

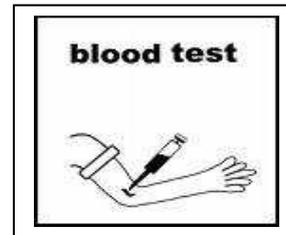
# Clinical Investigations

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### **How is a blood test normally done?**

The vein used for blood sampling is usually on the inside of your elbow or back of your wrist. A tourniquet (tight band) is usually placed around your upper arm. This makes the vein fill with blood and makes it easier for the blood sample to be taken. The skin over the vein is usually cleaned with an antiseptic wipe although this is not always necessary. A needle is then inserted into the vein through the cleaned skin. The needle is connected either to a syringe, or directly to blood sample bottles. When the required amount of blood is taken, the needle is removed. The small wound is pressed on with cotton wool for a few minutes to stop the bleeding and prevent bruising. The blood is placed in bottles. If only a small amount of blood is needed (e.g. for checking blood sugar using a test strip of paper) then a few drops of blood can be squeezed out from a small prick in the tip of the finger or earlobe. Some blood tests are taken from an artery in the wrist e.g. to measure the level of oxygen in the artery. This is usually only done in hospital in certain circumstances. You may be told to not eat for a time before certain tests. For example, a test of blood glucose is commonly done first thing in the morning before you have anything to eat.



**Are there any complications from blood taking?** Sometimes a bruise develops where the needle was inserted. This is much less likely to happen if you press over the site with cotton wool for several minutes. As with any wound, an infection may develop where the needle was inserted. See your doctor if the wound site becomes red and inflamed. Rarely, some people feel faint during a blood test. Tell the person doing the test if you feel faint as you should immediately lie down to prevent fainting.

### **Different blood samples**

Blood can be tested for many different things. The person who requests the blood test will write on the form which tests they want the 'lab' to do. Different blood bottles are used for different tests e.g. for some tests the blood needs to clot. For some tests, the blood is added to some chemicals to prevent it from clotting. If the blood glucose is being measured, then the blood is added to a special preservative, etc. This is why you may see your blood added to blood bottles of different sizes and colours.

The most common blood tests are:

- Full blood count & Blood grouping.
- Blood chemistry such as Kidney function, Liver function, Hormone levels, cholesterol
- Level glucose (sugar) level
- Immunology - such as checking for antibodies to certain viruses and bacteria.

### **What is a full blood count?**

A full blood count (FBC) is one of the most common blood tests done. A blood sample is taken which is prevented from clotting by using a preservative in the blood bottle. The sample is put into a machine which automatically:

- counts the number of red cells, white cells, and platelets per ml of blood.
- measures the size of the red blood cells and calculates their average (mean) size.
- calculates the proportion of blood made up from red blood cells (the haematocrit).

- measures the amount of haemoglobin in the red blood cells.
- The main abnormalities which can be detected are:

**Anaemia** which means that you have less red blood cells than normal, or have less haemoglobin than normal in each red blood cell. The most common reason for a full blood count to be done is to check for anaemia. There are many causes of anaemia. The average size of the red cells can give a clue as to the cause of some anaemia's. For example, the most common cause of anaemia is a lack of iron. With this type of anaemia the average size of the red blood cells is smaller than normal.

**Too many red cells**, which is called polycythaemia and can be due to various causes.

**Too few white cells**, which is called leucopenia. Depending on which type of white cell is reduced it can be called neutropenia, lymphopenia, or eosinopenia. There are various causes.

**Too many white blood cells** which is called leucocytosis. Depending on which type of white cell is increased it is called neutrophilia, lymphocytosis, eosinophilia, monocytosis, basophilia. There are various causes. For example: various infections can cause an increase of white blood cells, certain allergies can cause an eosinophilia, leukaemia causes a large increase in the number of white blood cells. The type of leukaemia depends on the type of white cell affected.

**Too few platelets** which is called thrombocytopenia. This may make you bruise or bleed easily. There are various causes.

**Too many platelets** which is called thrombocythaemia. This is due to a disorders which affect cells in the bone marrow which make platelets.

## **Biochemistry**

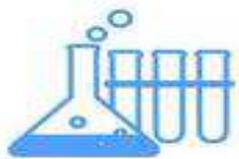
When we request blood test for biochemistry, this may includes a number of tests such as Urea and Electrolytes, Liver Function Test, Thyroid Function Test, Bone biochemistry such as calcium, phosphate and so on. We will first look at Urea and Creatinine test in this edition of the newsletter.

**Urea and creatinine** levels are used to evaluate kidney function and to monitor patients with kidney failure or those receiving dialysis. Urea is produced when the body breaks down protein. Healthy kidneys eliminate more than 90% of the urea the body produces, so blood levels indicate how well your kidneys are working. High urea levels suggest impaired kidney function.

However, there are many things besides kidney disease that can affect urea levels such as decreased blood flow to the kidneys as in congestive heart failure, shock, stress, recent heart attack or severe burns; bleeding from the gastrointestinal tract; conditions that cause obstruction of urine flow; or dehydration. Urea levels increase with age and also with the amount of protein in your diet. Drugs that impair kidney function may increase urea levels. Your urea and creatinine may be monitored if you are on certain drugs.

Creatinine is produced in your muscles when a compound called creatine spontaneously breaks down. Almost all creatinine is excreted by the kidneys, so blood levels are a good measure of how well your kidneys are working. Creatinine can also increase as a result of muscle injury. Since creatinine levels are in proportion to muscle mass, women tend to have lower levels than men. Creatinine may be part of a routine blood test, widely used when someone has non-specific health

complaints, or when your doctor suspects kidney problems. The test is also used to monitor treatment of kidney disease or to monitor kidney function while you are on certain drugs.



### Thyroid function tests

Thyroid function tests (**TFTs**) are a group of tests that are requested together to help evaluate thyroid gland function and to help diagnose thyroid disorders. TFTs include a measure of the amount of thyroid hormones, **Thyroxine (T4)** or **Tri-iodothyronine (T3)** in your blood. These hormones are chemical substances that travel through the bloodstream and control or regulate your body's metabolism—how it functions and uses energy. Thyroid hormones are present in the blood in either protein bound forms (the majority) or the free and active form of the hormone. Currently, the majority of UK laboratories measure the free form of the hormones – Free T4 (FT4) or Free T3 (FT3).

**Thyroid Stimulating Hormone (TSH)** is produced by the pituitary gland and is part of the body's feedback system to maintain stable amounts of the thyroid hormones in the blood. When concentrations decrease in the blood, the pituitary is stimulated to release TSH, which in turn stimulates the production and release of T4 and T3 by the thyroid gland. When the system is functioning normally, thyroid production turns on and off to maintain constant blood thyroid hormone levels.

TFTs are used to help diagnose hypothyroidism (**underactive thyroid**) and hyperthyroidism (**overactive thyroid**) which can be due to various thyroid diseases. It is also used to monitor thyroid replacement therapy.

Thyroid Function Tests usually include some combination of TSH, T4 or T3

The following table summarises test results and their potential meaning.

<b>TSH</b>	<b>T4</b>	<b>T3</b>	<b>Interpretation</b>
High	Normal	Normal	Mild (subclinical) hypothyroidism
High	Low	Low or normal	Hypothyroidism
Low	Normal	Normal	Mild (subclinical) hyperthyroidism
Low	High or normal	High or normal	Hyperthyroidism
Low	Low or normal	Low or normal	Non-thyroidal illness; Rarely hypothyroidism due to pituitary disease



### **Lipid profile (incl cholesterol)**

The lipid profile is a group of tests that are often requested together to determine **risk of coronary heart disease**. The tests that make up a lipid profile are tests that have been shown to be good indicators of whether someone is likely to have a heart attack or stroke caused by blockage of blood vessels (“hardening of the arteries”).

The lipid profile **includes total cholesterol, LDL-cholesterol** (sometimes called bad cholesterol), **HDL-cholesterol** (often called good cholesterol) and **triglycerides**. Sometimes the report will include additional calculated values such as total cholesterol/HDL-cholesterol ratio or a risk score based on lipid profile results, age, sex, and other risk factors.

Cholesterol is a substance that is essential for life. It helps form the membranes for cells in all organs and tissues in your body. It is used to make **hormones** that are essential for development, growth and reproduction. It forms bile acids that are needed to absorb nutrients from food. A small amount of your body’s cholesterol circulates in the blood in complex particles called lipoproteins. These lipoproteins include some particles that carry excess cholesterol away for disposal (HDL) and some particles that deposit cholesterol in tissues and organs (LDL). The test for cholesterol measures **all cholesterol** (good and bad) that is carried in the blood by lipoproteins. Cholesterol comes from your diet, and is also made in your liver. Your body produces the necessary quantity of cholesterol for your body to work properly but some cholesterol is also provided by your diet. If you have inherited a high cholesterol levels or if you eat too much of the foods which are high in cholesterol **or saturated fats**, then levels of cholesterol in your blood may increase and have a bad effect on your health. The extra cholesterol in your blood may be deposited on the walls of the blood vessels causing hardening of your arteries

For those **under 20 years of age** and at low risk, cholesterol testing is not requested routinely. **Ideally your cholesterol should be below 5mmol/l but must be considered with other risk factors**. If you are taking treatment to lower your cholesterol, the target is to lower your total cholesterol to a value less than 4 mmol/L, with a fall of around 20-25%.

## Medical Investigations Ultrasound

**An ultrasound** is a safe and painless procedure that uses sound waves to produce an image of the inside of the body (or part of the body).

**Abdominal ultrasound** can help doctors to diagnose problems with your liver, gallbladder, pancreas, spleen and kidneys. Pelvic ultrasound can help doctors to diagnose problems in your lower abdominal and pelvic organs, such as gynaecological or bladder problems. Ultrasound is also used to check fetal development during pregnancy.

**In women, pelvic ultrasound** can help find the cause of pelvic pain, heavy or painful periods or other abnormal vaginal bleeding. The scans can help diagnose cysts in the ovaries and fibroids in the womb, as well as ovarian and womb cancer. Sometimes, ultrasound is used to help guide procedures such as **needle biopsies**. This is when your doctor uses a needle to take a small sample of tissue. The tissue is sent to a laboratory for testing. Your doctor uses ultrasound to see inside your body during the procedure to check the needle is reaching the right tissue. Your doctor may use ultrasound to check for blood clots or narrowing of blood vessels. This is done using a Doppler ultrasound. **Doppler ultrasound** monitors flow in blood vessels.

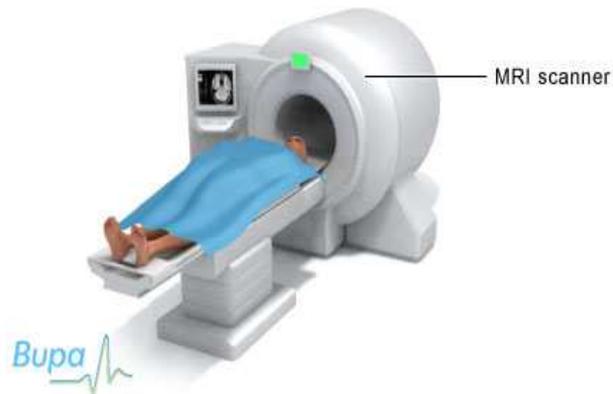
Ultrasound scans are usually done as **out-patient procedures** in hospital. Please read your appointment letter for instructions on how to prepare for your scan. The instructions will vary depending on your examination.

For some scans you need to fast for eight to 12 hours beforehand, whereas for others, such as **kidney or bladder scans, and sometimes pelvic scans, you need to drink water an hour beforehand**. A full bladder helps to lift the large bowel out of the pelvis so that your radiologist or sonographer can see your pelvic organs more easily.

The **scan usually takes 10 to 15 minutes**. You may be asked to wear a gown or take off some of your clothes. The ultrasound scanner looks a bit like a home computer system. There is a hard-drive, keyboard and a display screen. In addition, there is a sensor that your sonographer holds. The **sensor** sends out sound waves and picks up the returning echoes. Pictures of the inside of your body are displayed on the screen. These pictures are constantly updated, so the scan can show movement. The person scanning you will apply gel to the skin on your abdomen over the area to be examined. The gel allows the sensor to slide easily over your skin and helps to produce clearer pictures. The sensor is held firmly against your skin and moved over the surface.

The details of your scan may be explained to you straight after the examination. Alternatively your sonographer may send your results in a report to the doctor who requested your scan.

## Medical Investigations MRI scan



**MRI** stands for **magnetic resonance imaging**. An MRI scan uses a strong magnetic field and radio waves to create pictures, on a computer, of tissues, organs and other structures inside your body. The MRI scanner is like a tunnel about 1.5 meters long surrounded by a large circular magnet.

One of the main advantages of MRI is that, unlike X-rays, it does **not involve** exposing the body to **radiation**. You lie on a couch which then slides into the scanner. A 'receiving device', like an aerial, is placed behind, or around, the part of the body being examined. This detects the tiny radio signals emitted from your body. When each 'picture' is being taken you need to **keep still** for a few minutes, otherwise the scan picture may be blurred.

As MRI scans are **painless**, anaesthetic is not usually required. If you are **claustrophobic**, you may want to request a **mild sedative** during the scan in order to help you relax. Depending on the size of the area being scanned and how many pictures are taken, a typical scan lasts between 15 and 90 minutes. In some cases, an injection of a **special contrast dye** is given into the bloodstream via a vein on the arm. This helps to give clearer pictures of certain tissues or organs being examined.

At certain times during the procedure, the MRI scanner will make a loud knocking noise. You may be given earplugs or headphones to wear. The noise is caused by the magnets in the machine being turned on and off. An MRI scan can create clear pictures of most parts of the body. It is commonly used to get detailed pictures of the brain and spinal cord, to detect tumours in internal organs, damage or abnormalities of bones and joints and detailed of the heart and blood vessels. The

MRI scanner uses an extremely strong magnet, so people with certain types of medical **implant cannot be scanned**. This is because the magnet can potentially move medical devices with metal in them, or affect their function. e.g pacemakers, cochlea implants, metal heart valves, metal clips and eye implants. You will have to remove watches, rings, hearing aids, dentures, wigs, piercings and jewellery before a MRI scan.

## Medical Investigations - X-Rays

**An X-ray test (radiograph)** is a quick and painless way for doctors to diagnose and monitor many health conditions. X-rays are a form of radiation. Unlike light radiation (normal light), which is absorbed or reflected by the skin, X-ray radiation passes in straight lines through the body.

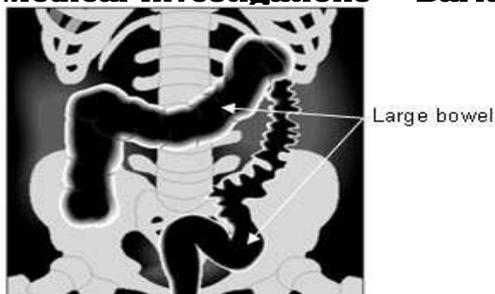
An X-ray machine works by projecting a beam of X-rays through part of your body. An X-ray sensitive detector, similar to a camera film, captures what comes out the other side as a black and white image called **a radiograph** - an X-ray image. Structures inside the body that are dense, such as bones, absorb X-rays. This weakens the X-ray beam, so that the bone casts a 'shadow'. This comes out white on the final image. Less dense structures, like the air in the lungs, let X-rays pass through them almost completely. There is no shadow and this part of the image will be black. Because parts of the body vary in how dense they are and block X-rays by different amounts, they show up as shades of grey, from black to white.

The images captured by the X-ray machine are now usually stored digitally and displayed on a computer screen (previously processed on films). X-rays can be used to look at bones & joints e.g. to look for fractures after a fall or injury. An X-ray image of the chest shows the size and shape of the heart and is good for spotting signs of infection in the lungs.

An abdominal X-ray image shows up the outline of the bowel, and can pick up stones in the kidney or bladder. X-rays aren't generally very helpful in giving information about solid organs, such as the liver or kidneys, brain & nerves which are made up of tissues of very similar density and require other test such as MRI scan.

The test usually takes only a few minutes but will vary depending on what part of your body is being examined. In a private cubicle, you will usually be asked to remove your clothing and put on a hospital gown. X-rays are commonly used and generally safe. . The radiation from X-rays only adds to your underlying risk of cancer by a very small amount. Although the radiation dose being used is generally thought to be safe for adults, it may harm an unborn baby. Therefore, X-rays aren't usually used on pregnant women unless there is an urgent medical reason

## Medical Investigations – Barium Enema



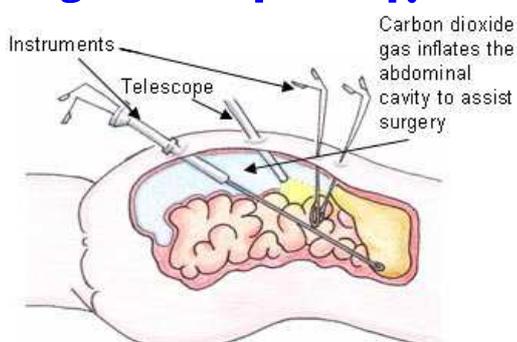
**A barium enema** is a test that uses X-rays to examine the large bowel (colon and rectum). The gut does not show up very well on ordinary X-ray pictures. However, if a liquid that contains barium is placed in the gut, the outline of the intestines (gut) shows up clearly on X-ray pictures. This is because X-rays do not pass through barium. A thick white liquid that contains

barium is used as an enema to place in the **colon** (lower gut). To get good X-ray images, it's essential for your bowel to be completely empty so that the barium, which acts like a temporary paint, can coat every part of your bowel lining. To achieve this, you will be asked to eat no solid food and drink only clear liquids for 24 hours before your test. You will usually be given two doses of a strong laxative to cleanse the bowel. The laxative effect can be quite powerful and you will probably pass lots of watery faeces. You will need to stay close to a toilet for several hours after taking the treatment. To prevent dehydration while this is happening, try to drink about 250ml (about half a pint) per hour of water or other clear fluids. You will usually be allowed to drink clear fluids until immediately before the test. The test usually takes 15 to 20 minutes. A small tube is then put into your anus (back passage) and gently pushed up a few centimeters. Barium liquid is then passed through the tube into your colon. During the examination, the barium will flow through the tube to coat your bowel wall. Air or carbon dioxide gas will also be gently pumped through the tube to expand the bowel and make the bowel wall easier to see. You may find this slightly painful but it won't last for long

You may feel as if you want to open your bowels. However, it's important to try and hold the barium fluid and air in by keeping the muscles of your bottom very tight. Several X-ray images, or a moving series of images, will be taken with you in different positions. When the radiologist has recorded enough images, the tube will be removed. You may have some stomach cramps after the procedure so, you may want to stay near a toilet for an hour or so when you get home. of a muscle relaxant to help relax the muscles of your bowel wall and make it less uncomfortable. A small tube is then put into your anus (back passage) and gently pushed up a few centimetres. Barium liquid is then passed through the tube into your colon. During the examination, the barium will flow through the tube to coat your bowel wall. Air or carbon dioxide gas will also be gently pumped through the tube to expand the bowel and make the bowel wall easier to see.

This may cause temporary discomfort. Images of your bowel will be displayed on a TV screen and you will be moved into different positions, both to help the barium flow and to see as much of the bowel as possible. Several X-ray images, or a moving series of images, will be taken with you in different positions. You will probably want to go to the toilet and pass out the barium when the procedure is over and you may feel bloated or constipated for a short time afterwards. Please drink plenty of water.

## Investigations - Laparoscopy



**Laparoscopy** is a procedure to look inside your abdomen by using a laparoscope. A laparoscope is like a **thin telescope** with a light source. It is used to light up and magnify the structures inside the abdomen.

A laparoscope is passed into the abdomen through a small incision (cut) in the skin about 1-2 cm long near to the navel (belly button). Some gas is injected through the cut to 'blow out' the abdominal wall slightly. This makes it easier to see the internal organs with the laparoscope, which is gently pushed through the incision into the abdominal cavity.

A laparoscopy may be done to find the cause of symptoms such as abdominal pain, pelvic pain, or swelling of the abdomen or pelvic region if a previous test such as an X-ray or scan has identified a problem within the abdomen or pelvis. A laparoscopy enables a doctor to see clearly inside your abdomen.

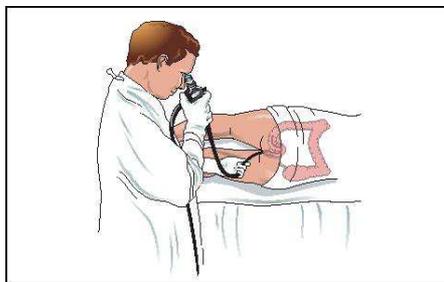
If you have a surgical procedure, one or more separate small incisions are made in the abdominal skin. These allow thin instruments to be pushed into the abdominal cavity. The surgeon can see the ends of these instruments with the laparoscope and so can perform the required procedure.

These instruments are used to cut, trim, biopsy, grab, etc, inside the abdomen. This laparoscopic surgery is sometimes called '**key-hole surgery**' or '**minimal invasive surgery**'. Laparoscopic surgery can be used for various procedures. Some commonly performed operations include removal of gallbladder, appendix or patches of endometriosis and female sterilization.

With laparoscopic surgery, there is usually less pain & risk of complications following the procedure risk with a shorter hospital stay and a quicker.

There may be some minor bleeding or bruising around the skin incisions. Otherwise, in most cases a laparoscopy just to look inside' goes without any problem.

## Medical Investigations - Sigmoidoscopy



**Flexible sigmoidoscopy** allows inspection of the lining of the rectum, anus and lower part of the colon. It uses a flexible tube with a "video camera" at the tip. The instrument is about 1cm thick. Flexible sigmoidoscopy is routinely done in an endoscopy clinic and you don't usually need an anaesthetic or sedation.

For your doctor to be able to see your bowel clearly, your bowel needs to be completely empty. To help empty your bowel you may be given a strong laxative to take, or you may be given an enema (a fluid which you inject into your back passage) to use before you come into hospital. You will be given instructions on how and when to do this. You can eat and drink normally until you have the enema and after that, you should drink clear fluids only. If you have difficulty giving yourself an enema at home, it can be given just before the procedure.

A sigmoidoscopy usually takes between 10 and 15 minutes. It may feel uncomfortable, but shouldn't be painful. While you're resting on your side, your doctor will gently examine your back passage with a gloved finger and then carefully insert the sigmoidoscope into your rectum. Lubricating jelly will be used to make this as easy as possible. Air is then usually pumped through the sigmoidoscope into your lower bowel to make it expand and to make the bowel wall easier to see. This can cause stomach cramps. It is normal if you get an urge to go to the toilet or pass wind.

If your doctor sees an area that needs further evaluation, your doctor might take a biopsy (sample of the colon lining) to be analysed. If necessary, it is possible to remove polyps and treat haemorrhoids during the procedure. Your doctor will explain the results to you when the procedure is done. You might feel bloating or some mild cramping because of the air that was passed into the colon during the examination. This will disappear quickly when you pass gas.

Flexible sigmoidoscopy is commonly performed and generally safe. If you have had a biopsy or had polyps removed you may have a small amount of bleeding. This usually stops on its own

Complications specific to sigmoidoscopy are uncommon but rarely can result in a tear of your bowel, bleeding, and infection.

## **Faecal Occult Blood Test (FOB)**

### **What does my Doctor mean by a FOB test?**

This is a test which checks for blood in your faeces/stool. It detects small amounts of blood in your faeces which you would not normally see or be aware of.

### **When would an FOB test be requested by the Doctor?**

Your doctor may request this test if you have a history of stomach or bowel problems or following some abnormal blood test results. This test is also used as a screening tool for early detection of bowel cancer. Screening means looking for early signs of a particular disease in otherwise healthy people who do not have any symptoms and when treatment is likely to be curative. In England, the NHS Bowel Cancer Screening Programme routinely offer screening, using FOB tests, every two years for people aged between 60-75.

### **How is the faecal occult blood test done?**

If your GP is requesting this test, they may give you three blue top bottles to collect 2-3 separate samples of faeces, obtained on different days. Ideally, these samples

should not be contaminated with urine or water. One suggestion is to catch your sample in a clean disposable container or small plastic bag. If you have received a FOB testing kit from the NHS Bowel Cancer Screening Programme, please read the instructions carefully. To see a video of how to use the FOB test kit from the Bowel Cancer Screening programme, log on to

<http://www.cancerscreening.nhs.uk/bowel/publications/video/how-to-use-the-kit.html>

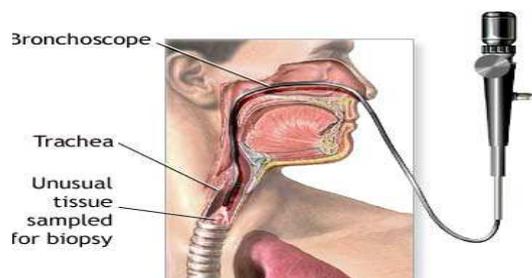


FOB testing kit.

### Do I need to prepare for the test?

To try and get more reliable results, the following may be advised:

- Avoid using ibuprofen, naproxen, aspirin (NSAID drugs) for 7 days prior to the test, if at all possible. These can sometimes trigger bleeding in the stomach.



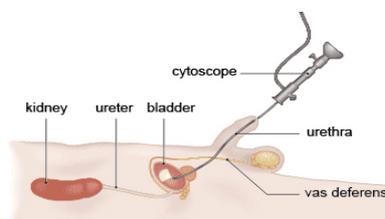
### Investigations - Bronchoscopy

Bronchoscopy is a procedure that allows a doctor to examine the airways using a **bronchoscope**. This is a flexible tube with a telescopic light and camera at the end, which allows your doctor to see down your airways and into your lungs. There are various reasons for having a bronchoscopy. For example, to help make a diagnosis if you have a persistent cough or cough up blood and the cause is not clear. If you have a shadow on a chest X-ray or the doctor can see a growth or a strange-looking area in a bronchus the doctor may take a **biopsy** (small sample) during a bronchoscopy. Your doctor can take samples of cells from your airways using a washing technique (**lavage**). The sample is then looked at under the microscope to help decide whether problems such as inflammation, infection or cancer might be responsible for your symptoms. Flexible bronchoscopy is routinely done as an outpatient or day-case procedure. This means you have the procedure and go home the same day. You **should not eat, drink or smoke** for several hours before the bronchoscopy nor take aspirin or warfarin 1 week before bronchoscopy. (Small sips of water may be allowed up to two hours before the test.) You may have a **sedative injection** to

help you relax. This will make you feel drowsy. Then you will lie on the couch and your doctor will spray the inside of your nose and throat with an **anaesthetic** to numb the area. Your doctor will pass the bronchoscope through your nose or mouth and into the airways of your lungs. This may feel uncomfortable but it won't last long. If anything other than air enters your voice box, you automatically cough to clear your airways. Your doctor will give you more local anaesthetic to reduce coughing. If you find yourself coughing, you should try to relax and take slow, shallow breaths through your mouth. He or she will examine your airways by looking at images sent through a camera attached to a video screen. Your doctor may take a sample such as a biopsy, brushings and washings of any abnormal areas. The procedure should take between 10 and 20 minutes. After a local anaesthetic, it may take several hours before the feeling comes back fully into your throat. You will need to rest until the effects of the local anaesthetic and sedation have passed. . You may have a chest X-ray to check for complications. **Don't eat or drink anything for two hours** after the procedure because your throat will be numb. It can be normal for you to have a small amount of blood in your mouth after the procedure. Sedation temporarily affects your co-ordination and reasoning skills, so you must not drive, drink alcohol, operate machinery or sign legal documents for 24 hours afterwards. You may have a sore throat after the procedure but serious complications such as bleeding or lung collapse are very rare. If you need pain relief, you can take over-the-counter painkillers such as paracetamol or ibuprofen.

Bronchoscopy can also be done with a **rigid bronchoscope**. This is less common and is done under general anaesthetic. This means you will be asleep during the procedure. Doctors may use a rigid bronchoscope if there is bleeding in your lungs, or to remove objects blocking your airway, such as a piece of food. Bronchoscopy can be used to remove a small object (such as an inhaled peanut) that has been lodged in an airway, or to insert a small tube called a stent to open a collapsed airway, or to remove a growth that is blocking an airway, etc.

### Medical Investigations – Cystoscopy



A flexible cystoscopy

**Cystoscopy** is a procedure that allows your doctor to look inside your bladder, take a tissue sample (biopsy) from your bladder wall or treat certain bladder conditions. A cystoscope is a thin telescope which is passed into the bladder via the **urethra** (the tube that takes urine from your bladder to the outside of your body). There are two types:

- A **flexible** cystoscope is a thin, flexible, fibre-optic telescope. It is about as thick as a pencil. The fibre-optics allow a doctor to see around bends.
- A **rigid** cystoscope is a thin, solid, straight telescope. Flexible cystoscopy is routinely done as an outpatient or day case **under local anaesthesia**. This means you will stay awake during the procedure. Your doctor will use anaesthetic gel to reduce feeling and lubricate the entrance to your urethra. Rigid cystoscopy is usually done **under general anaesthesia**. This means you will be asleep during the procedure and feel no discomfort. A cystoscopy may take anything from a few minutes to 20 minutes, depending on what your doctor needs to do. You will be asked to put on a gown and lie on your back with your knees raised and apart.

The doctor will then gently push the cystoscope up into the bladder. The doctor will look carefully at the lining of the urethra and bladder. Sterile water is passed down a side channel in the cystoscope to fill your bladder slowly. This makes it easier for the doctor to see the lining of the bladder. As your bladder fills you will feel the urge to pass urine, which may be uncomfortable. A camera lens at the end of the cystoscope sends pictures from the inside of your bladder to a monitor. Your doctor will look at these images to check your bladder. If necessary, your doctor will take a biopsy, using special instruments passed through the cystoscope. It's quick and painless, although you may feel a slight pinch. Your doctor will send the biopsy to a laboratory for testing to determine the type of cells and whether these are benign (non-cancerous) or cancerous. Most cystoscopies are done without any problem. For the next 24 hours you may have a mild burning feeling when you pass urine, and feel the need to go more often than usual. Also, the urine may look pink due to **mild bleeding**, particularly if a biopsy was taken. Occasionally, a **urine infection** develops shortly after a cystoscopy. This can cause a fever (high temperature) and pain when you pass urine. Rarely, the cystoscope may damage or perforate the bladder or urethra.



### ***What is spirometry?***

Spirometry is a simple breathing test that measures how your lungs are working, using a spirometer

### ***What does spirometry measure?***

Spirometry measures both the amount of air that you can breathe out and how quickly you can do so. It gives us information of what is happening in the small airways of your lungs. This information will help us to make the correct diagnosis of your condition.

### ***What is a spirometry reversibility test?***

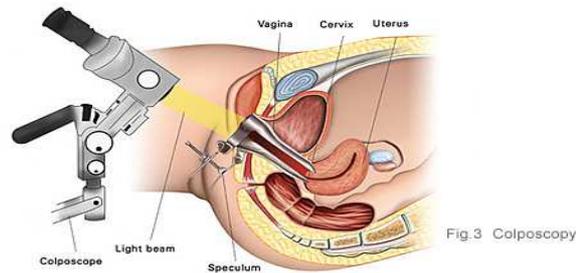
A reversibility test is carried out to see what affect certain medicines have on your breathing. First a spirometry test is carried out and then you will be asked to take some inhaled medication. A second test is done about 20 minutes after the medication. The test results taken from before and after treatment are compared to look for change in the tracings.

### ***Do I need to prepare for test?***

Yes, some simple steps should be taken in order to obtain the best possible results. Prior to your test it is important that you **avoid the following**:

- Taking your bronchodilator (blue) for 4 - 6 hours
- Taking your long acting bronchodilator for 12 - 24 hours
- Taking your other respiratory medications for 24 - 36 hours
- Smoking within 24 hours of test
- Consuming alcohol within 4 hours of test
- Eating a large meal within 2 hours of test
- Vigorous exercise within 30 minutes of test
- Wearing tight clothing that may restrict breathing

## Medical Investigation: – Colposcopy



**A colposcopy** is an examination to check for signs of cervical cancer. It uses a special instrument called a colposcope to look in detail at abnormal cells in the neck of the womb (cervix). It allows the doctor, or specialist nurse, to see the extent of the abnormal cells and the degree of change in the cells. A colposcope acts like a magnifying glass, which helps your doctor or nurse to see the cells of your cervix in detail and close up. A liquid is painted on to the cervix to show up any abnormal cells. You may also have a small biopsy taken during a colposcopy. This means removing a sample of cells from your cervix. Treatment of abnormal cervical cells (if needed), can be carried out at colposcopy. A colposcopy usually takes between 15 and 20 minutes. You will be asked to lie in a reclining chair, or on a couch, in the same position as during a cervical screening test. This is with your knees bent and your legs apart. Your doctor will use a speculum (the same instrument that is used during a cervical smear test) to hold open your vagina. A light is shone onto the cervix and your doctor or nurse uses the colposcope to look at the cells. The colposcope will stay outside your body at all times. If your doctor or nurse sees anything that looks abnormal, a biopsy will be taken and the cells sent to a laboratory to be checked. You may be given a local anaesthetic to numb the area before the biopsy is taken. If no abnormal cells are found, you won't need any treatment. If your doctor or nurse finds abnormal cells, you may be given treatment there and then to remove the cells before they can develop into cervical cancer. The most common type of treatment is LLETZ. Your doctor or nurse will inject a local anaesthetic into your cervix. This will numb the area so you won't feel any pain. Some women may notice a stinging sensation when the anaesthetic is injected – this settles down very quickly. A loop of fine wire with an electric current flowing through it is used to remove the abnormal cells from your cervix. After your colposcopy you can usually return to work or carry on with your normal day. You are likely to have a small amount of bleeding, especially if you have had a sample of tissue taken (a biopsy). Do not use tampons. You should not have sex or use vaginal creams or pessaries until the bleeding has stopped. Generally you should wait for five days or up to 4 weeks if you had treatment.

## Medical Investigation: – DEXA SCAN



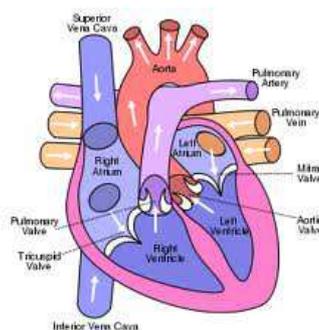
**DEXA SCAN-**“dual energy absorptiometry scan”, is an x-ray procedure that measures bone “density.” Density means how much there is of something in a space. In general, the more dense the bone the stronger it is. DEXA scan uses x-ray to measure how strong the bones are. This is used to assess risk of osteoporosis, a condition where the bone have lost their density, become weak and prone to developing breaks or fracture.

**How does it work?** A DEXA scan uses x-ray equipment and a computer to measure how dense the bone is. Low energy x-rays are projected into the bones. The amount of x-ray absorbed by the bones will depend on how dense the bone is. In general, the denser the bone is, the lesser the x-ray that will get through them. A detector measures the amount of x-ray that goes through the bone and sends this information to the computer, which calculates the average density of the bone. A low score means the bone is less dense than it should be, and is therefore more prone to fracture.

**When is DEXA scan requested?** You may be asked to have a DEXA scan if you sustained a broken bone following a minor bump or fall; have an eating disorder like anorexia; taking steroids; had early menopause; or have other conditions that increase risk of osteoporosis like rheumatoid arthritis or celiac disease. The scan can also be used to monitor response to osteoporosis treatment.

**How to prepare for the scan and what happens on the day?** Take your usual medications as normal unless specifically asked not to. Do not take any calcium supplements at least 24 hours before the scan. Wear light clothing, preferably without zip or metal fasteners on the hips or along the spine. Also avoid wearing metal jewelry as this interferes with the procedure. As you lie on the couch, the machine will pass over your body and send x-rays through the bones being tested, usually your hips, vertebrae (back bones), and wrist. It is important to lie still to prevent blurring of image. The entire procedure takes about 10-20 minutes.

**What to expect afterward?** Results are given in T scores. If it suggests osteopenia (thin bones), lifestyle changes are advised to slow down progression to osteoporosis. If it suggests osteoporosis, treatment is started to prevent fractures.



### **Investigation; -echocardiogram**

An **echocardiogram** is used to check the structure of your heart and how well it is functioning. The procedure uses ultrasound, which is a very high frequency sound that you cannot hear, but it can be emitted and detected by special machines. Using a probe, which is placed over your chest a moving real-time image of the inside of the heart, can be visualised giving an accurate pictures of the heart muscle, the heart chambers, and structures within the heart such as the valves. An ECHO can be carried out for many different reasons. It may be done to check how well your heart is working after a heart attack, or to look at how well the valves are

moving inside the heart. An ECHO can also help to see any fluid that may have collected around the heart. The test can also be carried out when your heart is under stress, for e.g. after you have been exercising. This is called a **stress echocardiogram** and is used to see how your heart copes with stress. The test normally takes around 40 minutes. You will be asked to undress to the waist. The doctor or technician will then ask you to lie on your left-hand side and will rub a clear gel over the left side of your chest. This is to make sure there will be a good, airtight contact between your skin and the probe. The echocardiogram machine creates a moving image of your heart on a screen. If a doctor is doing the test, he or she may be able to tell you straight away how your heart is functioning and whether everything looks normal.