

PET Scan: Patient information

PET scans create images which show where cells are particularly active in the body. They are most commonly used to diagnose cancer.

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.

What is a PET scan?

PET stands for positron emission tomography. A PET scan produces three-dimensional, colour images of your body. PET scans show where cells are particularly active. PET can be used to diagnose various medical conditions, or to find out more about how a condition is developing. It can also be used to measure how well treatment for a condition is working.

PET scans can be combined with other forms of imaging such as magnetic resonance imaging (MRI) or computed tomography (CT). Scan images can be superimposed on top of each other to create very detailed pictures of the body.

What is PET scan used for?

PET scanning is most commonly used in the diagnosis and assessment of cancer. However, it can be used to diagnose other conditions including fevers of unknown origin, brain and heart diseases. In cancer medicine, doctors may use the scan for the following reasons:

- Cancer detection. For example, to show whether a lump is cancer or not.
- Cancer 'staging': to find out how advanced a cancer is.
- To see whether a cancer has spread to other parts of the body.
- To see whether a cancer has changed its behaviour (for example, from low grade to higher grade)
- To determine if treatment has been effective for a cancer.
- To show the difference between scar tissue and active cancer tissue.

How does a PET scanner work?

Firstly, a radioactive medicine is produced in a machine called a cyclotron. The medicine is then 'tagged' to a natural chemical such as glucose. This labelled glucose is called a radiotracer. Once the radiotracer is inside the body, it goes to parts of the body that use

the glucose. In haematology PET scans, a radioactive drug called fluorodeoxyglucose (FDG) is often tagged to glucose to make a radiotracer. This radiotracer will naturally go to the tissues that use glucose for energy. Most cancers use more glucose than other tissues, so the radiotracer will be concentrated in these cancer tissues.

The PET scanner detects the presence of the radiotracer in tissues, and can show this as different colours and brightness on a PET image. The colour and brightness (or intensity) on PET images reflects differences in how much glucose is taken up in a tissue. Areas of greater intensity, called 'hot spots', show where large amounts of the radiotracer have built up. Less intense areas, or 'cold spots', indicate a smaller concentration of radiotracer. Many cancers are 'hot' on a PET scan.

A radiologist is a doctor who specialises in reading PET images. The radiologist will look at the images of your PET scan, and report the results to your doctor.

What happens during a PET scan?

Usually, a very small amount of a radiotracer is injected into your arm. You are then asked to rest quietly for 30-90 minutes to give the radiotracer time to travel to the part of your body to be scanned. You may be given a medication to help you relax.

When it is time for your scan, you will be taken to the scanning room. A PET scanner is a large machine with a round hole in the middle, similar to a CT or MRI scanner. The machine contains many rings of detectors that record the emission of energy from the radiotracer.

You will lie on a cushioned examination table, usually on your back. The table is then moved into the large hole in the scanning machine and the images for the scan are taken. The scan usually takes 30-60 minutes. Try to stay as still as possible during the scan.

What should I do to prepare for a PET scan?

Normally you will be asked not to eat anything for several hours before a PET scan. Eating food may lead to a poor-quality scan as it can alter the distribution of the radiotracer in your body. If this happens, the scan may need to be repeated on another day. So, following instructions regarding eating is very important. You may be asked not to drink any caffeine in the 24 hours leading up to your scan. If you have diabetes you may receive special instructions about how to prepare for the scan.

If you are pregnant or think you may be pregnant, you must advise your doctor. Breast feeding mothers may be advised to express enough milk to feed their baby for the first six hours after the scan. This isn't because there will be radiation in the milk. It is because a

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mother shouldn't be holding the baby closely during the time the radiation is in her body. Your hospital should advise you on the precautions to take.

For other people, it is advisable that you do not have close contact with babies or young children until about three hours after your PET scan.

How will I feel after my PET scan?

The dose of radiation in a PET scan is low, so you should not expect to feel very different, and you should be able to go home soon after your scan is completed. It is best to drink plenty of fluids after the scan as this will help to flush the radioactive drugs from your body. All traces of the radiotracer should leave your body naturally around three hours after it has been given to you.

Are there any side-effects or complications from a PET scan?

The word 'radioactivity' can be concerning, however the radioactive chemicals used in PET scans are considered to be safe, and they leave the body quickly in the urine. The dose of radiation that your body receives is very small.

If you are pregnant or breast-feeding, there may be a risk to your baby if you have a PET scan. This is because even small amounts of radiation can damage a baby. If you are pregnant, if you think you could be pregnant, if you are breast-feeding, or caring for small children, it is important that you inform the staff at the hospital before the scan is carried out. They can advise you on the precautions to take.