


The Technetium-99m hot cell facility is used for loading of the generators and for dispensing of the radiopharmaceuticals.



Tc-99m radiopharmaceutical products are usually prepared by reacting this element obtained from a Mo99–Tc-99m generator with non-radioactive components contained in the non-radioactive kit which is called a kit formulation. During the chemical reactions, the Tc-99m isotope is bound chemically to the non-radioactive components within the vial. The resulting kit undergoes quality control verification, followed by unit dose dispensing.

Based on the requirements of most nuclear medicine centers, PNRI will undertake the preparation of Tc-99m radiopharmaceuticals such as:

Tc-99m Medronate (Tc-99m Methylene Diphosphonate, Tc-99m MDP)	Tc-99m Diethylene Triamine Penta Acetic Acid (Tc-99m-DTPA)
<b>Generic name: Medronic Acid</b>	<b>Generic name: Tc-99m Pentetate</b>
MDP kit contains medronic acid, stannous chloride and ascorbic acid. Each reaction vial contains a sterile, nonpyrogenic, non-radioactive lyophilized mixture of medronic acid, sodium hydroxide, ascorbic acid, stannous chloride. This is used for bone scanning.	The composition of DTPA kits are stannous chloride and pentetate calcium trisodium. Tc-99m DTPA is used for renal scan and imaging.
	

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# PNRI ESTABLISHES FACILITY FOR LOCAL PRODUCTION OF TECHNETIUM-99M MEDICAL RADIOISOTOPE





*Molybdenum-99/Technetium-99m Generator Hot Cell Facility*

The Philippines will soon have the capability to locally prepare and produce the most commonly used medical radioisotope with the setting up of Molybdenum-99 / Technetium-99m generator production facility at the Department of Science and Technology - Philippine Nuclear Research Institute (DOST-PNRI). Currently, government/private hospitals import Technetium-99m (Tc-99m) generators from overseas.

When the facility is fully operational, it will be able to supply the local Technetium-99m requirements of nuclear medicine centers in the country. There are about 50 hospitals in the country with nuclear medicine facilities, 32 facilities of which are equipped with gamma cameras. The recent annual importation of Tc-99m is about 25,000 GigaBecquerel (GBq) for 2011; 28,000 GBq for 2012; 32,000 for 2013; 27,000 for 2014; and 39,000 for 2015.

The PNRI Tc-99m facility was installed by the Isotope Technologies Dresden Germany. The facility consists mainly of two hot cells; one hot cell is intended for the loading of the generators and the other cell for the dispensing of the Molybdenum-99 (Mo-99) solution to the alumina column Tc-99m generators.

### **BENEFITS OF THE MOLYBDENUM-99/ TECHNETIUM-99M GENERATOR PRODUCTION FACILITY**

- The local availability of Technetium-99m will mean wider and more accessible usage of this radioisotope for nuclear medicine procedures.
- Research on Technetium-99m labeling of molecules and new pharmaceuticals will be enhanced.
- Other research studies such as radiotracer applications in industry and other research fields can be undertaken.

### **IMPORTANCE OF TECHNETIUM-99M RADIOISOTOPE**

- It is the most commonly used medical radioisotope.
- It documents organ function and structure through images.
- It can detect abnormalities at an early stage.

## **Technetium-99m and Its Uses**

A unique characteristic of nuclear medicine\* is the use of specific radioactive tracers, which are collectively called radiopharmaceuticals, for imaging organ function and disease states. The “workhorse” of nuclear medicine is Technetium-99m, a radioactive isotope of the man-made element technetium. This radioisotope is used in over 85% of diagnostic imaging procedures of nuclear medicine worldwide.

Technetium-99m, which is imported to the Philippines, is used for imaging and scanning of various organs in the body such as the brain, lungs, kidneys, liver, thyroid and bones for diagnostic

*\*A branch of medicine that uses radioactive isotopes, or radioisotopes, to provide information if a person's organ is functioning properly, or to treat disease.*

purposes. Its gamma energy of 140 kiloelectron volt (keV) and half-life of six hours (meaning that after every six hours, the radioactivity is reduced by half) makes it a suitable tracer that can be detected by gamma cameras. The short physical half-life and biological half-life of one day allows fast scanning and low radiation



*The trade name for the Technetium-99m generator*

## **Applications of Tc-99m**

- Lung Scintigraphy
- Tc-99m Pertechnetate for Meckel's scan
- Tc-99m Labelled RBC's for Gastro-intestinal Bleeding
- Gastroesophageal Reflux (GER)
- Gastric Emptying Time (GET)
- Continuous Ambulatory Peritoneal Dialysis
- Liver SPECT scan
- Hepatobiliary
- Renal Scintigraphy
- DMSA Renal scan
- DTPA Renal scan w/ In-Vitro Test
- Diuretic Renal scan w/ In-Vitro Test
- Captopril Pre & Post DTPA
- Glomerular Filtration Rate (GFR) with in-Vitro Test
- Renal scan MAG 3
- Renal SPECT scan
- Bone Scintigraphy
- Sesta-MIBI Cardiovascular Imaging