEE)**
A TEE is a test that produces pictures of your heart. TEE uses high-frequency sound waves to make pictures of your heart’s muscle and chambers, valves and outer lining (pericardium), as well as the blood vessels that connect to your heart. TEE helps doctors detect problems with the structure and function of the heart and its blood vessels. A long, thin tube containing an ultrasound device is guided down your throat into the esophagus (the “food pipe” leading from the mouth into the stomach).

CT calcium score

What is CT calcium scoring?

This is a simpler CT scan of the heart. It doesn’t provide detailed pictures of the heart or heart arteries but instead measures the amount of calcified, or hardened, plaques in the heart arteries. This is usually explained as a calcium score which provides an assessment of the number of fatty plaques in the heart arteries. Again, the more fatty plaques you have, the higher the risk of heart attacks. Unlike a CT angiogram, a calcium score doesn’t involve a dye.

**CT coronary angiogram**

**What is a CT coronary angiogram?**

A CT coronary [angiogram](https://www.bhf.org.uk/informationsupport/heart-matters-magazine/medical/primary-angioplasty) is used to directly visualise the heart arteries and the fatty deposits (plaques) that can develop within them. This fatty plaques can mean your heart is not getting the blood supply it needs, which can cause chest pain (angina) and heart attacks.

Similar to a conventional [coronary angiogram](https://www.bhf.org.uk/informationsupport/tests/angiogram), a CT coronary angiogram involves injecting an iodine-based dye into your bloodstream to highlight your blood vessels. However, unlike the traditional angiogram, which involves inserting a catheter (a thin flexible tube) via the wrist or groin into the heart, a CT coronary angiogram, is non-invasive. This means that there are fewer potential complications such as bleeding or bruising.

Treadmill Exercise Stress Test

(Also called: cardiac stress test, treadmill stress test)

**Purpose**

A treadmill exercise stress test is used to determine the effects of exercise on the heart. Exercise allows doctors to detect [abnormal heart rhythms](https://www.ottawaheart.ca/heart-condition/arrhythmias-heart-rhythm-disorders) (arrhythmias) and diagnose the presence or absence of [coronary artery disease](https://www.ottawaheart.ca/heart-condition/coronary-artery-disease-atherosclerosis).

This test involves walking in place on a treadmill while monitoring the electrical activity of your heart. Throughout the test, the speed and incline of the treadmill increase. The results show how well your heart responds to the stress of different levels of exercise.

**Description**

1. A technologist will explain the test to you, take a brief medical history, and answer any questions you may have. Your blood pressure, heart rate, and [electrocardiogram](https://www.ottawaheart.ca/test-procedure/electrocardiogram) (ECG) will be monitored before, during, and after the test.
2. You will be asked to remove all upper body clothing, and to put on a gown with the opening to the front.
3. Adhesive electrodes will be put onto your chest to capture an ECG. The sites where the electrodes are placed will be cleaned with alcohol and shaved if necessary. A mild abrasion may also be used to ensure a good quality ECG recording.
4. Your resting blood pressure, heart rate, and ECG will be recorded.
5. You will be asked to walk on a treadmill. The walk starts off slowly, then the speed and incline increases at set times. It is very important that you walk as long as possible because the test is effort-dependent.
6. You will be monitored throughout the test. If a problem occurs, the technologist will stop the test right away. It is very important for you to tell the technologist if you experience any symptoms, such as chest pain, dizziness, unusual shortness of breath, or extreme fatigue.
7. Following the test, you will be asked to lie down. Your blood pressure, heart rate, and ECG will be monitored for three to five minutes after exercise.
8. The data will be reviewed by a cardiologist after the test is completed. A report will be sent to the doctor(s) involved in your care.

Single Photon Emission Computed Tomography (SPECT) imaging and DAT scans

Single photon emission computer tomography, commonly known as SPECT, is a type of neuroimaging which can give information on both the structure and the function of different parts of the brain. SPECT neuroimaging uses radioactive substances (called "tracers") which connect to specific cells or parts in the brain. A specialized camera detects the radioactive radiation the tracers emit and uses it to re-construct an image of the relevant brain region. Dopamine is a major brain chemical and the loss of brain cells responsible for producing dopamine is believed to be the main cause of Parkinson's disease.  A special type of SPECT scan, called Dopamine Active Transfer scan (DAT scan) uses a tracer which labels dopamine-producing cells in the brain. This procedure can therefore be used to assess the number and activity levels of dopamine-producing brain cells. DAT scans can be used as part of the clinical diagnostic process for Parkinson's and may be used in research to look at disease-related changes over time and to assess the effects of new potential treatments.
The procedure: SPECT and DAT scans require the injection or infusion of a radioactive tracer. The test requires only a small amount of radiation which is not associated with any long-term health risks. Following the injection you will be asked to wait approximately 3-4 hours before the scan can start. For the scan itself you will be asked to lie perfectly still on your back for the duration of the scan, which is typically 30-60 min. The images are taken with specialized cameras which can rotate all around you but will not touch you and you will not be enclosed in a tunnel-like scanner. Most of the radioactive tracer leaves your body through your urine within a few hours after the scan and your body breaks down the remaining tracer over the next few days.

**Electroencephalogram (EEG)**

**An electroencephalogram (EEG) is a recording of brain activity.**

During the test, small sensors are attached to the scalp to pick up the electrical signals produced when brain cells send messages to each other.

These signals are recorded by a machine and are looked at by a doctor later to see if they're unusual.

The EEG procedure is usually carried out by a highly trained specialist, called a clinical neurophysiologist, during a short visit to hospital.

**When an EEG is used**

An EEG can be used to help diagnose and monitor a number of conditions affecting the brain.

It may help identify the cause of certain symptoms – such as seizures (fits) or memory problems – or find out more about a condition you've already been diagnosed with.

The main use of an EEG is to detect and investigate [epilepsy](https://www.nhs.uk/conditions/epilepsy/), a condition that causes repeated seizures. An EEG will help your doctor identify the type of epilepsy you have, what may be triggering your seizures and how best to treat you.

Less often, an EEG may be used to investigate other problems, such as [dementia](https://www.nhs.uk/conditions/dementia/about/), [head injuries](https://www.nhs.uk/conditions/severe-head-injury/), [brain tumours](https://www.nhs.uk/conditions/brain-tumours/), [encephalitis (brain inflammation)](https://www.nhs.uk/conditions/encephalitis/) and sleep disorders, such as [obstructive sleep apnoea](https://www.nhs.uk/conditions/obstructive-sleep-apnoea/).

**What is Cerebral Angiography**

Angiography is a minimally invasive medical test that uses [x-rays](https://www.radiologyinfo.org/glossary?modal=1&id=ezRGNDBGOTVFLTU5NjItNDU1Ni04NENELTlEMjM1QzA1RURDNn0=) and an iodine-containing contrast material to produce pictures of blood vessels in the brain.

In cerebral angiography, a thin plastic tube called a [catheter](https://www.radiologyinfo.org/glossary?modal=1&id=ezM5NkE5N0U4LUUzN0EtNEVBRi1CNDg2LUVERDhBOEU1OEU3Qn0=) is inserted into an artery in the leg or arm through a small incision in the skin. Using x-ray guidance, the catheter is navigated to the area being examined. Once there, contrast material is injected through the tube and images are captured using ionizing radiation (x-rays).

Cerebral angiography is also called intra-arterial digital subtraction angiography (IADSA). This phrase refers to acquiring the images electronically, rather than with x-ray film. The images are electronically manipulated so that the overlying bone of the skull, normally obscuring the vessels, is removed from the image resulting in the remaining vessels being clearly seen.

**What are some common uses of the procedure?**

Physicians use the procedure to detect or confirm abnormalities within the blood vessels in the brain, including:

* an [aneurysm](https://www.radiologyinfo.org/glossary?modal=1&id=ezdCMEVGMDlGLUIyQjMtNENCOC1BNjdFLUIzQUM5QUFFREM2N30=), a bulge or sac that develops in an artery due to weakness of the arterial wall.
* [atherosclerosis](https://www.radiologyinfo.org/glossary?modal=1&id=ezY4MTg4MDA5LTUxRjUtNDc4NC1BOTE3LUNDN0ExQjkyNjcyQX0=), a narrowing of the arteries.
* [arteriovenous malformation](https://www.radiologyinfo.org/glossary?modal=1&id=ezU4QTA1REM5LThENDQtNDQyNC1BMTZDLUJCQTk1MTVDRUU5N30=), a tangle of dilated blood vessels that disrupts normal blood flow in the brain.
* vasculitis, an inflammation of the blood vessels, generally narrowing them.
* a [brain tumor](https://www.radiologyinfo.org/en/info/braintumor).
* a [blood clot](https://www.radiologyinfo.org/en/info/bloodclot).
* a tear in the wall of an artery, known as a vascular dissection.
* a [stroke](https://www.radiologyinfo.org/en/info/stroke).

A cerebral angiogram may be performed:

* to evaluate arteries of the head and neck before surgery.
* to provide additional information on abnormalities seen on MRI or CT of the head, such as the blood supply to a tumor.
* to prepare for other medical treatment, such as in the surgical removal of a tumor.
* in preparation for minimally invasive treatment of a vessel abnormality.

The procedure may also be used to help diagnose the cause of symptoms, such as:

* severe headaches
* slurred speech
* dizziness
* blurred or double vision
* weakness or numbness
* loss of coordination or balance.

 Peak flow test

The peak flow test measures how fast you can breathe out after you’ve taken a full breath in. Your peak flow score is sometimes called your peak expiratory flow (PEF).

What happens during a peak flow test? 

You take the biggest breath in that you can. Then blow out as fast as you can, into a small, hand-held plastic tube called a peak flow meter. You don’t need to empty the lungs completely – just a short, sharp blow, as if you’re blowing out a candle. The measurement taken is called your peak flow.

Each time you check your peak flow, you should do 3 blows, with a short rest in between the blows. The best of the 3 is the one that should be recorded.

Peak flow scores will vary depending on your age, your height and whether you’re a man or a woman. The expected values are higher in younger people, taller people and men.

Peak expiratory flow (PEF) is measured in litres per minute. Normal adult peak flow scores range between around 400 and 700 litres per minute, although scores in older women can be lower and still be normal. The most important thing is whether your score is normal for you. Your peak flow reading may vary through the day and night. The amount of variation is important as well as the pattern.

Keeping track of your peak flow can help you spot when your symptoms are getting worse and [when you need to take your reliever inhaler](https://www.blf.org.uk/support-for-you/asthma/treatment) or get medical help.

Spirometry

Spirometry is a common and effective diagnostic test that can easily be done in your doctor's office or at a nearby hospital or clinic. You will be asked to take in a big breath, and then blow as hard and long as you can into a machine. The machine measures how much air you can blow out from your lungs and how fast you can blow it out. Spirometry is the most reliable way to test your lungs for COPD (chronic obstructive pulmonary disease) and asthma.

Your doctor may call spirometry by another name including: pulmonary function test (PFT) or lung function test.

**Holter monitor (24h)**

A Holter monitor is a machine that continuously records the heart's rhythms. The monitor is worn for 24 to 48 hours during normal activity.

**How the Test is Performed**

Electrodes (small conducting patches) are stuck onto your chest. These are attached by wires to a small recording monitor. You carry the Holter monitor in a pocket or pouch worn around your neck or waist. The monitor runs on batteries.

While you wear the monitor, it records your heart's electrical activity.

* Keep a diary of what activities you do while wearing the monitor, and how you feel.
* After 24 to 48 hours, you will return the monitor to your health care provider's office.
* The provider will look at the records and see if there have been any abnormal heart rhythms.



It is very important that you accurately record your symptoms and activities so the provider can match them with your Holter monitor findings.

Electrodes must be firmly attached to the chest so the machine gets an accurate recording of the heart's activity.

24 Ambulatory Blood Pressure Monitoring

Having your blood pressure taken in clinic is a well validated method to assess hypertension. However, this can sometimes be falsely high-so called “white coat hypertension”. A 24 hour ambulatory blood pressure monitor is used to get a better assessment of hypertension, as it enables cardiologists to assess blood pressure during the patients daily activity – leading to more accurate results.

What happens during a Blood Pressure Monitoring Test

A blood pressure cuff is fitted to your arm. It is connected to an automated inflating device which records the blood pressure every half an hour during the day and every hour at night. When you return the monitor, the readings are analysed to give a day-time, night-time and 24 hour average for your blood pressure.

Endoscopy ( Gastroscopy and Colonoscopy )

**What is Endoscopy**

[**Endoscopy**](https://www.vista-health.co.uk/services/endoscopy) is a procedure to examine changes in the large intestine and rectum. The specialist will insert a long, thin, and flexible tube with a tiny video camera at the end into the gastrointestinal tract. It can capture images and videos which specialists can review to arrive at an accurate diagnosis.

With the amount of preparation it requires from the patient, this procedure is always scheduled ahead of time.

There are two types of endoscopy procedures:

1. [**Upper endoscopy**](https://www.vista-health.co.uk/services/gastroscopy)**/**[**Gastroscopy**](https://www.vista-health.co.uk/services/gastroscopy)- This refers to endoscopy wherein the tube is introduced into the body through the upper gastrointestinal tract.
2. [**Colonoscopy**](https://www.vista-health.co.uk/services/colonoscopy)- This procedure introduces the video camera through the lower gastrointestinal tract, starting from the rectum.

Most medical personnel simply refer to upper endoscopy as “endoscopy” for convenience, and also to differentiate the procedure from colonoscopy.

**How does an Endoscopy work?**

During an [**endoscopy**](https://www.vista-health.co.uk/services/endoscopy), the patient is asked to lie on their side and allow the specialist to pass the tube through the mouth, nasal passage, or rectum depending on the type of procedure being undertaken. The specialist can then examine the esophagus, stomach, and duodenum or the first part of the small intestine.

If they must peek farther into the small intestine, they’ll be performing a small bowel endoscopy, otherwise known as deep[**endoscopy**](https://www.vista-health.co.uk/services/endoscopy). This procedure calls for one or two “balloons” that will be alternatively inflated and deflated to help the tube move forward through the small bowel (the process is similar to how pleat curtains through a curtain rod).

This is a safe and painless, albeit slightly uncomfortable, procedure. Patients also have the option to be sedated during the procedure.

**So what is a Colonoscopy?**

[**Colonoscopy**](https://www.vista-health.co.uk/services/colonoscopy) is a type of [**endoscopy**](https://www.vista-health.co.uk/services/endoscopy) and is considered the safest, easiest, and fastest method of viewing the inside of the large intestine. It is typically conducted to rule out colon cancer. Since many old people often experience constipation and cramping (the two most symptoms of late-stage colon cancer), doctors may recommend a colonoscopy at least once every 10 years for people over 50 years old.

Like in [**endoscopy**](https://www.vista-health.co.uk/services/endoscopy), patients who will undergo [**colonoscopy**](https://www.vista-health.co.uk/services/colonoscopy) are asked to lie on their side. The doctor will then insert the tube with the camera into the rectum and slowly advance the endoscope through the large intestine. The endoscope can reach as far as the ileum or the very last part of the small intestine.

The procedure is painless, but patients can also ask to take sedatives to help them relax and reduce their discomfort during the examination.

**What Is Gastroscopy?**

A [**gastroscopy**](https://www.vista-health.co.uk/services/gastroscopy) is a procedure where a thin, flexible tube called an endoscope is used to look inside the oesophagus (gullet), stomach, and first part of the small intestine (duodenum). It's also sometimes referred to as an upper gastrointestinal endoscopy. The endoscope has a light and a camera at one end.

A [**gastroscopy**](https://www.vista-health.co.uk/services/gastroscopy)often takes less than 15 minutes, although it may take longer if it's being used to treat a condition.

A local anaesthetic spray will be used to numb your throat for the procedure and you'll be asked beforehand if you'd like to have a sedative injection.

You'll be asked to lie down on your left-hand side and the endoscopist will insert the endoscope into your throat. They'll ask you to swallow it to help move it down into your oesophagus. This may be uncomfortable at first and you may feel sick or gag, but this should pass as the endoscope is moved further down.

**Flexible sigmoidoscopy**

Flexible sigmoidoscopy looks inside the rectum (back passage) and the lower part of the large bowel (sigmoid colon). This is where the majority of polyps (non-cancerous growths) and bowel cancers start. During this procedure, if the doctor or nurse sees anything that needs further investigation, samples (biopsies) can be taken for examination in the laboratory.

**Colon capsule endoscopy**

A colon capsule endoscopy involves swallowing a small camera that's about the size of a large vitamin pill. As the capsule travels through your bowel it takes thousands of pictures that are sent wirelessly to a digital recording device you wear in a bag over your shoulder. This means you can go home and go about your day as normal. Within a day or two, the capsule should pass in a bowel movement.

The pictures taken by the capsule are examined by a specialist doctor called a colonoscopist, who will let you know if further investigation or treatment is needed. If the test finds something suspicious, a specialist doctor will refer you for further investigation, such as a colonoscopy.

Whilst this test is currently being offered by the NHS in England, it is only available right now to people at specific pilot sites, and to those who need to be seen urgently.

**Ultrasound Scan**

An ultrasound scan is a painless test that uses sound waves to create images of organs and structures inside your body. It is a very commonly used test. As it uses sound waves it is thought to be very safe.  Doppler and duplex scans are used to visualise blood or fluids flowing through the body.

**Note**: the information below is a general guide only. The arrangements, and the way tests are performed, may vary between different hospitals. Always follow the instructions given by your doctor or local hospital.

**IN THIS ARTICLE**

* [What is an ultrasound test used for?](https://patient.info/treatment-medication/ultrasound-scan#nav-0)
* [What should I do to prepare?](https://patient.info/treatment-medication/ultrasound-scan#nav-1)
* [What happens after a scan?](https://patient.info/treatment-medication/ultrasound-scan#nav-2)
* [What is ultrasound?](https://patient.info/treatment-medication/ultrasound-scan#nav-3)
* [What is a Doppler ultrasound scan?](https://patient.info/treatment-medication/ultrasound-scan#nav-4)
* [What is duplex ultrasound?](https://patient.info/treatment-medication/ultrasound-scan#nav-5)
* [Are there any side-effects?](https://patient.info/treatment-medication/ultrasound-scan#nav-6)

**What is an ultrasound test used for?**

An ultrasound scan is a safe and painless test that creates images of organs, glands, abnormal lumps and other structures like muscles, tendons and joints. It is also used to check unborn babies during pregnancy. It is used in many situations. The way the ultrasound bounces back from different tissues can help to determine the size, shape and consistency of organs, structures and abnormalities. So it can:

* Help to monitor the growth of an unborn child and check for abnormalities. [An ultrasound scan is routine for pregnant women](https://patient.info/pregnancy/pregnancy-screening-tests).
* Detect abnormalities of heart structures such as the heart valves. This type of ultrasound scan is called echocardiography. [See the separate leaflet called Echocardiogram for more details](https://patient.info/heart-health/echocardiogram).
* Help to diagnose problems of internal organs such as the:
	+ Liver
	+ Gallbladder
	+ Pancreas
	+ Thyroid gland
	+ Lymph nodes
	+ Ovaries
	+ Testes
	+ Kidneys
	+ Bladder
	+ Appendix
* For example, it can help to determine if an abnormal lump in one of these organs is a solid tumour or a fluid-filled cyst. Ultrasound also helps look for [stones in the gallbladder](https://patient.info/digestive-health/gallstones-and-bile) or [kidney](https://patient.info/kidney-urinary-tract/kidney-stones).
* Help determine the nature of breast lumps. Ultrasound is one of the tests used to establish if a [lump is non-cancerous (benign)](https://patient.info/womens-health/breast-problems/breast-lumps)or [breast cancer.](https://patient.info/cancer/breast-cancer-leaflet)
* Help diagnose problems with muscles, tendons and joints. For example, ultrasound scans are used to help diagnose:
	+ [Frozen shoulder](https://patient.info/bones-joints-muscles/frozen-shoulder-leaflet)
	+ [Tennis elbow](https://patient.info/bones-joints-muscles/tendinopathy-and-tenosynovitis-tendinosis/tennis-elbow)
	+ [Morton's neuroma](https://patient.info/foot-care/heel-and-foot-pain-plantar-fasciitis/mortons-neuroma)
	+ [Carpal tunnel syndrome](https://patient.info/bones-joints-muscles/carpal-tunnel-syndrome-leaflet)
* Detect abnormal widening of blood vessels (aneurysms).
* [Guide internal biopsies. A biopsy is a procedure in which a sample of tissue is taken](https://patient.info/treatment-medication/biopsy). Some biopsies are taken using a thin needle, and the needle is guided to the right place with an ultrasound scan. For example, if you have a lump in your breast, you may have a sample of the lump taken away. The sample is then examined under the microscope to see if your lump is cancerous or not.

**What is a Doppler ultrasound scan?**

A Doppler ultrasound records sound waves reflecting off moving objects, such as blood cells, to measure their speed and other aspects of how they flow through the body.

**How does Doppler ultrasound work?**

If the structure is moving then the echo comes back at a slightly different frequency (called the Doppler effect). This difference in frequency can be used to measure the speed of movement. Blood moving in an artery or vein causes small echoes and these are used to measure the speed of movement of the blood cells. The sound waves may be amplified though speakers. This allows the practitioner to listen to the flow of blood cells to determine whether or not there is normal flow. For example, listening to the flow of blood through the heart of a baby during a routine antenatal check-up. The sound waves may also be converted to colour pictures on a screen so that flow can be seen through the arteries or veins (colour Doppler) - as below.

**Colour Doppler ultrasonography**

They may also be plotted on a graph showing changes in speed and direction (velocity).

**What is Doppler ultrasound used for?**

* To listen to the heartbeat of an unborn baby (fetus) during pregnancy.
* To examine blood flow in arteries or veins in your arms or legs to see if you might have:
	+ [Deep vein thrombosis](https://patient.info/allergies-blood-immune/deep-vein-thrombosis-leaflet).
	+ [Peripheral arterial disease](https://patient.info/heart-health/peripheral-arterial-disease-leaflet).
	+ Injury to your veins or arteries following trauma.

**What is a cystoscopy?**

Your healthcare provider may use a cystoscopy to view the inside of the bladder and urethra. The bladder stores urine until it flows out of the body through a tube called the urethra.

A urologist, or urinary tract specialist, performs a cystoscopy. For the procedure, your doctor uses a cystoscope, a pencil-sized lighted tube with a camera or viewing lens. A cystoscopy helps specialists diagnose, and sometimes treat, urinary tract problems.

**Who might need a cystoscopy?**

Your healthcare provider may recommend a cystoscopy if you experience:

* [Bladder control issues](https://my.clevelandclinic.org/health/diseases/7064-bladder-control-issues), such as [urinary retention](https://my.clevelandclinic.org/health/diseases/15427-urinary-retention) (being unable to empty the bladder all the way) or incontinence (not being able to control urine flow).
* [Bladder stones](https://my.clevelandclinic.org/health/diseases/16312-bladder-stones-bladder-calculi).
* [Blood in urine](https://my.clevelandclinic.org/health/diseases/15234-hematuria) (hematuria).
* Frequent [urinary tract infections](https://my.clevelandclinic.org/health/diseases/9135-urinary-tract-infections) (UTIs).
* [Painful urination](https://my.clevelandclinic.org/health/diseases/15176-dysuria-painful-urination) (dysuria).

**Why do healthcare providers perform cystoscopies?**

Urologists use cystoscopies to diagnose and treat urinary tract problems. A cystoscopy can diagnose:

* [Bladder cancer](https://my.clevelandclinic.org/health/diseases/14326-bladder-cancer) or[urethral cancer](https://my.clevelandclinic.org/health/articles/6223-urethral-cancer).
* Bladder stones.
* Bladder control problems.
* Enlarged prostate ([benign prostatic hyperplasia](https://my.clevelandclinic.org/health/diseases/9100-benign-prostatic-enlargement-bph)).
* Urethral strictures and urinary fistulas.
* UTIs.

**Treatments using cystoscopy**

Your doctor may also use a cystoscope to:

* Get urine samples from ureters (the ducts that carry urine from the kidneys to the bladder).
* Inject dye for an X-ray procedure that tracks urine flow.
* Inject medication to stop urine leakage.
* Remove a ureteral stent (a tiny tube that holds open a ureter) placed during an earlier procedure.
* Remove bladder stones, abnormal tissue, polyps or tumors.
* Take small pieces of bladder or urethral tissue to [biopsy](https://my.clevelandclinic.org/health/diagnostics/15458-biopsy-overview) (examine in a lab).
* Treat urethral strictures (narrowing) or fistulas (holes that form between two areas).

**What are the types of cystoscopies?**

There are two types of cystoscopes. Your healthcare provider will use the one that works best for your specific procedure.

* **Rigid:** These cystoscopes don’t bend. Your doctor may pass instruments through the tube to perform biopsies or remove tumors.
* **Flexible:** Your doctor may use a bendable scope to examine the inside of the bladder and urethra and make a diagnosis.

Colposcopy

A colposcopy is a test to have a look at the cervix in detail. A colposcope is a large magnifying glass that a doctor or specialist nurse (colposcopist) uses to closely look at the skin-like covering of the cervix. By looking through it, the colposcopist can see changes that may be too small to see with the naked eye. They can take samples (biopsies) of any abnormal areas on the cervix.

You usually have a colposcopy in the hospital outpatient clinic.

Why you might have a colposcopy

You have a colposcopy if you've had an abnormal result after a cervical screening test, or if you have symptoms that could be caused by cervical cancer.

How you have the test

To have the colposcopy, you need to undress from the waist down. Your nurse will give you a sheet to cover yourself.

You lie on your back on the couch with your feet drawn up and your knees apart. If you can't get into that position for any reason, the colposcopist may be able to do the examination with you lying on your side with your knees drawn up. Your nurse will help you to get in a comfortable position.

The colposcopist gently puts in a speculum to open up your vagina. Then they look through the colposcope at the surface of your cervix. They can take biopsies of any abnormal areas. They send these to the laboratory to be looked at. The examination takes up to 20 minutes.

The biopsy is usually painless. But some women have crampy pain for a few minutes.



If your doctor or specialist nurse finds an area of abnormal cells, you might have treatment there and then. They call this see and treat. Or they may wait until they have the biopsy results.