Overview

- The Colorectal Cancer Study with technetium-99m labeled fragments of a monoclonal antibody allows imaging of recurrent colorectal cancer in approximately 5 hours. In addition, even though the fragment is derived from a murine antibody there is very little HAMA (human anti-mouse antibody) response because an antibody fragment is much less antigenic than a whole antibody.

Indications

- Detection and localization of extrahepatic tumor in patients with potentially resectable hepatic metastases (1,2).
- Detection and localization of recurrent tumor in patients with rising CEA (carcinoembryonic antigen) levels (1,2).

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

Examination Time

- Initially: 20 minutes for explaining the procedure to the patient and injection of the radiopharmaceutical.
- 2-5 hours later: 1 hour for image acquisition.
- A delayed SPECT at 24 hrs may be performed. 1 hour for image acquisition.

Patient Instructions / Scheduling

- Confirm with the Nuclear Medicine Physician that this is the appropriate test (FDG or Oncoscint may be preferred).

- Ask the patient if they have had any prior monoclonal antibody studies (CEA, Oncoscint, Prostascint) as this is a relative contraindication.

- Absolute contraindications include: age <21, pregnancy, breast feeding.

Lab / Image Correlation
Obtain the patient’s most recent CEA level and if available surgical/pathology reports.

Obtain all abdominal/pelvic CT images.

### Patient Preparation

- CEA-Scan is contraindicated in patients who are hypersensitive to products of murine origin (1).

- Explain to the patient that CEA-Scan is a foreign (mouse) protein and that:
  1. There is a < 1% chance of inducing human anti-murine antibodies (HAMA). HAMA may interfere with subsequent murine-antibody based diagnostic tests and therapeutic agents.
  2. There is a < 1% chance of having a mild limited reaction consisting of fever, urticaria, generalized itching, nausea, or headache (see table below) at the time of injection; severe reactions are rare (1).

Patients should not have a serum assay for CEA for 1 week following a CEA-Scan (3,4).

### Equipment & Energy Windows

- Gamma camera: Large field of view dual head with SPECT/CT capability. (The Symbia will be used)

- Collimator: Low energy, high resolution, and parallel hole.

- Energy windows: 20% centered at 140 keV.

### Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Tc-99m-arcitumomab [CEA-Scan] (1).

- Dose: 25 mCi (925 MBq).

- Technique of administration: Standard intravenous injection (3).

### Acute adverse reactions (3).

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Frequency (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>&lt; 1</td>
<td>1,3</td>
</tr>
<tr>
<td>Headache</td>
<td>&lt; 1</td>
<td>1,3</td>
</tr>
<tr>
<td>Nausea</td>
<td>&lt; 1</td>
<td>1,3</td>
</tr>
<tr>
<td>Bursitis</td>
<td>&lt; 1</td>
<td>1,3</td>
</tr>
</tbody>
</table>
Urticaria < 1 1,3
Generalized itching < 1 1,3
Transient eosinophilia < 1 1,3

Patient Position & Imaging Field

- Patient position: Supine.
- Imaging field: Chest, abdomen, and pelvis.

Acquisition Protocol

- Acquire one complete set of images at 3-4 hours after injection (8,1).
- The patient should void immediately before beginning image acquisition and image acquisition should begin with the pelvis (8,1).
- Perform Pelvic SPECT/CT First:
  1. 128x128 matrix
  2. Dual head acquisition with 360° rotation, 64 images, 30 sec per image.
- Perform planar whole body imaging second:
  1. Anterior and Posterior whole body at 8cm/sec.
  2. Spot views at 10min per image.
- Perform Abdomen SPECT/CT third:
  1. 128x128 matrix
  2. Dual head acquisition with 360° rotation, 64 images, 30 sec per image.

Delayed SPECT/CT Imaging at 24 hrs:
  1. Only if instructed by physician.
  2. 64x64 matrix
  3. 360° rotation, 32 images, 70 sec per image.

Data Processing

Process SPECT/CT images using the e-Soft computer and software for display on the reading workstation.

 Principle Radiation Emission Data - Tc-99m (7)

- Physical half-life = 6.01 hours.
<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
</tr>
</tbody>
</table>

**Dosimetry - Tc-99m-arcitumomab (3)**

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/25 mCi</th>
<th>mGy/925 MBq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>9.3</td>
<td>93.0</td>
</tr>
<tr>
<td>Bladder</td>
<td>1.5</td>
<td>15.0</td>
</tr>
<tr>
<td>Spleen</td>
<td>1.5</td>
<td>15.0</td>
</tr>
<tr>
<td>Liver</td>
<td>0.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Red marrow</td>
<td>0.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Lungs</td>
<td>0.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Whole body</td>
<td>0.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Testes</td>
<td>0.4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**References**


JSM
Rev 9/1/2008