

## Lymphoscintigraphy

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### *What is Lymphoscintigraphy?*

Lymphoscintigraphy provides a view of the workings of the lymphatic system, which is a network of small channels, like arteries and veins, that transport the fluid and cells of the immune system through the lymph nodes and throughout the body. This fluid, called lymph, normally flows slowly from the periphery toward the center of the body and into the general circulation. If lymphatic flow is blocked, the areas of drainage that are affected can become swollen.

A scintigram is a type of picture that uses a radiopharmaceutical (a radioactive drug), which is injected or taken orally, that makes the lymphatic system visible to specialized cameras. The study is performed in the Nuclear Medicine section of the hospital, where the radiopharmaceuticals are prepared and the pictures are taken. Lymphoscintigraphy can be helpful for localizing points of blockage and is also important for identifying abnormal lymph nodes and planning a biopsy or surgery for suspicious areas. Generally, the radiation dose is similar to that of a standard x-ray examination.

### *What are some common uses of Lymphoscintigraphy?*

Lymphoscintigraphy can assist the physician in diagnosing diseases. It can help detect tumors, infection and other disorders such as the following:

- Lymphoscintigraphy can help diagnose lymphedema, a condition in which lymphatic fluid accumulates in soft tissues and may lead to inflammation and obstruction. This nuclear medicine test has all but replaced lymphangiography, a diagnostic x-ray procedure that used an oil-based contrast material that required surgical incisions on both feet to expose and inject the lymphatics directly.
- Lymph flow in an arm or leg may be evaluated with lymphoscintigraphy by injecting radioactive material into a web space between the fingers or toes and recording images for 60 minutes. Local anesthesia is not necessary.
- When planning surgery for a breast tumor, it is helpful to assess the lymphatic drainage beforehand to identify the sentinel lymph node (the first lymph node that receives lymph drainage from the tumor site) for excisional biopsy. A radiopharmaceutical is injected either just beneath the skin around the areola (nipple); at two to four sites around the tumor; beneath the skin above the tumor; or into the tumor itself on the day of surgery. Imaging usually is completed within 30 minutes, but may take up to one to two hours. Lymphoscintigraphy of the breast is very safe. Side effects are infrequent, and morbidity is much reduced compared with axillary lymph node dissection, which formerly was the routine staging procedure for patients with breast cancer and no obvious spread (metastasis).
- Malignant melanoma is an aggressive form of skin cancer that may spread rapidly to distant body sites. Lymphoscintigraphy may be performed preoperatively in order to identify the sentinel lymph node. A tumor-negative sentinel lymph node is strong evidence that there has not been spread of the tumor. This is important for staging the disease and planning treatment management.

#### *How should I prepare my Lymphoscintigraphy?*

No special preparation is needed for lymphoscintigraphy.

#### *What does the Lymphoscintigraphy equipment look like?*

During lymphoscintigraphy 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 a large, round device enclosed in a metallic housing and suspended over the examination table. The camera sometimes is located within a large, doughnut-shaped structure similar in appearance to a computed tomography (CT) scanner. A nearby computer console, often in an adjacent room, processes the data from the procedure.

### *How does the Lymphoscintigraphy work?*

With regular x-ray examinations, an image of the body is made by passing x-rays through the body part from an outside x-ray source. In contrast, with nuclear medicine a radioactive substance called a radiopharmaceutical or radiotracer localizes in a certain body part (or parts) which emits gamma rays that are detected by a gamma camera. The gamma camera sends the information to a computer that develops the image. Scanning times may vary considerably.

The most commonly used radiopharmaceutical in the United States for lymphoscintigraphy is called technetium-99m sulfur colloid. It typically loses its radioactivity in less than 24 hours.

### *How is the Lymphoscintigraphy procedure performed?*

You will be asked to lie face up beneath or next to a gamma camera. When assessing lymph drainage to identify the sentinel lymph node, as in patients with melanoma, three to five injections of radiopharmaceutical are given into the skin surrounding the site of the melanoma. For breast cancer, the injections are given through the skin near the tumor or around the areola. All injections are made using a very small needle.

In lymphoscintigraphy performed for leg or arm edema, the radiopharmaceutical is injected into the skin between the first and second fingers or toes of each hand or foot.

Imaging begins immediately after injection and is repeated at five-minute intervals for 45 to 60 minutes. Often, both sides are studied so that the normal and abnormal sides can be compared. You may also be asked to exercise lightly for about 10 minutes, either by walking for leg exams or by doing handgrip or lifting exercises for arm exams. Images are acquired after exercise and, in some cases, delayed images are needed at one- to two-hour intervals for up to six hours, or even up to 24 hours.

For patients with breast cancer, images will be made of the underarm regions and breast/chest. For melanoma patients, images will be made of the underarms, head, neck and both groins. In most melanoma patients, imaging will take three to four hours. Markings are made on the skin to show where lymph nodes are located.

### *What will I experience during my Lymphoscintigraphy procedure?*

Lymphoscintigraphy is an outpatient procedure. No anesthesia is needed unless a lymph node biopsy is performed in the operating room immediately following lymphoscintigraphy in order to detect involvement by melanoma or breast cancer. It is important that you avoid moving while the images are recorded.

Most patients can resume regular activities immediately after the procedure. The small amount of radioactivity in your body will decrease due to the natural process of radioactive decay over several hours.

### *What are the benefits vs. risks of Lymphoscintigraphy?*

#### **Benefits**

- The functional information provided by nuclear medicine examinations such as lymphoscintigraphy 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.
- Sentinel lymph node biopsy following lymphoscintigraphy is a useful means of diagnosing and staging melanoma and learning whether the disease has spread from its primary site.
- Lymphoscintigraphy and sentinel lymph node biopsy are less traumatic than the alternatives of staging breast cancer or melanoma by surgical lymph node dissections.
- Computers are involved in the generation of images, making it possible to measure function and quantify it in addition to identifying abnormalities.
- Because lymphoscintigraphy is generally performed according to standardized protocols, the type of examination done at one hospital is likely to be similar to that performed at other hospitals, making the information easy to understand and easy to transfer to all doctors who may be involved in your care.

#### **Risks**

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

- As with all radiological procedures, it is important that you inform your physician and the radiological technologist if you are pregnant. In general, exposure to radiation during pregnancy should be kept to a minimum. Allergic reactions to radiopharmaceuticals may occur but are extremely rare.
- Injection of the radiopharmaceutical may cause slight pain and redness.

*What are the limitations of Lymphoscintigraphy?*

Nuclear medicine procedures such as lymphoscintigraphy are time-consuming. They involve administration of a radiopharmaceutical, acquisition of images, and interpretation of the results. Imaging can take up to an hour and sometimes longer to perform.