

PET CT

WHAT IS PET CT?

A **PET (Positron Emission Tomography) scan** is a diagnostic imaging tool that produces pictures of any abnormal cell activity in the body, often before changes may be visible on conventional imaging. A tiny amount of a radioactive substance, called a radionuclide (radiopharmaceutical or radioactive tracer), is used during the procedure to assist in the examination of the tissue under study.

PET scans can detect cancers, brain disorders such as Alzheimer's Disease, Parkinson's Disease and epilepsy, heart disease and bone abnormalities.

CT (Computed Tomography) uses a combination of x-rays and high-powered computers to obtain cross-sectional images of the body.

The combination of PET and CT produces a highly sensitive imaging device able to detect early stages of disease often undetectable by CT alone, or by other imaging procedures such as MRI.

PET CT scans are simple and painless, offering patients and their families information that helps doctors detect and diagnose disease early and begin treatment quickly. It can also provide much more specific information, distinguishing between benign and malignant disorders for example, unlike other medical imaging techniques such as ultrasound, x-rays, MRI or CT that merely confirm the presence of a mass.

PET CT can also help doctors monitor the treatment of disease. For example, chemotherapy leads to changes in cellular activity and these changes can be seen on PET CT scans, long before any structural changes can be measured by other imaging techniques. These scans give doctors another tool to evaluate treatments, perhaps even leading to a modification in treatment before any other imaging is done.

HOW DOES PET CT WORK?

When disease is present, the biochemistry of cells and tissues changes. In cancer, for example, cells begin to grow at a much faster rate. A PET CT scan begins with an injection of a glucose-based radiopharmaceutical called fluorodeoxyglucose (FDG). The FDG travels through the body and eventually settles in any organs or tissues that have an increased metabolic activity, such as an area of rapidly growing cells.

During the scan, the patient lies on a table that moves through the PET CT scanner. The cameras in the PET scanner detect gamma rays emitted by the FDG in the patient. It converts these gamma rays into electrical signals and then into digital images. If there are any areas of increased metabolic activity, such as a cancer, the signals will be stronger, since more of the FDG will have been absorbed in these areas.

The CT component of the scan adds anatomical information to the PET scan, and provides very accurate information on the location of disease in the body.

REASONS FOR THE PROCEDURE:

In general, PET scans may be used to evaluate organs and/or tissues for the presence of disease or other conditions. PET may also be used to evaluate the function of organs such as the heart or brain. Another use of PET scans is in the evaluation of the treatment of cancer.

BEFORE THE PROCEDURE:

- **Allow up to four hours for your appointment.** Do not arrange any other appointments before or after this one.
- **You will need to fast for four hours prior to your appointment.** Eat nothing and drink only water.
- **You will need to be well hydrated.** Drink 4 glasses of water in the 2 hours prior to your appointment and empty your bladder as needed.

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- **Be relaxed.** Please do not exercise the day before, or the day of, your scan. Allow plenty of travel time to avoid being rushed.
- **Bring a list of all your current medications with you** to your appointment.
- **If you are diabetic,** please call us to discuss your medication as additional preparation may be needed.
- You will need to fill in a questionnaire and sign a consent form prior to your scan.
- To achieve the best possible scan for your specific needs, it may be necessary to use oral contrast. This involves drinking three glasses of liquid over an hour before your scan.
- **If friends or family accompany you to your appointment,** they must not be pregnant or aged under 16 years.

DURING THE PROCEDURE:

- You will be asked to remove any jewellery and clothing items made of metal and you will be given a gown to wear.
- You will be asked to empty your bladder prior to the start of the procedure.
- An intravenous (IV) line will be inserted into your hand or arm for injection of the radionuclide, fluorodeoxyglucose (FDG).
- After the injection, will then be asked to rest quietly for about an hour. This allows the FDG to concentrate in the organ or tissue of interest.
- After the FDG has been absorbed for the appropriate length of time, you will be taken into the PET CT scanner room. You will lie on your back on a table that will then moves through the scanner.
- When the scan has been completed, the IV line will be removed.

AFTER THE PROCEDURE:

- After the scan you may eat and drink normally.
- Drink plenty of water to help flush the FDG out of your system.
- Because the FDG takes a few hours to leave your system, we suggest you minimise contact with others (especially children and pregnant women) for 4 hours following your scan.

RISKS OF THE PROCEDURE:

- PET CT is a very safe and routine procedure with millions of scans done around the world without complication.
- The radiation dose is small and the FDG will be out of your system by the end of the day.
- Minimise contact with others (especially children and pregnant women) for 4 hours following your scan.

IN BRIEF:

- PET scans give information about the body's metabolic activity that is not available with other imaging modalities, such as ultrasound, x-rays, MRI & CT alone.
- The combination of CT scanning with PET scanning, provides anatomical information and the exact location, and often the severity of any disease present.
- Because PET CT scanning often reveals disease much earlier than other diagnostic imaging techniques, it can help doctors diagnose disease more quickly and often alter the course of treatment.