

# Nuclear Medicine



# What is a Nuclear Medicine?

Nuclear Medicine is a medical specialty that uses minute quantities of radioactive material or radiopharmaceuticals (tracers) to diagnose or treat diseases. For imaging different organs and diseases, different radiopharmaceuticals are used.

## How do Radiopharmaceuticals (tracers) work?

Radiopharmaceuticals (tracers) are introduced into the patient's body by injection, swallowing or inhalation. The amount given is very small. The medicine part of the tracer goes to a specific organ in the body where disease or abnormality is expected. The radioactive part of the tracer emits radiation, which is detected using a special camera called a gamma camera.

## Are Radiopharmaceuticals Safe?

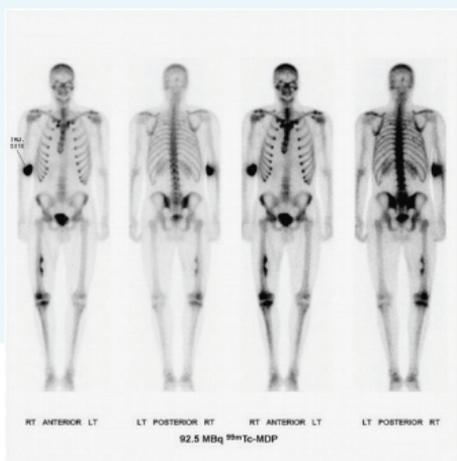
Absolutely. The quantity of the pharmaceutical part of the tracer is very small, generally 1/10th of a millionth of an ounce. As a rough estimate, one teaspoon of sugar is sufficient to perform approximately 5 million scans. The risk of a reaction is 2-3 incidents per 100,000 injections, over 50% of which are rashes.

## Is Radioactivity Harmful?

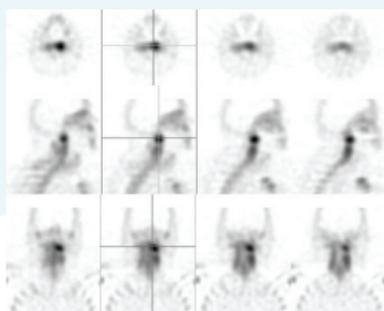
A larger exposure to radioactivity is always harmful. However, the amount of radioactivity in tracer is carefully selected and safe. No reports have been made available, regarding any harmful human effects in diagnostic Nuclear Medicine procedures.

## Type of imaging techniques in Nuclear Medicine

Gamma imaging operates in different modes, PLANAR imaging and Single Photon Emission Computed Tomography (SPECT) imaging. In planar imaging, the gamma camera remains stationary. The resulting images are two-dimensional (2D) images of the part or organ being studied while in single photon emission computed tomography, or SPECT, produces three-dimensional (3D) images because the gamma camera rotates around the patient.



Planar Imaging



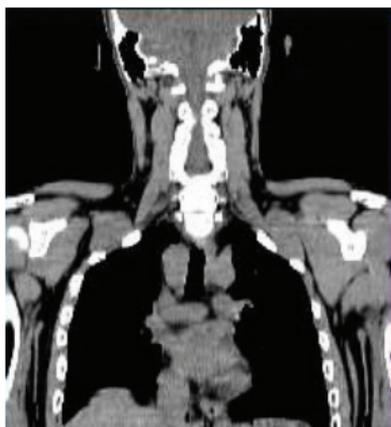
SPECT Imaging

SPECT-CT is a revolutionary diagnostic modality which combines SPECT and CT.

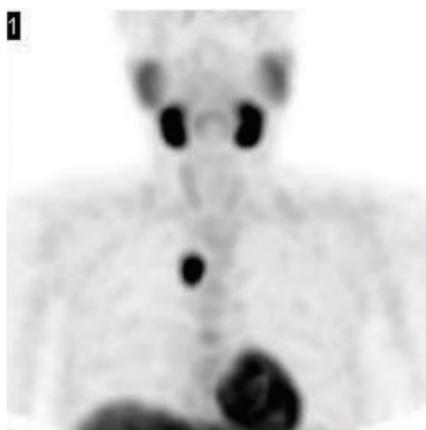
It enhances physicians ability to detect tumors and cardiac diseases, by integrating the functional sensitivity of a SPECT gamma camera and detailed anatomical information provided by CT.



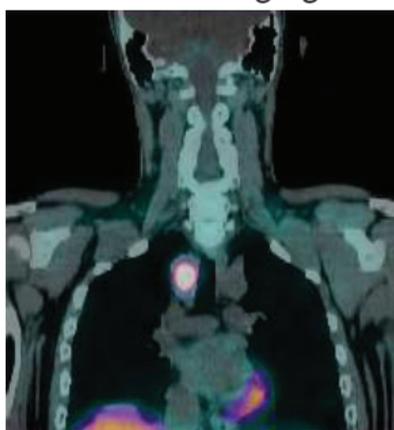
SPECT-CT captures both functional and anatomical information for precise lesion localization in single examination. Nuclear medicine examinations are function-oriented, as opposed to CT procedures which is structure-oriented. Combining nuclear medicine technology with CT brings together the advantages of both procedures and significantly increases the diagnostic precision of SPECT. After the examination, the CT slice images are superimposed on the SPECT images, enabling the physician to detect the location of disease in the body with subcentimetre precision.



CT Imaging



SPECT Imaging



SPECT-CT FUSION

## What types of disease may benefit from a Nuclear Medicine scan?

- To determine adequate pump function of the heart (contraction), in coronary artery disease, valvular disease, cardiomyopathies and effect of chemotherapy.
- To diagnose functional significance of coronary artery disease.
- To assess risk of future cardiac events.
- To determine effectiveness of revascularization procedures (angioplasty, CABG).
- To assess blood flow to different parts of the brain in cancers, dementias etc.
- To evaluate kidney functions and any obstruction.
- To evaluate flow, function and rejection of transplanted kidney.
- To assess thyroid and its function and parathyroid cancers.
- To diagnose neuroendocrine, carcinoid tumors.
- To assess flow and function of the liver cells.
- To detect unknown site of gastrointestinal bleeding.
- To detect and stage different cancers, check for any metastasis and response for treatment.

## How should I prepare for Nuclear Medicine Test?

- No special preparation is required for scans involving the *bones, inflammatory, lymphatics, renal and pulmonary systems*.
- Scan involving the *gastrointestinal* system requires fasting of at least 4 hours. Some scans require pre-medication.
- *Thyroid* scan may require cessation of certain medication prior to the scan.

## What to expect on the day of the examination?

A radiopharmaceutical will be given to you, either by injection into a vein, by mouth or through a breathing device. The radiopharmaceutical will concentrate in the particular part of your body under investigation.

Sometimes you may have to wait for a few hours or even a day or two after the radiopharmaceutical has been administered for the scan to be done. This is because it may take a while for the radiopharmaceutical to lodge in the part of your body to be examined.

Prior to scanning you may be asked to change into medical gown. During the scan, you will be asked to lie on the bed with the camera placed close to the part of the body being examined. It is important to remain still as movement would result in blurred images that are difficult to interpret. A delayed image may be necessary in selective cases. Should such a need arise, the technologist will inform you.

## What happens after the examination?

After most nuclear medicine procedures, you may resume your daily activities as per normal. It is generally best to drink a lot of fluids and urinate as frequently as you can. This will help to flush the remaining radioactivity out of your body.

## When can you expect the results?

When the exam is complete, the acquired data will be processed by the technologist and the nuclear medicine physician will review the image and provide a written report to your doctor.

# Benefits and Risks of Nuclear Medicine Imaging

## Benefits

- Nuclear Medicine examinations provide functional information of the organs under study.
- Nuclear medicine scans provide information to your physician in making diagnosis or to determine appropriate treatment, if any.

## Risks

- Diagnostic nuclear medicine procedures have a very low radiation risk, however as the doses of radiotracer administered are small, the potential benefits of the procedures may outweigh the radiation risk.
- Due to potential radiation risks, female patients should always inform their physician or staff of nuclear medicine department if they are pregnant, could be pregnant or are breastfeeding.
- Allergic reactions to radiopharmaceuticals are extremely rare and usually mild. Please inform our staff if you have any allergies.



### SERVICE IS AVAILABLE AT:

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