General Nuclear Medicine

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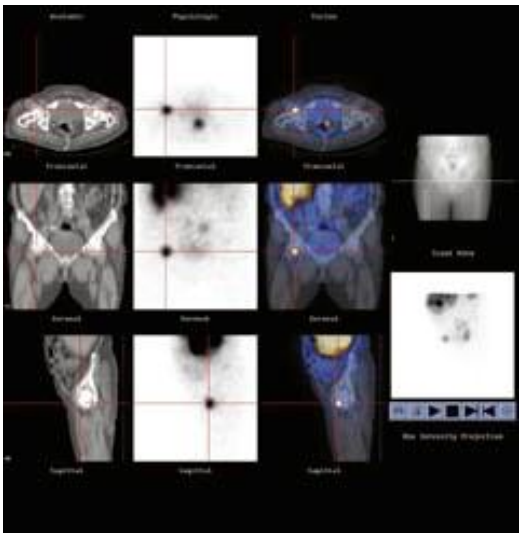
What is General Nuclear Medicine?

Nuclear medicine is a subspecialty within the field of radiology. It comprises diagnostic examinations that result in images of body anatomy and function. The images are developed based on the detection of energy emitted from a radioactive substance given to the patient, either intravenously or by mouth. Generally, radiation to the patient is similar to that resulting from standard x-ray examinations.



Nuclear camera scans.

What are some common uses of Nuclear Medicine?

Nuclear medicine images can assist the physician in diagnosing diseases. Tumors, infection and other disorders can be detected by evaluating organ function. Specifically, nuclear medicine can be used to:

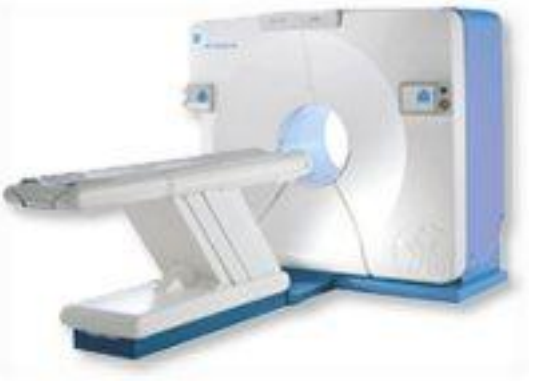
- Analyze kidney function
- Image blood flow and function of the heart
- Scan lungs for respiratory and blood-flow problems
- Identify blockage of the gallbladder
- Evaluate bones for fracture, infection, arthritis or tumor
- Determine the presence or spread of cancer
- Identify bleeding into the bowel
- Locate the presence of infection
- Measure thyroid function to detect an overactive or underactive thyroid

How should I prepare for my Nuclear Medicine procedure?

Usually, no special preparation is needed for a nuclear medicine examination. However, if the procedure involves evaluation of the stomach, you may have to skip a meal before the test. If the procedure involves evaluation of the kidneys, you may need to drink plenty of water before the test.

What does Nuclear Medicine equipment look like?

During most nuclear medicine examinations, you will lie down on a scanning table. Consequently, the only piece of equipment you may notice is the specialized nuclear imaging camera used during the procedure. It is enclosed in metallic housing designed to facilitate imaging of specific parts of the body. It can look like a large round metallic apparatus suspended from a tall, moveable post or a sleek one-piece metal arm that hangs over the examination table. The camera can also be located within a large, doughnut-shaped structure similar in appearance to a computed tomography (CT) scanner. Sometimes, the camera is beneath the table out of view.



PET scanner.

A nearby computer console, possibly in another room, processes the data from the procedure.

How does the Nuclear Medicine procedure work?

You are given a small dose of radioactive material, usually intravenously but sometimes orally, that localizes in specific body organ systems. This compound, called a radiopharmaceutical agent or tracer, eventually collects in the organ and gives off energy as gamma rays. The gamma camera detects the rays and works with a computer to produce images and measurements of organs and tissues.

How is the Nuclear Medicine procedure performed?

A radiopharmaceutical agent is usually administered into a vein. Depending on which type of scan is being performed, the imaging will be done either immediately, a few hours later, or even several days after the injection. Imaging time varies, generally ranging from 20 to 45 minutes.

The radiopharmaceutical that is used is determined by what part of the body is under study, since some compounds collect in specific organs better than others. Depending on the type of scan, it may take several seconds to several days for the substance to travel through the body and accumulate in the organ under study, thus the wide range in scanning times.

While the images are being obtained, you must remain as still as possible. This is especially true when a series of images is obtained to show how an organ functions over time.

After the procedure, a physician with specialized training in nuclear medicine checks the quality of the images to ensure that an optimal diagnostic study has been performed.

What will I experience during my Nuclear Medicine procedure?

Some minor discomfort during a nuclear medicine procedure may arise from the intravenous injection, usually done with a small needle. With some special studies, a catheter may be placed into the bladder, which may cause temporary discomfort. Lying still on the examining table may be uncomfortable for some patients.

Most of the radioactivity passes out of your body in urine or stool. The rest simply disappears through natural loss of radioactivity over time.

Who interprets the my Nuclear Medicine results and how do I get them?

Most patients undergo a nuclear medicine examination because their primary care physician has recommended it. A physician who has specialized training in nuclear medicine will interpret the images and forward a report to your physician. It usually takes a day or so to interpret, report and deliver the results.

What are the benefits vs. risks of Nuclear Medicine?

Benefits

- The functional information provided by nuclear medicine examinations is unique and currently unattainable by using other imaging procedures. For many diseases, nuclear medicine studies yield the most useful information needed to make a diagnosis and to determine appropriate treatment, if any.
- Nuclear medicine is much less traumatic than exploratory surgery, and allergic reaction to the radiopharmaceutical material is extremely rare.

Risks

- Because the doses of radiopharmaceutical administered are very small, nuclear medicine procedures result in exposure to a small dose of radiation. Nuclear medicine has been used for more than five decades, and there are no known long-term adverse effects from such low-dose studies.

- As with all radiologic procedures, be sure to inform your physician if you are pregnant. In general, exposure to radiation during pregnancy should be kept to a minimum.
- Allergic reactions to the radiopharmaceutical can occur, but are extremely rare.

What are the limitations of General Nuclear Medicine?

Nuclear medicine procedures are time-consuming. They involve administration of a radiopharmaceutical, acquisition of images and interpretation of the results. It can take hours to days for the radiopharmaceutical to accumulate in the part of the body under study. Imaging can take up to three hours to perform, though new equipment is available that can substantially shorten the procedure time.