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Nuclear medicine - atoms of peace

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We can confidently say that PET/CT is the new stethoscope in oncology



In the past, diagnosing any internal problems required surgery, but as technology advances, new methods have evolved which works on the non-invasive lines. Nowadays there are diagnosing methods which are painless and usually done as an outpatient procedure. Where other diagnostic imaging procedures—such as x-rays, computed tomography (CT) and

ultrasound—offer pictures of physical structure, Nuclear medicine allows physicians to see how the body is functioning and to measure its chemical and biological processes. This helps the doctors to diagnose and evaluate medical conditions, it enables to find tumours and see how much cancer has spread in the body and determining the stage. Other than diagnosing it, it is also used to assess response for treatment.

What is Nuclear Medicine?

In nuclear medicine, a small amount of radioactive material i.e. radiopharmaceutical is used to diagnose, evaluate or treat diseases. These diseases will include different types of cancers, kidney problems, gastrointestinal, neurological disorders, heart disease and other abnormalities.

In nuclear medicine imaging, the radiopharmaceuticals are detected by special types of cameras that work with computers to provide very precise pictures of the area of the body being imaged. Nuclear medicine can also be used to treat certain types of cancer and other diseases.

Nuclear medicine in Diagnosis

Nuclear medicine is a simple procedure, wherein the patient has to swallow, inhale or be injected with a radioactive material. Post that the person has to lie down on the scanning table, while the special camera is taking pictures providing molecular information. The radioactive material accumulates in the area of the body under examination. The camera focuses on the area where the radioactive material is accumulated which further helps the doctor understand the problem, its kind and its location in the body.

With the advent of hybrid imaging, positron emission tomography (PET) and single-photon emission computed tomography (SPECT) images are now superimposed with CT (computed tomography) images which provides complete metabolic as well as anatomical information.

Nuclear medicine in therapy and treatment

Nuclear medicine is also used in treating both benign and malignant conditions. It offers therapeutic procedures, one of which is radioactive iodine (I-131) therapy which is used to treat thyroid cancer as well as benign thyroid disorders like AFTN/Graves'. "Theranostics" is a new field of Nuclear medicine which combines specific targeted therapy based on specific targeted diagnostic tests. With a key focus on patient centred care, theranostics provides a transition from conventional medicine to a contemporary personalised and precision medicine approach. Here beta or alpha emitting radionuclides are tagged with target molecules to treat various advanced cancers. Lutetium/Actinium Octreotate Therapy for somatostatin positive tumours, Lutetium/Actinium PSMA Therapy for metastatic or treatment resistant prostate cancer, Yttrium-90 SIRT Therapy for liver cancer, Yttrium-90 Radiosynovectomy Therapy for inflammatory synovitis of joints and many more.

Advantages of Nuclear Medicine:

- 1) It has a capability of early detection of diseases and medical conditions.
- 2) It has medically and technically enhanced the treatment options for various medical conditions. In some cases, where other treatments have not responded well, nuclear medicine has shown evident positive results.
- 3) One of the key advantages that nuclear medicine has brought to table is the detailed accuracy. It enables the doctors to get an in depth examination and analysis. Earlier, for comprehensive diagnosis, patients had to undergo surgeries but nuclear medicine has made it much easier.

Conclusion

As there is a small dose of radioactive material used, nuclear medicine has a relatively low radiation exposure which is suitable for diagnosis. The radiation risk is minimal as compared to the benefits that are tagged along. Now, we can confidently say that "PET/CT is the new stethoscope in oncology".

And as technology advances, we expect the treatment to be directed more towards the tumour and less towards the person i.e only the target cells can be aimed at and not the nearby healthy tissue.

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