Austin Radiological Association
Nuclear Medicine Procedure

PROSTATE CANCER STUDY
(In-111-Capromab Pendetide [ProstaScint®])

Overview

- The Prostate Cancer Study with an indium-111 labeled murine monoclonal whole antibody seeks to image recurrent prostate cancer, particularly in the retroperitoneal nodes of the abdomen and pelvis. In-111-capromab pendetide binds to the prostate specific membrane antigen which is expressed by prostate cancer and benign prostatic hypertrophy, but not by other cancers.

Indications

- Detection of pelvic metastases in patients with newly diagnosed biopsy proven prostate cancer thought to be clinically localized after standard diagnostic evaluation, but who are thought to be at high risk for metastases.

- Detection of metastases in patients who have undergone prostatectomy and have a rising prostatic specific antigen level (PSA) and negative or equivocal standard metastatic evaluation.

Examination Time

- Initially: 15 minutes for explaining the procedure to the patient and for injection of the radiopharmaceutical.

- Early imaging 30 minutes after injection: 30 minutes for whole body imaging.

- Late imaging at 3-5 days: 2 hours for whole body and SPECT/CT imaging 4 days post injection.

Patient Preparation

- Determine if the patient has previously been injected with murine (mouse) antibody-based products. If so, this is a relative contraindication; consult the nuclear medicine physician.

- Determine if the patient has a history of hypersensitivity to murine proteins. Hypersensitivity represents a contraindication.

- Explain to the patient that ProstaScint is a foreign (mouse) protein and that:
1. There is an approximately 8% chance of inducing human anti-murine antibodies (HAMA). HAMA may interfere with subsequent murine-antibody based diagnostic tests and therapeutic agents. In approximately 50% of patients who do develop HAMA, the blood HAMA levels return to normal in 4-12 months.

2. There is a 5% chance of having a mild limited reaction with injection site reaction being the most common (see table below) at the time of injection; severe reactions are rare.

- The patient should void completely before each imaging session including between whole body and SPECT/CT acquisitions.
- Tridrate bowel prep to be performed the day before delayed imaging (Sunday).

**Equipment & Energy Windows**

- Gamma camera: Large field of view with SPECT/CT capability, preferably with opposing dual heads.
- Collimator: Medium (or high) energy, parallel hole.
- Energy windows:
  > One pulse height analyzer: 156 to 272 keV.
  > Two pulse height analyzers: 20% windows centered at 171 and 245 keV.
- Computer with SPECT/CT software.

**Radiopharmaceutical, Dose, Technique of Administration, & Acute Adverse Reactions**

- Radiopharmaceutical: In-111-capromab pendetide (ProstaScint®).
- Dose: 6 - 8 mCi (222 - 296 MBq)
- Technique of administration: Inject intravenously over 5 minutes.
  
  ▶ Use established I.V. with 3-way stopcock and 10-20cc flush
  ▶ Initially push three or four drops of ProstaScint and wait 1 minute
  ▶ Push remaining dose over the next 4-5 minutes
  ▶ Flush I.V. and syringe after all of isotope injected

- Acute adverse reactions.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Frequency (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any reaction</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Bilirubinemia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hypotension</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Injection site reaction</td>
<td>&lt; 1</td>
<td>1</td>
</tr>
</tbody>
</table>
Alkaline phosphatase increased $< 1$ 1
Pruritis $< 1$ 1
Fever $< 1$ 1
Rash $< 1$ 1
Asthenia $< 1$ 1
Headache $< 1$ 1
Myalgia $< 1$ 1
Hyperkalemia $< 1$ 1

**Patient Position & Imaging Field**

- Patient position: Supine.
- Imaging field: Whole body and SPECT/CT of abdomen and pelvis.

** Acquisition Protocol**

- Acquire Whole Body imaging at 30 minutes after injection to serve as reference images of the blood pool anatomy.

- Acquire delayed whole body scan at four days post injection
  > Moving acquisition protocol: Acquire ANT and POST Whole body scan taking approximately 10min at 15cm/minute.
  > Static acquisition protocol: Acquire ANT and POST images for approximately 10 minutes each.

- Acquire SPECT/CT images of the pelvis and abdomen 3-5 days post injection:
  1. Image acquisition parameters:
     a) degrees of rotation: 180°.
     b) number of images: 60 per head.
     c) time per image: 30 seconds.
  2. SPECT/CT images of the chest are obtained if pathology noted on whole body imaging.

**Protocol Summary Diagram**

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In-111-capromab

Action

Blood Pool

WB Planar images & SPECT/CT

Time

0 30 min 3-5 days
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Data Processing

- SPECT/CT image reconstruction:
  1. The exact procedure for processing SPECT/CT images depends on the computer software being used. This varies with the manufacturer and, in general, the manufacturer’s protocol should be followed.
  2. The reconstruction process in general terms is:
     a) correct the 60 planar images for uniformity (camera non-uniformity) using a high count, e.g. 30 million count, cobalt-57 flood acquisition.
     b) check the images for patient motion and apply a motion correction algorithm if indicated and if available.
     c) if the entire field of view is not of interest, indicate the region that is of interest to conserve computer time during reconstruction.
     d) utilize Flash 3D processing with attenuation and scatter correction
     e) Gaussian 8.4 filter
     f) reconstruct transverse, sagittal, and coronal images

Optional Maneuvers

- Intraoperative probes: Tumor deposits may be localized intraoperatively with hand held probes.

Method for timely correction of Data Analysis and reporting errors and notification of referring parties

- Data Analysis and reporting errors are reported to the interpreting physician and appropriate clinic manager for timely correction and notification of the referring physician via report addendum or STAT call if error is significant.

Principle Radiation Emission Data - In-111

- Physical half-life = 2.83 days.

<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>90.2</td>
<td>171.3</td>
</tr>
<tr>
<td>Gamma-3</td>
<td>94.0</td>
<td>245.3</td>
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</table>
## Dosimetry - Capromab Pendetide

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/5 mCi</th>
<th>mGy/185 MBq</th>
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<tbody>
<tr>
<td>Liver</td>
<td>18.5</td>
<td>185.0</td>
</tr>
<tr>
<td>Spleen</td>
<td>16.3</td>
<td>163.0</td>
</tr>
<tr>
<td>Kidney</td>
<td>12.4</td>
<td>124.0</td>
</tr>
<tr>
<td>Heart wall</td>
<td>7.8</td>
<td>77.7</td>
</tr>
<tr>
<td>Lower large intestine</td>
<td>7.6</td>
<td>75.9</td>
</tr>
<tr>
<td>Gallbladder wall</td>
<td>7.2</td>
<td>72.1</td>
</tr>
<tr>
<td>Lungs</td>
<td>5.7</td>
<td>57.4</td>
</tr>
<tr>
<td>Testes</td>
<td>5.6</td>
<td>55.5</td>
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<tr>
<td>Red marrow</td>
<td>4.3</td>
<td>42.5</td>
</tr>
<tr>
<td>Whole body</td>
<td>2.6</td>
<td>25.9</td>
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