Overview

- Functioning bone marrow consists of several cell lines, which tend to distribute in parallel. The Bone Marrow Study performed with radio colloid demonstrates the distribution of functioning bone marrow within the skeleton by imaging one component of the bone marrow, the intravascular mononuclear phagocyte system.

Indications

- Evaluation of regional bone marrow abnormalities in general (1-3).
- Selection of bone marrow biopsy sites (4).
- Diagnosis of osteomyelitis in conjunction with In-111-white blood cell (In-111-WBC) imaging (5-7).

Examination Time

- 1 hour.

Patient Preparation

- None.

Equipment & Energy Windows

- Gamma camera: Large field of view.
- Collimator: Low energy, high resolution, and parallel hole.
- Energy window: 20% window centered at 140 keV.

Radio pharmaceutical, Dose, & Technique of Administration

- Radio pharmaceutical (8-10): Tc-99m-sulfur colloid.
  - Tc-99m-albumin colloid may be used.
- Dose: 10mCi (444 MBq).
- Technique of administration: Standard intravenous injection.

Patient Position & Imaging Field

- Patient position: Supine.
Imaging field: Entire skeleton.

**Acquisition Protocol**

- Wait 15 minutes following injection of the radio pharmaceutical before imaging.
- Imaging to be performed with multiple spot images or whole body images.
- For spot images:
  1. Image the head and torso in the ANT and POST projections; and the arms and legs in the ANT projection.
  2. Acquire each image for approximately 4 minutes.
- For whole body imaging:
  1. Image the entire body in the ANT projection and the head and torso in the POST projection (Acquire spot images of the arms if necessary.).
  2. Set scan speed to 15 cm/min approximately.

**Data Processing**

- Whole Body Display.
- Static Images 4, 6 or 8 on one.

**Optional Maneuvers**

- Bone marrow imaging may be performed in conjunction with positive In-111-WBC studies for osteomyelitis to increase the specificity of the test (5-7):
  1. Immediately following acquisition of the 24 hour In-111-WBC images perform a bone marrow study as above with the following modifications:
     a) only image the sites with increased In-111-WBC activity.
     b) use a 10% energy window (low energy collimator may be used) (7).
     c) acquire each image for 5 minutes.

- Liver/Spleen Study at same sitting: A Liver/Spleen Study may be performed at the same time as outlined in the Gastrointestinal System section.

- Alternative radiopharmaceutical: Bone marrow imaging may be performed with In-111 chloride (11-13).

**Principle Radiation Emission Data - Tc-99m (14)**

- Physical half-life = 6.01 hours.

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
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<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
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Dosimetry - Tc-99m-Sulfur Colloid

<table>
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<tr>
<th>Organ</th>
<th>rads/15 mCi</th>
<th>mGy/555 MBq</th>
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<tbody>
<tr>
<td>Liver</td>
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<td>Spleen</td>
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<td>Bone marrow</td>
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<td>Total body</td>
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<tr>
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<tr>
<td>Testes</td>
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</table>

References


Normal Findings