UW Health
University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol

LYMPHOSCINTIGRAPHY **CPT CODE: 78195**
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Indications:

- Evaluation of chronic lymphedema of a swollen extremity, where scan is used to differentiate primary or secondary lymphedema (primary has neither lymphatic nor proximal LN visualization, secondary has interstitial lymphatic uptake but poor visualization of proximal lymph channels and nodes)
- Identification of patent lymph channels prior to lymphovenous anastomosis
- Determination of lymph node drainage and sentinel lymph node identification in malignancies such as truncal or head and neck melanomas and breast cancer.
- Evaluation of inguinal pelvic and periaortic lymphatic drainage for blockage by tumor (or trauma) and sentinel node identification, e.g., rectal, prostatic, cervical, or vulvar cancer.

Patient Prep:

If the patient wears elastic stockings for lymphedema, these should generally be removed 3-4 hours prior to the study. If this cannot be done, it should be noted and considered in the interpretation.

For breast lymphoscintigraphy, or other sites anticipated as painful, lidocaine 4% cream can be placed on the area to be injected a minimum of 15 minutes before the injections are made. This may be done, time permitting. Apply liberally and allow to sit on the surface. Do not rub cream in all the way.

Note: For breast lymphoscintigraphy or other sensitive sites, we must maintain a sense of respect for the patient and their vulnerability. In order to maintain this respect, only same gender technologists are to perform this procedure. If a same gender technologist is not available, then a same gender patient advocate/witness is to be obtained. The patient advocate/witness could be faculty, resident, nurse, or another technologist from another modality. The minimal requirement for the patient advocate/witness is to be present for the lidocaine cream application, and the injection to follow.

Scheduling:

Allow 3 hours for all except breast imaging. Check with NM physician after initial study to determine if delayed images may be needed. Allow 60 minutes for each delayed imaging set.

For breast imaging, the day before surgery, schedule after 1PM, preferably at 3PM, for 1½ hours.

For breast imaging, the day of surgery (short version), schedule for 45 minutes. Ideally, there should be at least 30 minutes between the end of the scan and the surgery time.

Radiopharmaceutical & Dose:

Radiopharmaceutical: Tc-99m sulfur colloid suspension with a particle size ≤ 220 nm (small particle size prepared by boiling twice and passing through a 100 nanometer (or 220 nanometer if specific activity of generator elution isn't high enough) Millipore filter per the Package Insert Deviation procedure).

- Adults (≥18 yr) up to 1.5 mCi/region
- Children (<18 yr) up to 1.5 mCi/region

Note: Dose in children is determined by the Nuclear Medicine physician on a case by case basis.

Dose/injection for all except cervical: 520 µCi/0.12 mL dispensed in each of four 1cc TB syringes.

Note: This injection has a validated retention of ~300 µCi in the hub of the syringe; the actual administered dose per syringe used is ~200 µCi. One injection per syringe and one to three injections are made. Those validating the doses will enter into NMIS that actual reading from the dose calibrator without accounting for retention.

Dose injection for cervical cancer, 1 mCi in 2.5 ml in 3ml syringe with leur-tip cap.

Injection: First, identify the patient using two approved methods. Fully explain the procedure to the patient, and answer all their questions. Obtain patient's verbal approval. Identify the area to be injected, with the patient's help. NM Physician, NM Resident, or Radiology Resident injects the doses, as described below.

LYMPHEDEMA: Inject tracer subcutaneously in the webs between toes and/or fingers (2 sites per limb). Inject both feet subcutaneously in the webs between 1st-2nd or 2nd-3rd toes. Inject hand between 2^{nd}-3^{rd} and 3^{rd}-4^{th} fingers as per pedal injection.

MELANOMA: Inject tracer intradermally around the tumor or excision site. Four (4) injection sites are used. It is important to be as close as possible (within 5 mm) to the tumor excision scar site without injecting scar tissue.

BREAST CANCER: For breast injection place intradermal dose in skin over tumor site (near needle localization if in-situ). Skin preparation with anesthetic cream is recommended time permitting. Also, inject 2-3 sub/intradermal doses on the sub/periareolar plexus, and inject these on the side the tumor is, injecting the 2-3 appropriate cardinal points (2 or 3 at 6,9 and 12 o'clock, as appropriate).

CERVICAL/VULVAR CANCER: Intradermal injection at 3-4 points surrounding the known cancer. Skin preparation with anesthetic cream is recommended for vulvar cancer. For cervical (uterine) scanning, the injection is performed by appropriate medical staff off site. Four separate injections preferred, with perhaps one subdermally. If necessary, call resident/staff looking after patient if injecting staff is uncomfortable with injection.

OTHER SITES: 4 injections at the discretion of NM physician.

Note: For breast lymphoscintigraphy or other sensitive sites, we must maintain a sense of respect for the patient and their vulnerability. In order to maintain this respect, we must offer a same gender MD or patient advocate/witness prior to the procedure's injection. If no same gender MD is available, then the same gender patient advocate/witness is to be obtained. The patient advocate/witness could be the nuclear technologist, faculty, resident, or nurse.

Imaging Device: The GE Infinia with Hawkeye CT is the preferred camera with the LEHR collimator. However, for breast imaging, the GE Millennium can be used.

Imaging Procedure:

Static of injection site post injection. Check with NM staff or resident physician to determine if additional views are indicated.

FOOT INJECTION: Immediate post-injection, acquire 2-minute static of injection sites. At 15, 30, and 90 minutes acquire anterior whole body image from feet to head at 12 min/meter. Acquire all images with the oldest cobalt sheet transmission source under the table to outline the body.

HAND INJECTION: Position camera over axilla. Acquire dynamic images 128 x 128 for 1 minute/frame for 1 hour. Repeat imaging procedure at 2 hours. Check with a NM staff or resident physician to determine if additional views are indicted.

MELANOMA INJECTION:
Use the GE Protocol Melanoma in the Lymphoscintigraphy folder. It will have the parameters for all acquisition steps for each type of study listed below.

Lymphatic Flow Study: Immediately post-injection (very rapid injection required) acquire 30-second frames for 20 minutes to identify lymphatic drainage and interval and sentinel lymph nodes. Include **ALL** potential drainage sites in the images.

Regional Lymph Node Study: At 20 minutes, obtain 5-minute images of the expected regional nodal sites beyond the area imaged in the flow study. Often the patient flow study will demonstrate two or more lymphatic draining channels. Obtain transmission scan images with Co-57 markers on appropriate sites.

A. Axilla: Anterior and lateral views to coordinate localization, using skin markers.
B. Neck: Anterior, lateral, and oblique views as needed to identify anterior and posterior drainage. Possible SPECT/CT may also be needed.
C. Pelvis: Anterior and posterior views. Possible SPECT/CT may also be needed.

Delayed Images may be needed: At 2 hours the patient returns for identical images and additional images where appropriate if drainage site(s) have not been successfully identified.

BREAST CANCER INJECTION:
Regional Lymph Node Study: At 20 minutes, obtain two-minute images of the expected regional nodal sites. Use the appropriate anterior oblique image (RAO on R, LAO on L) for delayed images if the lesion is lateral to the areola. Include the axilla and sternum/supraclavicular regions in the images. Repeat with transmission views. If requested, mark sentinel node in operative position (arm abducted at 90°) if considered appropriate, do delayed images as required.

CERVICAL & VULVAR CANCER INJECTION:
Study: Start dynamic study (30 second images) immediately and at 20 minutes obtain 2-minute images of the groin. Delayed images at 2 hours are obtained of groin region. Transmission planar scan views are suggested, in addition. SPECT/CT images must be obtained with cervical, vulvar, and uterine injections.

Display: Conventional static images with and without transmission scans including screen caps. With SPECT/CT, see tumor SPECT processing for processing and screen caps.

PACS: All images should be sent to the PACS, including the flow and static images, and images with and without transmission scans and all SPECT/CT images. Be sure to include the low-dose CT scan images. Include all screen caps.

Interpretation: Radiopharmaceutical should promptly ascend up the appropriate lymph node chains. Asymmetry in lymph node uptake may indicate obstruction. The drainage pathways and the first lymph node(s) identified may be marked, if requested by the referring physician. (This is usually not done because of the use of the intra-operative probe). In vulvar and cervical carcinomas, it is important to determine if both groins/iliac chains have sentinel nodes.

Comments: A Nuclear Medicine staff or resident physician should be consulted to determine if additional views are indicated.

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