



# IMAGING TESTS FOR CANCER – HOW IT PAINTS THE REST OF A PATIENT'S JOURNEY

Cancer imaging originally began as a mode of cancer screening and detection, but advances in technology has given it a pivotal role in treatment planning and monitoring patient response to treatment. We speak to Dr Lee Kim Shang, Senior Consultant, Radiation Oncology to learn more about why imaging is a key part of a patient's cancer journey.



Cancer imaging refers to examinations by various means to screen, diagnose, prognosticate and treat cancer conditions. Types of imaging scans for cancer may include plain X-Rays, fluoroscopy, ultrasonography, computed tomography (CT), magnetic resonance imaging (MRI) and nuclear medicine imaging.

According to Dr Lee, these different types of imaging can be used to detect malignant or abnormal tissues present in the body. The sensitivity to detect small focus of cancer cells varies in different imaging modalities, but in general, a scan that combines anatomical and metabolic or biochemical activity in the body can detect the presence of cancer cells when it is still small.

A PET-CT scan—short for positron emission tomography-computed tomography—for instance, involves the injection of a radiotracer such as sugar fluorodeoxyglucose (FDG), which helps 'light up' tumour tissue on the scan.

### How imaging is used in cancer diagnosis, and more

Dr Lee points out that an image that shows the presence or absence of abnormal tissues, together with clinical symptoms, signs and sometimes abnormal blood tumour markers, help point doctors towards the diagnosis of a cancer for the patient. A sample of the abnormal tissue is then usually obtained and examined under the microscope to confirm the diagnosis of cancer.

Beyond diagnostic screening, imaging can tell a doctor many things about a patient at different points of their treatment journey.

*Imaging can be used to diagnose; stage how advanced the cancer has spread in the body; guide the doctor to plan the appropriate treatment; assess the response to the treatment carried out; for follow-ups, determine that the patient is in remission; and to detect recurrence so as to restart further treatment to control the cancer.*

### What can imaging tell you about your cancer?

- Diagnosis of cancer
- Stage of cancer
- Metastasis or spread of cancer in the body
- The appropriate treatment plan for your cancer
- Your body's response to treatment
- Whether you are in remission
- Whether your cancer has recurred

### What happens at an imaging appointment

Though imaging is a common procedure at the centre, patients may not necessarily be familiar with what happens at an imaging appointment.

"It depends on the specific procedure requested," says Dr Lee. "The patient may be required to fast before the imaging; stop certain diabetic medication on the day of the imaging and days after; need an intravenous contrast injection during the procedure; or maintain a full bladder during the examination, amongst a non-exhaustive list. Female patients of reproductive age will be asked about whether they are pregnant or when was their last menstruation date to avoid radiation exposure to the embryo or foetus."

Images are usually available on the same day but it may take up to a day or two for the radiological report to be finalised by the radiologist reporting the scan.

"At Parkway hospitals, the radiologists aim to deliver the reports of the scans within the same day or the next day and hence, the primary physicians are able to review the results to the patients early and treatment, if needed, can be started immediately," shares Dr Lee.

### Improving accuracy and precision for treatment

Over the years, developments in imaging have helped greatly in improving treatment accuracy and precision for radiation treatment modalities.

"Imaging is a very important modality to a radiation oncologist," Dr Lee emphasises.

"Apart from being used for diagnosis and staging, imaging is necessary to localise the cancer that we are treating so that we can deliver a precise dose of radiation to the tumour to achieve a maximal chance of cure and at the same time, avoid exposing the normal tissues to the radiation to avoid acute immediate and long term side effects.

"Appropriate imaging such as MRI and PET-CT scan images may enhance the precision and clarity of the localisation of the tumour and normal structures on the CT simulation, which is a planning CT scan that is carried out for radiation treatment planning."

*These days, such accuracy and precision can be achieved not just through diagnostic imaging tests, but through the integration of imaging tools into radiation therapy machines as well.*

Both cancer and normal tissues can be visualised in 3D at the treatment station when CT scan or MRI scan images are

acquired during each daily treatment, while real-time motion management and guidance built into radiation machines ensure the tumour is targeted accurately, limiting surrounding normal tissue exposure to radiation.

Says Dr Lee, "Imaging—especially CT scans or MRIs—carried out real time on the radiation treatment machines allows the radiation oncologist and his team of radiation therapists to verify the precision of the patient set up and correct organ motion during each radiation treatment fraction and between daily treatment fractions. Such capabilities of modern machines allow us to create a steep dose gradient between

tumour and its adjacent normal tissue to reduce side effects in techniques like IMRT."

Today, imaging tests serve a multimodal role in a patient's cancer journey, from diagnosis and staging to treatment planning and delivery, particularly in the field of radiation oncology.

*With new developments and technologies on the horizon, there is hope that such advancements will continue to bring improved precision and accuracy to cancer treatment, translating into a higher control rate. ■*