Overview

The Liver/Spleen Study demonstrates the distribution of the intravascular mononuclear phagocyte system. The intravascular members of this system are cells that line the sinusoids of the liver (Kupffer cells), spleen, and bone marrow.

Indications

Assessment of chronic liver disease (1).
Assessment of liver or spleen size and configuration (2).
Diagnosis of focal nodular hyperplasia (3-5).
Detection of accessory splenic tissue (Heat damaged RBC’s).

*Exams ordered for indications which are not listed above need to be discussed with the Nuclear Medicine Physician.

Examination Time

30 minutes.

Patient Instructions / Scheduling

No special preparation is required. Patients may take medications and eat before coming in.

Liver/spleen scanning should not be done for 24 hours after a CT scan with oral contrast, or for 48 hours after an upper GI x-ray or a barium enema.

A radionuclide brain scan can be done immediately after a liver/spleen scan if both are requested.

If both liver and bone scans are requested, schedule the liver scan first. The bone scan should be scheduled 48 hours later if time permits, but may be done 24 hours later if necessary. Notify technologist to use only 4mCi dose if bone scan is to follow within 24 hours.

Lab / Image Correlation
None required. If available, obtain total bilirubin, alkaline phosphatase, ALT (SGOT), AST (SGPT) when indication is abnormal LFT's.

Patient Preparation

None.

Equipment & Energy Windows

Gamma camera: Large field of view.

Collimator: Low energy, high resolution, parallel hole.

Energy window: 20% window centered at 140 keV.

Matrix: 256 x 256

Radiopharmaceutical, Dose, & Technique of Administration

Radiopharmaceutical: Tc-99m Sulfur Colloid, 8 mCi (296 Mbq), IV

* Reduce dose to 4 mCi if bone to follow.

Technique of administration: Standard intravenous injection.

Patient Position & Imaging Field

Patient position: Supine.

Imaging field: Upper abdomen to include the liver and spleen.

Acquisition Protocol

Planar:
Administer the radiopharmaceutical intravenously. Begin imaging 10 to 15 minutes after injection.

Obtain 8 views. Accumulate 500,000 counts per image. (If separate anterior and posterior views of the liver and spleen are obtained on a small field of view camera, acquire 300,000 counts over the liver and record the spleen image in the same amount of time.)

a. Anterior - supine. Have women raise right arm to elevate breast. If needed, her left hand can elevate breast further.

b. RAO - supine, angle camera 45 degrees. Have women raise right
arm to elevate breast.

c. R lateral - right lateral decubitus position, camera under table.

d. Posterior - supine, camera under table.

e. L lateral - left lateral decubitus position, camera under table.

f. LAO - supine, angle camera 45 degrees. Have women raise left arm to elevate breast.

g. LPO – supine, angle camera 45 degrees.

h. RPO – supine, angle camera 45 degrees.

**SPECT (7-9)**
Administer the radiopharmaceutical intravenously. Begin imaging 10 to 15 minutes after injection.

Acquire: 3° stop, 30 sec/frame, 128 matrix, 180° dual heads, 360° single heads.

**Data Processing**

Reconstruc SPECT images in the transverse, sagittal and coronal views.

**Principle Radiation Emission Data - Tc-99m (10)**

Physical half-life = 6.01 hour.

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
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</thead>
<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
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</tbody>
</table>

**Dosimetry - Tc-99m-Sulfur Colloid (11,12)**

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/6 mCi</th>
<th>mGy/222 MBq</th>
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<tbody>
<tr>
<td>Liver</td>
<td>2.03</td>
<td>20.3</td>
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<tr>
<td>Spleen</td>
<td>1.28</td>
<td>12.8</td>
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<tr>
<td>Bone marrow</td>
<td>0.17</td>
<td>1.7</td>
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<tr>
<td>Total body</td>
<td>0.11</td>
<td>1.1</td>
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<tr>
<td>Ovaries</td>
<td>0.03</td>
<td>0.3</td>
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<tr>
<td>Testes</td>
<td>0.001</td>
<td>0.01</td>
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</table>

**References**

Normal Findings
1. This protocol adheres to the *Society of Nuclear Medicine guidelines: Hepatic and Splenic Imaging 2.0 Approved February 7, 1999.*

JSM

PROTOCOL/05-4

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