Lymphoscintigraphy for Breast Cancer

Primary Indications: Lymphoscintigraphy is indicated to identify the axillary lymph node or nodes that receive the primary lymphatic drainage from a breast cancer (sentinel nodes).

Rationale: Tc-99m sulfur colloid particles are transported away from the injection site by the lymphatic channels. These particles are then phagocytosed by macrophages within the sentinel lymph node.

Interfering Conditions: Performing this study within 1-2 weeks of an excisional biopsy decreases the sensitivity for detecting the normal lymphatic drainage to the sentinel nodes. The presumed mechanism for this decreased sensitivity is “clogging” of the lymphatic channels and lymph nodes by the debris created by the excisional biopsy. It is not clear, based on published data, whether this is an important practical issue. Care needs to be taken at the time of injection to avoid contaminating the patient’s skin with the radioactive tracer.

Precautions: None

Radiopharmaceutical: Tc-99m millipore-filtered sulfur colloid in a concentration of \( \approx 5 \text{ mCi/mL} \). Preparation of this radiopharmaceutical involves millipore filtration of the Tc-99m sulfur colloid through a 0.22 µm filter. [When surgery is to be performed the next day, Tc-99m millipore-filtered sulfur colloid in a concentration of \( \approx 10 \text{ mCi/mL} \) is used.]

Syringes and needles required:
For same day surgery:
Two 1- mL syringes – each containing 1.0 mCi of Tc-99m millipore-filtered sulfur colloid in a volume of 0.2 mL.
One short 27 gauge needle for each syringe
For next day surgery:
Two 1 mL syringes – each containing 2.0 mCi of Tc-99m millipore-filtered sulfur colloid in a volume of 0.2 mL.
One short 27 gauge needle for each syringe

Adult Dosage: For same day surgery: \( \approx 1.0 \text{ mCi} \)
For next day surgery: \( \approx 2.0 \text{ mCi} \)

Radiation Dosimetry: There is a large local radiation dose (10s - 100s rem) to the injection site and lymph nodes, although the effective dose of this study is small (less than 50 mrem) because most of the radiopharmaceutical remains at the injection site.

Route of Administration: Intradermal/subdermal
Location of injection: 1 intradermal/subdermal injection 1 cm from the areolar margin along the radius extending from the nipple to the site of the lesion or excisional biopsy
Volume of injectate: \( \approx 0.2 \text{ mL per injection} \)
**Patient Scheduling:** The procedure for scheduling lymphoscintigraphy is described in a document entitled “Scheduling Sentinel Lymph Node Mapping in Patients with Breast Cancer”. The scheduling form entitled “Scheduling Form for Breast Lymphoscintigraphy” should be used. Copies of this form can be found in the scheduling book. See these documents for the details on how to schedule patients for breast lymphoscintigraphy.

**Patient Preparation:** The injection site is cleaned.

**Equipment Setup:** Gamma Camera: LFOV preferred  
Collimator: LEAP  
Energy Window: 140 keV with 20% window

**Patient Positioning:** Supine

**Procedure:** Before injection of the radiopharmaceutical, the side to be studied must be confirmed. The patient should be asked the side of the breast tumor and this response must be compared with the side of the tumor indicated on the lymphoscintigraphy scheduling form and/or a separate requisition. If there is a discrepancy in this information, the staff nuclear medicine physician must be asked to clarify the side of injection.

The specific injection site (1 cm from the areolar margin along the radius extending from the nipple to the site of the lesion or excisional biopsy) is determined from the information on the lymphoscintigraphy scheduling form, which will indicate the quadrant of the lesion. Clean the injection site using betadine and/or alcohol. For a central (subareolar) lesion, the tracer should be injected along the radius extending from the nipple to the center of the ipsilateral axilla.

The injection of the radiopharmaceutical is performed by a staff or resident nuclear medicine physician or by a staff or resident physician of the department of Radiology. Place a bandage over the injection site. Ask the patient to massage the injection site gently to facilitate the movement of the tracer into the lymphatics. The first images (anterior and lateral) should be obtained 20 minutes following the injection. Repeat images (anterior and lateral images) at 45 minutes also should be obtained. Anterior and lateral transmission images should be obtained at 45 minutes to provide anatomic landmarks. Clearly labeled images (printed on paper) should be sent with the patient to the operating room.

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<thead>
<tr>
<th>View</th>
<th>Digital Acquisition</th>
<th>Film Display (If Applicable)</th>
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<tbody>
<tr>
<td><strong>20- and 45-minute delayed views</strong></td>
<td>Static acquisition</td>
<td>Will usually need to use a G display to photograph images with the correct intensity.</td>
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<tr>
<td>Transmission images</td>
<td>256 x 256 matrix, word-mode</td>
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<td></td>
<td>5 minutes per view</td>
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<td>1 minute per view</td>
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<td>SUBJECT: Lymphoscintigraphy for Breast Cancer</td>
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**Items Required For Complete Study:**
1. 20- and 45-minute images.
2. Transmission images or images with the patient's body outlined (for both the immediate and delayed images).
3. Transfer of all digital images to archival computer.
4. Satisfactory films (if available).
5. Films and digital studies properly labeled.
6. Give clearly labeled laser printed images to the patient to take to the operating room.