

News

Shorter, sharper scan for prostate cancer

A new imaging technique makes use of a substance to locate prostate cancer cells, producing highly accurate results that help doctors design the best treatment regime for a patient

BY TEH JOO LIN

A PATIENT LIES DOWN INSIDE A HIGH-TECH POSITRON EMISSION TOMOGRAPHY (PET) SCANNER. HE IS GIVEN AN INJECTION OF A CLEAR LIQUID, A TYPE OF CHEMICAL SUBSTANCE THAT SEEKS OUT THE AREAS IN HIS BODY THAT MAY BE CANCEROUS.

Known as radiotracers, these chemical substances circulate through the patient's blood vessels and target tissues with abnormal metabolic behaviour. For prostate cancer, the radiotracer used is 18F-Fluorocholine (FCH), which accumulates more avidly in the abnormal cells. The scanner picks up the radioactive signals from FCH, which show up as colourful images on a computer monitor.

The imaging, which takes just 30 minutes, will reveal just how bad – or not so bad – the situation is.

This new imaging technique – called the FCH PET/CT – breaks new ground because it is capable of delivering scans with very high levels of accuracy, helping doctors assess whether a patient's prostate cancer is still confined to the prostate, or if the cancer cells have spread to other organs.

Dr Anthony Goh, Senior Consultant and Head, Department of Nuclear Medicine and PET, Singapore General Hospital (SGH), described the imaging technique as “a valuable addition to the currently available tests in the care of patients with prostate cancer”.

“No scan is perfect, and much depends also on good clinical judgement,” said Dr Goh.



(The FCH PET/CT scan) is a valuable addition to the currently available tests.

DR ANTHONY GOH, SENIOR CONSULTANT AND HEAD, DEPARTMENT OF NUCLEAR MEDICINE AND PET, SINGAPORE GENERAL HOSPITAL



Most patients will undergo surgery to remove the primary tumours. In the subsequent monitoring of these patients, they may undergo other tests such as the prostate-specific antigen blood test, magnetic resonance imaging (MRI), computed tomography (CT) and bone scans.

Bone scans are highly effective in finding cancer hot spots in the bones, but conventional scans have not been as useful in tracing the spread of cancer to the lymph nodes. Conventional imaging techniques include CT, a kind of x-ray that provides 3-D images of internal organs and glands; and MRI, which uses a magnetic field and radio waves to obtain pictures of body structures. MRI images show a clearer contrast between the different kinds of soft tissue than do x-rays, which perform a better job of showing the contrast between soft tissue and bone, for instance.

FCH PET/CT imaging, which combines both CT and PET scans, is more sensitive to cancer spots that are microscopic in size, making it helpful when doctors are concerned about the early spread of the disease.

Key to this technique is choline – a substance that is produced naturally in the liver and which is chemically tagged to the radioactive 18F to produce FCH. Prostate cancer cells have been found to absorb choline in order to multiply and studies have found that in prostate cancer cells, the rate of accumulation is even more significant. Choline accumulation has also been observed in breast, liver and some brain tumours.

The PET/CT scanner maps the areas where choline accumulates in the body, possibly pinpointing the organs that may contain prostate cancer cells. This scan, already used widely in Europe, was launched as a new service at SGH in August 2011, after doctors evaluated it in a pilot trial of 21 patients in 2010. Since the service was introduced, some 50 patients have used the technique. The procedure costs about \$2,600 for Singaporeans and \$3,000 for foreigners.

Prostate cancer is the third most common cancer among Singapore men, and four in every 100 prostate cancer patients die from the disease, which can spread to the bones as well as the lymph nodes, an essential part of the immune system.

The prostate – a gland found below the bladder in men – helps to control urine flow and produces fluids that are found in semen. The prostate is prone to cancer, with more than 500 new cases diagnosed every year. Men as young as their early 40s can get the disease, although prostate cancer mostly shows up in men over 70 years of age.

Diagnosing prostate cancer

It's not clear what causes prostate cancer, but men who are over 55 years old, eat a diet rich in animal fat and red meat or have a family history of the disease, appear to be more likely to develop the condition. But, at the same time, most men who fit this profile never develop prostate cancer.

Patients with this cancer may or may not have any symptoms, but some of the common symptoms include urinary problems, difficulty having an erection, frequent lower back, hips or upper thigh pain, or blood in the urine or semen.

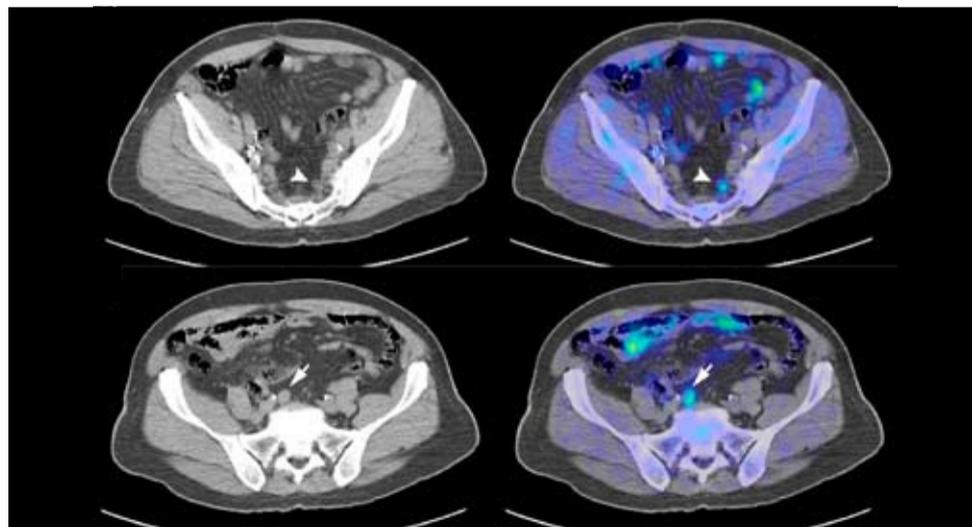
When prostate cancer is suspected, doctors rely on a few methods to diagnose the disease, including:

- ⊙ **Digital rectal examination**, where the doctor uses his finger to feel the surface of the prostate gland. The tissue could be malignant if it is firm and feels hard to the touch.
- ⊙ **Blood test**, which allows the doctor to review the level of a substance called the prostate-specific antigen. An elevated reading indicates prostate cancer.
- ⊙ **Biopsy**, where some tissue is drawn from the prostate gland and inspected under a microscope. The sample is histologically graded, or assessed, to determine the aggressiveness of the tumour.

Imaging techniques help doctors determine the extent and spread of the disease (known as cancer staging process). The techniques include:

- ⊙ **Bone scan**, where a small amount of radioactive material is injected into the body, so cancerous areas of the bones can show up.
- ⊙ **Computed tomography (CT)**, a kind of x-ray scan that provides 3-D images of internal organs and glands.
- ⊙ **Magnetic resonance imaging scans**, which use a magnetic field and radio waves to make pictures of body structures.
- ⊙ **18F-Fluorocholine PET/CT**, which combines the CT and positron emission tomography (PET) scans. The new scan uses radioactively tagged agents – choline in the case of prostate cancer – to observe the activities of organs and tissues.

Doctors decide on the treatment after evaluating the seriousness of the prostate cancer.



Cancer spots

This picture shows the CT (images on the left) and FCH PET/CT (images on the right) scans of the abdominal/pelvic area of a 65-year-old Chinese man who has undergone surgery for prostate cancer. The 18F-Fluorocholine (FCH) PET/CT scans highlight clearly the

presence of cancer spots. The arrows point to lymph nodes. The FCH PET/CT scan uses a substance called choline to detect prostate cancer cells, which absorb choline in order to multiply. Choline is chemically tagged to the radioactive 18F to produce FCH. The scanner maps the areas where choline accumulates and possibly pinpoints prostate cancer spots.