

What You Should Know

About Pediatric Nuclear Medicine



Children commonly undergo nuclear medicine procedures to evaluate bone pain, injuries, infection, or kidney and bladder function.

What is Children's (Pediatric) Nuclear Medicine?

Nuclear medicine is a branch of medical imaging that uses small amounts of radioactive material to diagnose and determine the severity of or treat a variety of diseases, including many types of cancers, heart disease, gastrointestinal, endocrine, neurological disorders and other abnormalities within the body. Because nuclear medicine procedures are able to pinpoint molecular activity within the body, they offer the potential to identify disease in its earliest stages as well as a patient's immediate response to therapeutic interventions.

Children's (pediatric) nuclear medicine refers to imaging examinations done in babies, young children and teenagers.

Nuclear medicine imaging procedures are noninvasive and, with the exception of intravenous injections, are usually painless medical tests that help physicians diagnose and evaluate medical conditions. These imaging scans use radioactive materials called radiopharmaceuticals or radiotracers.

Depending on the type of nuclear medicine exam, the radiotracer is either injected into the body, swallowed or inhaled as a gas and eventually accumulates in the organ or area of the body being examined. Radioactive emissions from the radiotracer are detected by a special camera or imaging device that produces pictures and provides molecular information.

What are some common uses of the procedure?

Children's (pediatric) nuclear medicine imaging is performed to help diagnose childhood disorders that are congenital (present at birth) or that develop during childhood.

Physicians use nuclear medicine imaging to evaluate organ systems, including the:

- kidneys and bladder.
- bones.
- liver and gallbladder.
- gastrointestinal tract.
- heart.
- lungs.
- brain.
- thyroid.

Nuclear medicine scans are typically used to help diagnose and evaluate:

- urinary blockage in the kidney.
- bone cancer, infections and trauma.
- gastrointestinal bleeding and motility.
- tumors and the spread of cancerous cells in the body.
- jaundice in newborns and older children.
- epilepsy.
- location, anatomy and function of the thyroid gland.

How does the procedure work?

With ordinary x-ray examinations, an image is made by passing x-rays through the body from an outside source. In contrast, nuclear medicine procedures use a radioactive material called a radiopharmaceutical or radiotracer, which is injected into your bloodstream, swallowed or inhaled as a gas. This radioactive material accumulates in the organ or area of your body being examined, where it gives off a small amount of energy in the form of gamma rays. A gamma camera, detects this energy and with the help of a computer creates pictures offering details on both the structure and function of organs and tissues in your body.

What does the equipment look like?

Nuclear medicine procedures are performed using single or sometimes 3D photon emission computed tomography which is called SPECT.

The gamma camera, which is encased in metal, is capable of detecting radiation and taking pictures from different angles. A gamma camera does not emit any radiation. It may be suspended over the examination table or it may be beneath the table. Often, gamma cameras are dual-headed with one camera next to the other at a 90 degree angle. The camera may be located within a large, doughnut-shaped scanner similar in appearance to a computed tomography (CT) scanner.

SPECT uses a gamma camera that rotates around the body to produce more detailed, three-dimensional images. A computer aids in creating the images from the data obtained by the camera or scanner.

How is the procedure performed?

Nuclear medicine imaging is performed on an outpatient basis. Brampton Nuclear Services offers a home like environment, friendly certified staff, free parking and convenient location.

The type of nuclear medicine examination will determine how the radiotracer is introduced into your child's body:

- Intravenous: a small needle is used to inject the radiotracer. The needle is removed immediately after. At times, an indwelling intravenous catheter may be needed for the duration of the exam.
- Oral: for some exams, the radiotracer is taken by mouth, such as for a gastroesophageal reflux test.
- Inhaled: occasionally the radiotracer will be inhaled as a gas via a mask, such as with a lung scan.

It can take several seconds to a few days for some radiotracers to travel through your child's body and accumulate in the organ or area being studied. As a result, imaging may be done immediately, a few hours later, or even a few days after your child receives the radioactive material.

When it is time for the imaging to begin, your child will lie down on an examination table. The gamma camera will then take a series of images. The camera may rotate around your child or the camera will stay in one position and your child will be asked to change positions in between images. While the camera is taking pictures, your child will need to remain still for brief periods of time. Actual scanning time varies from 10 minutes to several hours.

During this procedure, parents are usually allowed and often encouraged to stay in the room. The exception to this is if the child's mother is pregnant. When the examination is completed, your child will be asked to wait until the nuclear physician checks the images in case additional images are needed.



What will my child experience during and after the procedure?

Except for intravenous injections, most nuclear medicine procedures are painless and are rarely associated with significant discomfort or side effects.

If the radiotracer is given intravenously, your child will feel a pin prick, much like a shot, when the needle is inserted into the vein. When the radioactive material is injected into the arm, your child will generally not experience any discomfort. When swallowed, the radiotracer has little or no taste. If inhaled, your child should feel no differently than when breathing room air or holding his or her breath.

It is important that your child remain very still while the images are being recorded. Though nuclear imaging itself causes no pain, children may experience some discomfort from having to remain still during imaging. Parents are encouraged to stay with their children to help them remain calm and still during imaging. Comfort items such as pacifiers, blankets and books are also very helpful.

Unless your physician tells you otherwise, your child may resume his/her normal activities after the nuclear medicine scan.

Through the natural process of radioactive decay, the small amount of radiotracer in your child's body will lose its radioactivity over time. In many cases, the radioactivity will dissipate over the first 24 hours following the test and pass out of your child's body through urine or stool. Your child should also drink plenty of water to help flush the radioactive material from his or her body.

A Parent's/Guardian's Role During the Test

We welcome your help and support during this test.

- One parent or guardian is welcome to join your child in the testing room. All other adults and children must stay in the waiting area.
- So that your child can have your complete support and attention during the test, we recommend that you arrange to have siblings cared for by another adult.
- The most important role of a parent or guardian during the test is to help your child stay calm and relaxed. It is important that your child stays still when the scan is being done.
- The best way to help your child stay calm is for you to stay calm.
- We encourage you to talk to your child and hold his or her hand, if possible.
- If an IV must be placed, you can help by reassuring and calming your child. Please tell the staff of ways that they might also help in keeping your child calm.
- Please do not distract the technologist or interrupt the test in any way.
- We welcome your questions, but please ask them either before or after the test.

Home Preparation

You may reassure your child that you will be able to be in the room with her/him during the procedure. If your child is old enough, you may choose to explain the procedure yourself. Some pediatric nuclear medicine exams will involve an injection into a vein in your child's arm or hand.

You may want to bring along a “comfort item”—such as a favorite stuffed animal or “blankie”—for your child to hold during the test.

Children should wear comfortable, loose-fitting clothing to the exam, but they may be given a gown to wear during the procedure.

You should inform your physician of any medications your child is taking as well as vitamins and herbal supplements and if he or she has any allergies. Also inform your doctor of any recent illnesses or other medical conditions.

Jewelry and other metallic accessories should be left at home if possible, or removed prior to the exam because they may interfere with the procedure.

Depending on the type of nuclear scan being performed, you will receive specific preparation instructions for what your child may eat and drink before the exam, especially if your physician plans to use sedation for the procedure.

Who interprets the results and how do we get them?

A Nuclear Physician will interpret the images and forward a report to your referring physician.

What are the benefits vs. risks?

Benefits

- The information provided by nuclear medicine examinations is unique and often unattainable using other imaging procedures.
- For many diseases, nuclear medicine scans yield the most useful information needed to make a diagnosis or to determine appropriate treatment, if any.

Risks

- Because the doses of radiotracer administered are small, diagnostic nuclear medicine procedures result in low radiation exposure, acceptable for diagnostic exams. Thus, the radiation risk is very low compared with the potential benefits.
- Nuclear medicine diagnostic procedures have been used for more than five decades, and there are no known long-term adverse effects from such low-dose exposure.
- Allergic reactions to radiopharmaceuticals may occur but are extremely rare and are usually mild. Nevertheless, you should inform the nuclear medicine personnel of any allergies your child may have or other problems that may have occurred during a previous nuclear medicine exam.

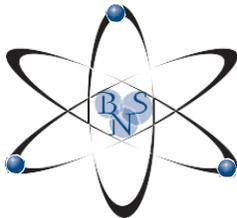
What are the limitations of Children's (Pediatric) Nuclear Medicine?

- Nuclear medicine procedures can be time consuming. Rarely, it can take hours to days for the radiotracer to accumulate in the part of the body under study and imaging may take up to several hours to perform, though in some cases, newer equipment is available that can substantially shorten the procedure time.
- The resolution of structures of the body with nuclear medicine may not be as high as with other imaging techniques, such as MRI. However, nuclear medicine scans are more sensitive than other techniques for a variety of indications, and the functional information gained from nuclear medicine exams is often unobtainable by other imaging techniques.

Special Needs and Patient Preparation

If your child has any special needs or health issues you feel the doctor or technologist performing the test needs to know about, about please call us before the test. It is important to notify us in advance about any special needs.

Before you come to the clinic, explain to your child what will happen in words that he or she can understand. Preparing your child beforehand, as well as comforting your child during the test, will help your child have a more positive experience. Sometimes it is difficult to know how to explain tests to children. If you have any questions about ways to prepare or support your child, please contact us at the phone number listed below.



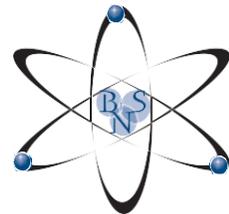
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Appointment Date: _____ **Time:** _____

Preparation: _____