Kidney Nuclear Medicine Scan

Procedure: Nm
Bodypart: Genit
Patient Group: Female Male Child

Summary

Other terms: Isotope Kidney (Renal) Scan, DMSA Scan, Kidney Scan
The kidney nuclear medicine scan involves an injection into a vein in the arm of a small quantity of liquid tracer preparation. This goes round in the bloodstream, and is taken out by the kidneys. When the gamma camera is placed over the abdomen it detects the radiation coming from the radioisotope in the kidneys. Consequently, an image is produced of the kidneys, showing what they look like, and also reflecting how well they are working. It is necessary to wait for 2 or 3 hours after the injection before obtaining the images.

Technique

What it is
A kidney nuclear medicine scan, or study, is a simple outpatient test that involves administering small amounts of radioactive substances, called tracers, into the body and then imaging the kidneys and bladder with a special camera. The images obtained can help in the diagnosis and treatment of certain kidney diseases.

What does DMSA actually stand for?
It is di mercapto succinic acid. This is the substance that the tracer, technetium 99m is attached to, and which is taken up in the kidneys.

How it works
Nuclear medicine is a branch of radiology that uses radioactive materials to diagnose or treat various diseases. These radioactive materials (tracers) may also be called radiopharmaceuticals, and they accumulate (collect) in specific organs in the body. Radiopharmaceuticals are able to yield valuable information about the particular organ being studied.

Whether outside the body or inside the body, tracers emit radioactive signals, called gamma rays, which can be collected and counted by a special device, called a gamma camera. The images of the kidney that the camera produces are called renal scans.

Studies may be performed to determine the rate at which the kidneys are filtering a patient's blood. These studies use a radiopharmaceutical, called Technetium DTPA (Tc 99m DTPA). This radiopharmaceutical also can identify obstruction (blockage) in the collecting system. To study how well the tubules and ducts of the kidney are functioning, the radiopharmaceutical Technetium MAG3 is used. Studying tubular function is a good indicator of overall renal function. In many renal diseases, one of the first things that disappears or diminishes is the tubular function.
Purpose

Candidates for a kidney nuclear medicine scan are patients who have:

- renal failure or chronic renal failure
- obstruction in their urine collection systems
- renal artery stenosis
- a kidney transplant

Procedure

Persons

You will be cared for by a small team comprising mainly of radiographers. A radiologist, or other specialist doctor will subsequently examine the images prior to writing a report on the results.

Kidney scans are performed by a nuclear medicine technologist trained in handling radioactive materials, operating the equipment, and processing data obtained during the procedure. The technologist is responsible for explaining the test to the patient, obtaining pertinent medical history, and administering injecting the radionuclide. All data collected is submitted either to a doctor who is a nuclear medicine specialist or a radiologist for interpretation. Patients obtain the results of the study from their primary care physician or the physician who ordered the study.

Preparation

No preparation is necessary for a kidney nuclear medicine scan. The doctor may ask the patient to refrain from certain medications, however, before the scan if the medications might interfere with the test. For example, if a scan is being performed to study renal artery stenosis, the patient may have to refrain from taking medications for hypertension.

Precautions

If a patient is pregnant, it is generally recommended that she not have a kidney nuclear medicine scan. The unborn baby is more sensitive to radiation than an adult. If a woman thinks she might be pregnant, she should inform her doctor of this too.

Women who are breastfeeding should also inform their doctor. The doctor may recommend the woman stop breastfeeding for a day or two after a kidney nuclear medicine scan, depending on the particular tracer that was used since the tracer can accumulate in breast milk.

Duration

A kidney nuclear medicine scan ranges from 45 minutes to three hours in length, depending on the goals of the test. But the test typically takes about an hour to an hour-and-a-half.

Process

Upon collection

The radiographer will explain the procedure, and you have the opportunity to ask any questions. You may be asked some questions about your health, or whether you have had this examination before.

The radiographer, or a radiologist, will then give you the injection of radio-tracer preparation into a vein, generally the one near your elbow. This is really just like having blood taken.

There is then a 2 to 3 hour delay to allow the tracer to be concentrated by the kidneys, during which time you may leave the hospital if you are an outpatient and return home.

You do not need to undress but you should remove any jewellery and metallic objects such as keys, coins or buckles. You will be taken to the examination room and made comfortable lying on the special couch. The radiographer will position the gamma camera over your abdomen and ask you to lie still. The radiographer will remain in the room with you, and will watch the images...
as they are displayed on a television monitor. It will be necessary to take up to four or six different views. Some images may be taken with you sitting upright.

**Experience**
Apart from the normal injection you will not feel anything.

**After procedure**
Patients can resume their normal daily activities immediately after the test. Most tracers are passed naturally from the body, though drinking fluids after a kidney nuclear medicine scan can help flush the tracer into the urine and out of the body more quickly.

In addition to the case of mothers who are breast-feeding, mothers with young children should notify the radiographer, who will explain that it is advisable not to have prolonged close contact with them for the rest of the day. This is to avoid them being exposed to unnecessary radiation.

**Results**
The radiologist, or other specialist doctor, will examine your kidney scan shortly after your visit, and will write a report on the results. This should reach your doctor, within a few days. You could ask the radiographer for some indication of timing.

**Normal results**
The test reveals normal kidney function for age and medical situation.

**Abnormal results**
The test reveals a change in function that may be attributable to a disease process, such as obstruction or a malfunctioning kidney. If the test is abnormal, the patient may be recalled another day for a repeat study, performed differently, to narrow the list of causes.

**Consideration**

**Importance**
While many tests, such as X-rays, ultrasound exams, or computed tomography scans (CT scans), can reveal the structure of the kidneys (its anatomy), the kidney nuclear medicine scan is unique in that it reveals how the kidneys are functioning. This is valuable information in helping a doctor make a diagnosis. Therefore, the kidney nuclear medicine scan is performed primarily to see how well the kidneys are working and, at the same time, can identify some of the various structures that make up the kidney.

**Risks**
Nuclear medicine procedures are very safe. Unlike some of the dyes that may be used in x-ray studies, radioactive tracers rarely cause side effects. There are no long-lasting effects of the tracers themselves, because they have no functional effects on the body's tissues.

As the gamma rays are similar to X-rays, there are small risks associated with being exposed to radiation. The total amount of radiation involved is about the same amount as we receive from natural background radiation in the environment in about six months. This probably increases the risk of developing cancer by about 1 in 10,000. However, as one in three of us will develop a cancer at some stage during our lives, the added risk is very small indeed. In fact, the risks from missing a serious disorder by not having a kidney scan may be considerably greater.

**Citations**
