HOW SUPPLIED
Phosphotec® (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) is supplied in a kit containing 10 reaction vials (5 mL size), 10 pressure-sensitive labels, and 1 package insert.

Storage
Store the Phosphotec® (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) refrigerated at 2°-8°C (36°-46°F). The reconstituted preparation should be refrigerated since the product does not contain a preservative. When reconstituted with sodium pertechnetate Tc 99m, Phosphotec® must be used within 6 hours. When reconstituted with Sodium Chloride Injection USP for blood pool imaging, use the solution within 30 minutes.

PROCEDURES FOR RECONSTITUTION OF PHOSPHOTEC®

Procedural Precautions
The contents of the Phosphotec® reaction vial are sterile and nonpyrogenic. Aseptic procedures should be used during reconstitution of Phosphotec® and the withdrawal of doses for intravenous administration. The introduction of air into the vial during the reconstitution step should be avoided.

Reconstitution

Bone and Cardiac Imaging

Each reaction vial contains 40 mg sodium pyrophosphate (equivalent to 23.9 mg anhydrous sodium pyrophosphate) and 0.4 mg pertechnetate (Tc 99m) radioactivity to be used, the labeling efficiency, number of patients, administered radioactive dose and radioactive decay must be taken into account.

Physical Decay Chart.

Radiation Disintegration (keV)

Table 3 shows the principal radiation emission data for Technetium Tc 99m, the fractions that remain at selected intervals after the time of calibration are shown in Table 3.

Fraction Fractions

To correct for physical decay of technetium Tc 99m, the fractions that remain at selected intervals after the time of calibration are shown in Table 3.

Table 2

To facilitate control of the radiation exposure from millicurie amounts of this radionuclide, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of 1,000.

The principal photon that is useful for detection and imaging studies is shown in Table 1.

DESCRIPTION

Each reaction vial contains 40 mg sodium pyrophosphate (equivalent to 23.9 mg anhydrous sodium pyrophosphate) and 0.4 mg pertechnetate (Tc 99m) radioactivity to be used, the labeling efficiency, number of patients, administered radioactive dose and radioactive decay must be taken into account.

Principal Radiation Emission Data

The U.S. Nuclear Regulatory Commission has approved this reagent kit for distribution to persons licensed to use byproduct material identified in §35.200 of 10 CFR Part 35, to persons who hold an equivalent license issued by an Agreement State, and, outside the United States, to persons authorized by the appropriate authority.

Manufactured for
Bracco Diagnostics Inc.
Princeton, NJ 08543

by Nycomed Amersham plc Little Chalfont UK

Rx only

PHOSPHOTEC®
Kit for the Preparation of Technetium Tc 99m Pyrophosphate

For Diagnostic Use

PHYSICAL CHARACTERISTICS

Technetium Tc 99m decays by isomeric transition with a physical half-life of 6.02 hours. The principal photon that is useful for detection and imaging studies is shown in Table 1

The specific gamma ray constant for Tc 99m is 0.78 R/hour-millicurie at 1 cm. The first half-value layer is 0.017 cm of Pb. Table 2 shows the principal radiation emission data for Technetium Tc 99m, the fractions that remain at selected intervals after the time of calibration are shown in Table 3.

To facilitate control of the radiation exposure from millicurie amounts of this radionuclide, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of 1,000.

Table 2

To correct for physical decay of technetium Tc 99m, the fractions that remain at selected intervals after the time of calibration are shown in Table 3.
blood flow to bone and bone efficiency in extracting the complex. Phosphorus crystals are generally considered to be hydroxyapatite, and the complex appears to have an affinity for the hydroxyapatite crystals in bone. It is theorized that the complex also reacts with the mitochondrial calcium crystals, produced within infarcted myocardial cells which are believed to be hydroxyapatite, this phenomenon usually does not persist beyond six days after the occurrence of an infarction.

Clearance of the radioactivity from the blood is quite rapid with skeletal uptake and urinary excretion being the principal mechanism of clearance. At two hours following intravenous injection, approximately 55 percent of the injected dose has localized in bone; four hours each 10 percent of the dose remains in the vascular system, decreasing to about 7 percent at 24 hours. The average urinary excretion was observed to be about 38 percent of the administered dose after eight hours increasing to an average of about 44 percent at 24 hours. A minimum amount of uptake has been observed in soft-tissue organs, most notably the kidneys.

Blood Pool Imaging

The in vivo tagging of Phosphotec results in the radiolabelling of red blood cells. Approximately 76 percent of the injected activity remains in the blood pool between 30 and 60 minutes after injection of sodium pertechnetate Tc 99m, thereby permitting excellent images of the cardiac chambers. Maximum blood radioactivity levels occur in about 30 minutes; the initial biological half-life is approximately 18 hours. There is virtually no biological elimination of the agent after approximately six hours. The suggested dose is 41 mg (content of one reaction vial) of Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate). This is to be used for blood pool imaging.

Bone Imaging

Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) may be used as a bone imaging agent to delineate areas of altered osteogenesis.

Cardiac Imaging

Phosphotec is a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction. The infarction is best visualized one to six days after onset of symptoms. False-positive scans can occur if imaging is done too early in the evolution phase of the infarct or too late in the resolution phase. The incidence of false-positives may range from 5 to 9 percent of and false-negatives from 6 to 9 percent but may vary even more depending on selection criteria of patient populations.

Blood Pool Imaging

Phosphotec is also used for blood pool imaging which may be used for gated cardiac blood pool imaging and for the detection of sites of gastrointestinal bleeding. When administered intravenously 15 to 60 minutes prior to intravenous administration of sodium pertechnetate Tc 99m, approximately 75% of the injected activity remains in the blood pool.

CONTRAINDICATIONS

None known.

WARNINGS

Preliminary reports indicate impairment of brain scans using sodium pertechnetate Tc 99m injection which have been preceded by a bone scan using an agent containing stannous ions. The impairment may result in false-positive or false-negative brain scans. It is recommended, where feasible, that brain scans precede bone imaging procedures. Alternatively, a brain-imaging agent such as technetium Tc 99m pertechnetate may be employed.

PRECAUTIONS

General

The lipophilized contents of the Phosphotec vial are very active; extreme care must be observed to prevent exposure to the patient only as an intravenous injection (see PROCEDURES FOR RECONSTITUTION OF MECHANICAL HYDROSEPARATION). Any sodium pertechnetate Tc 99m solution which contains an oxidizing agent is not suitable for use with Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate.

When reconstituted with sodium pertechnetate Tc 99m, Phosphotec must be used within 6 hours. When reconstituted with Sodium Chloride Injection USP for blood pool imaging, use the solution within 30 minutes.

The imaging of gastrointestinal bleeding is dependent on such factors as the region of imaging, rate and volume of the bleed, efficacy of labeling of the red blood cells and time of the imaging of the blood pool. Imaging should be performed within 30 minutes to 24 hours after injection of sodium pertechnetate Tc 99m, thereby permitting excellent images of the cardiac chambers.

Maximum blood radioactivity levels occur in about 30 minutes; the initial biological half-life is approximately 18 hours. There is virtually no biological elimination of the agent after approximately six hours. The suggested dose is 41 mg (content of one reaction vial) of Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate). This is to be used for blood pool imaging.

Bone Imaging

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Phosphotec is an intravenous radiopharmaceutical suitable for use with Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate).

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Cardiac Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Bone Imaging

Dosage

Both prior to and following administration of the technetium Tc 99m pyrophosphate, the patient should be encouraged to drink fluids and experience instability and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.
blood flow to bone and bone efficiency in extracting the complex. Red blood cells are generally considered to be hydroxyapatite, and the complex appears to have an affinity for the hydroxyapatite crystals in bone. It is theorized that the complex also reacts with the mitochondrial calcium crystals, produced within infarcted myocardial cells which are believed to be hydroxyapatite, this phenomenon usually does not persist beyond six days after the occurrence of an infarction.

Clearance of the radioactivity from the blood is quite rapid with skeletal uptake and urinary excretion being the principal mechanisms of clearance. At two hours following intravenous injection, approximately 55 percent of the injected dose has localized in bone; at four hours approximately 10 percent of the dose remains in the vascular system, decreasing to about 7 percent at 24 hours. The average urinary excretion was observed to be about 38 percent of the administered dose after eight hours increasing to an average of about 44 percent at 24 hours. A minimum amount of uptake has been observed in soft-tissue organs, most notably the kidneys.

**Blood Pool Imaging**

The in vivo tagging of Phosphotec results in the radiolabelling of red blood cells. Approximately 76 percent of the injected activity remains in the blood pool between 30 and 60 minutes after injection of sodium pertechnetate Tc 99m, thereby permitting excellent images of the cardiac chambers.

Maximum blood radioactivity levels occur in about 30 minutes; the initial biological half-life is approximately 18 hours. There is virtually no biological elimination of the agent after approximately six hours.

**INDICATIONS AND USAGE**

**Bone Imaging**

Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) may be used as a bone imaging agent to delineate areas of altered osteogenesis.

**Cardiac Imaging**

Phosphotec is a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction. The infarction is best visualized one to six days after onset of symptoms. False-negative images can occur if imaging is done too early in the evolution phase of the infarct or too late in the resolution phase. The incidence of false-positives may range from 5 to 9 percent and of false-negatives from 6 to 9 percent but may vary even more depending on selection criteria of patient populations.

**Blood Pool Imaging**

Phosphotec is also a blood pool imaging agent which may be used for gated cardiac blood pool imaging and for the detection of sites of gastrointestinal bleeding. When administered intravenously 15 to 60 minutes prior to intravenous administration of sodium pertechnetate Tc 99m, approximately 75% of the injected activity remains in the blood pool.

**CONTRAINdications**

None known.

**WARNINGS**

Preliminary reports indicate impairment of brain scans using sodium pertechnetate Tc 99m injection which have been preceded by a bone scan using an agent containing stannous ions. The impairment may result in false-positive or false-negative brain scans. It is recommended, where feasible, that brain scans precede bone imaging procedures. Alternatively, a brain-imaging agent such as technetium Tc 99m pertechnetate may be employed.

**PRECAUTIONS**

**General**

The lypophilized contents of the Phosphotec reconstitution vial are to be reconstituted with 1 ml of sterile NaCl solution (see PROCEDURES FOR RECONSTITUTION). The resulting solution (1 ml) should be injected intravenously. Following intravenous injection, the complex is cleared from the blood at a rate comparable to that of red blood cells and the other 25% remains as pertechnetate.

Any sodium pertechnetate Tc 99m solution which contains an oxidizing agent is not suitable for use with Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate).

When reconstituted with sodium pertechnetate Tc 99m, Phosphotec must be used within 6 hours. When reconstituted with Sodium Chloride Injection USP for blood pool imaging, use the solution within 30 minutes.

The imaging of gastrointestinal bleeding is dependent on such factors as the region of imaging, rate and volume of the bleed, efficacy of labeling of the red blood cells, and the speed of the bleeding. Images obtained at a later time in a positive image is obtained or clinical findings warrant the discontinuance of the procedure. The period of time for collecting the images may range up to thirty-six hours.

Technetium Tc 99m pyrophosphate as well as other radioactive drugs must be handled with care, and appropriate safety measures should be used to minimize radiation exposure to the patient and occupational workers consistent with proper patient management.

Radioisotopes should be used only by physicians trained in the proper handling and administration of these agents.

**Pediatric Use**

Safety and effectiveness in children have not been established.

**ADVERSE REACTIONS**

Several adverse reactions due to Phosphotec have been reported. These were usually hypersensitivity reactions characterized by itching, various skin rashes, hypotension, fever, chills, nausea, vomiting and dizziness.

**DOSEAGE AND ADMINISTRATION**

The patient dose should be measured by a suitable radiometric calibration system prior to administration.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration. Intravenous doses for an average adult (70 kg) are as follows:

- **Bone Imaging**
  - The suggested dose is 370 to 555 MBq (10 to 15 mCi).
  - Following reconstitution, Phosphotec is injected intravenously over a 10- to 20-second period. Imaging may be started at one hour after administration; however, for optimal results bone imaging should be performed two to four hours following administration.

- **Cardiac Imaging**
  - The suggested dose is 370 to 555 MBq (10 to 15 mCi) administered intravenously over 10 to 20 seconds and within 24 hours to six days after the onset of symptoms suggestive of acute myocardial infarction.
  - Imaging is recommended at 45 to 60 minutes postinjection. It is suggested that imaging be obtained in at least three projections (e.g., anterior, lateral, and left anterior oblique).

**Blood Pool Imaging**

The suggested dose is 41 mg (contents of one reaction vial) of Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) (see PROCEDURES FOR RECONSTITUTION) administered intravenously, followed 15 to 60 minutes later by the intravenous administration of 740 MBq (20 mCi) of sodium pertechnetate Tc 99m. Administration should be made by direct venipuncture and not by heparinized catheter systems. Cardiac pool imaging should be initiated 15 to 20 minutes after the administration of sodium pertechnetate Tc 99m.

**Radiation Dosimetry**

The effective half-life was assumed to be equal to the physical half-life for all calculated values. The estimated absorbed radiation doses to an average adult (70 kg) from an intravenous injection are shown in Tables 4 and 5.

**TABLE 4**

<table>
<thead>
<tr>
<th>Target Organ (mGy/555 MBq) (rads/15 mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Body</strong></td>
</tr>
<tr>
<td><strong>Kidneys</strong></td>
</tr>
<tr>
<td><strong>Bone Marrow</strong></td>
</tr>
<tr>
<td><strong>Skeleton</strong></td>
</tr>
<tr>
<td><strong>Bladder Wall</strong></td>
</tr>
<tr>
<td><strong>Testes</strong></td>
</tr>
<tr>
<td><strong>Ovaries</strong></td>
</tr>
<tr>
<td><strong>2 hour void</strong></td>
</tr>
<tr>
<td><strong>4.8 hour void</strong></td>
</tr>
</tbody>
</table>

If patient voids frequently after radiopharmaceutical is administered, this dose will be reduced slightly.

lf patient voids frequently after radiopharmaceutical is administered, this dose will be reduced slightly.

<table>
<thead>
<tr>
<th>Target Organ (mGy/740 MBq) (rads/20 mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Body</strong></td>
</tr>
<tr>
<td><strong>Spleen</strong></td>
</tr>
<tr>
<td><strong>Bladder Wall</strong></td>
</tr>
<tr>
<td><strong>Testes</strong></td>
</tr>
<tr>
<td><strong>Ovaries</strong></td>
</tr>
</tbody>
</table>

*Assume 75% of the Sodium Pertechnetate Tc 99m labels red blood cells and the other 25% remains as pertechnetate.

HI 25% excreted with 1 hour Tc 99m.

HOW SUPPLIED
Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) is supplied in a kit containing 10 reaction vials (5 mL size), 10 pressure-sensitive labels, and 1 package insert.

Storage
Store the Phosphotec (Kit for the Preparation of Technetium Tc 99m Pyrophosphate) refrigerated at 2°-8°C (36°-46°F). The reconstituted preparation should be refrigerated since the product does not contain a preservative. When reconstituted with sodium pertechnetate Tc 99m, Phosphotec must be used within 6 hours. When reconstituted with Sodium Chloride Injection USP for blood pool imaging, use the solution within 30 minutes.

PROCEDURES FOR RECONSTITUTION OF PHOSPHOTEC

Procedural Precautions
The contents of the Phosphotec reaction vial are sterile and nonpyrogenic. Aseptic procedures should be used during reconstitution of Phosphotec and the withdrawal of doses for intravenous administration. The introduction of air into the vial during the reconstitution step should be avoided.

Reconstitution
Bone and Cardiac Imaging

The principal photon that is useful for detection and imaging studies is shown in Table 1.

<table>
<thead>
<tr>
<th>Hours Remaining</th>
<th>Fraction Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.000</td>
</tr>
<tr>
<td>1</td>
<td>0.891</td>
</tr>
<tr>
<td>2</td>
<td>0.794</td>
</tr>
<tr>
<td>3</td>
<td>0.708</td>
</tr>
<tr>
<td>4</td>
<td>0.631</td>
</tr>
<tr>
<td>5</td>
<td>0.562</td>
</tr>
<tr>
<td>6</td>
<td>0.501</td>
</tr>
<tr>
<td>7</td>
<td>0.447</td>
</tr>
</tbody>
</table>

Each reaction vial contains 40 mg sodium pyrophosphate (equivalent to 23.9 mg anhydrous sodium pyrophosphate) and 0.4 mg stannous fluoride (minimum) and 0.9 mg total tin (maximum) as stannous fluoride; the product does not contain a preservative. The pH of the product is adjusted with sodium hydroxide or hydrochloric acid prior to lyophilization. At the time of manufacture, the air in the vial is replaced with a nitrogen gas atmosphere. The pH of the reconstituted product is 5.5 to 6.9. When sterile, nonpyrogenic sodium pertechnetate Tc 99m solution is added to the vial, a diagnostic agent, technetium Tc 99m pyrophosphate, is formed for intravenous administration; the structure of this radiolabeled complex is unknown.

The product as supplied is sterile and nonpyrogenic.

PHYSICAL CHARACTERISTICS
Technetium Tc 99m decays by isomeric transition with a physical half-life of 6.02 hours.

Tc 99m Half-life 6.02 hours

The specific gamma ray constant for Tc 99m is 0.78 R/hour-millicurie at 1 cm. The first half-value layer is 0.017 cm of Pb. Table 2 shows the attenuation of various thicknesses of Pb is shown in Table 2. To facilitate control of the radiation exposure from millicurie amounts of this radionuclide, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of 1,000.

**TABLE 2**

<table>
<thead>
<tr>
<th>Shield Thickness (Pb) cm</th>
<th>Attenuation Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.017</td>
<td>0.5</td>
</tr>
<tr>
<td>0.08</td>
<td>10^1</td>
</tr>
<tr>
<td>0.16</td>
<td>10^2</td>
</tr>
<tr>
<td>0.25</td>
<td>10^3</td>
</tr>
<tr>
<td>0.33</td>
<td>10^4</td>
</tr>
</tbody>
</table>

To correct for physical decay of technetium Tc 99m, the fractions that remain at selected intervals after the time of preparation are shown in Table 1. The principal photon that is useful for detection and imaging studies is shown in Table 1.

**TABLE 1**

<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>

*Calibration Time

CLINICAL PHARMACOLOGY
Bone and Cardiac Imaging

The specific gamma ray constant for Tc 99m is 0.78 R/hour-millicurie at 1 cm. The first half-value layer is 0.017 cm of lead (Pb). A range of values for the relative attenuation of the radiation emitted by this radionuclide that results from interposition of various thicknesses of Pb is shown in Table 2. To facilitate control of the radiation exposure from millicurie amounts of this radionuclide, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of 1,000.