The estimated absorbed radiation doses to organs and tissues of an average subject (70 kg) from an intravenous injection of 370 MBq (10 mCi) of Technetium Tc 99m Mebrofenin are shown in Table 4.

**TABLE 4**

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Normal Subjects*</th>
<th>Jaundiced Patients**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mGy/rad</td>
<td>mGy/rad</td>
</tr>
<tr>
<td></td>
<td>mgGy/mCi</td>
<td>mgGy/mCi</td>
</tr>
<tr>
<td>Total Body</td>
<td>2.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Gallbladder Wall</td>
<td>13.7</td>
<td>1.37</td>
</tr>
<tr>
<td>Small Intestine</td>
<td>29.9</td>
<td>2.99</td>
</tr>
<tr>
<td>Upper Large Intestine</td>
<td>47.4</td>
<td>4.74</td>
</tr>
<tr>
<td>Lower Large Intestine</td>
<td>36.4</td>
<td>3.64</td>
</tr>
<tr>
<td>Urinary Bladder</td>
<td>2.2</td>
<td>0.22</td>
</tr>
<tr>
<td>Ovaries</td>
<td>10.1</td>
<td>1.01</td>
</tr>
<tr>
<td>Testes</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Red Marrow</td>
<td>3.4</td>
<td>0.34</td>
</tr>
</tbody>
</table>

**Method of Calculation:**


Calculations assume that 98% of the injected activity is taken up by the liver; activity not removed in the urine in 24 hours is secreted in the intestines and no enterohepatic circulation of activity.

Calculations assume that 66% of the injected activity is taken up by the liver; activity not removed in the urine in 24 hours is secreted in the intestines and no enterohepatic circulation of activity.

HOW SUPPLIED

Choletec (Kit for the Preparation of Technetium Tc 99m Mebrofenin) is supplied in kits of 10 reaction vials. Each vial contains a sterile, nonpyrogenic lyophilized mixture of 45 mg mebrofenin, 0.54 mg (minimum) stannous fluoride dihydrate, SnF₂·H₂O and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂·H₂O) not more than 5.2 mg methylparaben, and 0.58 mg propylparaben. The pH has been adjusted with hydrochloric acid or sodium hydroxide prior to lyophilization. The lyophilized vial contents are sealed under nitrogen at the time of manufacture. The pH of the reconstituted product is 4.2 to 5.7.

Kit Contents

10 sterile multidose reaction vials.
20 pressure-sensitive labels for Technetium Tc 99m Mebrofenin.
1 package insert.

Preparation

Preparation of Technetium Tc 99m Mebrofenin is done by the following aseptic procedure:

1. Waterproof gloves should be worn during the preparation procedures.
2. Place reaction vial in an appropriate lead shield.
3. Swab the rubber closure of the reaction vial with a germicide.
4. Inject 1 to 5 mL sterile additive free sodium pertechnetate Tc 99m injection containing up to 3700 MBq (100 mCi) Tc 99m into the reaction vial. Be sure to maintain a nitrogen atmosphere in the vial by not introducing air during reconstitution.
5. Secure the lead shield cover. Swirl the vial gently to mix contents and let stand for 15 minutes.
6. Record the date and time of preparation on pressure-sensitive label.
7. Affix pressure-sensitive label to shield.
8. Examine vial contents. If the solution is not clear and free of particulate matter and discoloration on visual inspection, it should not be used.
9. Measure the radioactivity by a suitable calibration system and record on the shield label prior to patient administration.
10. Withdraw material with a sterile lead shielded syringe for use within 18 hours of preparation.

Storage

Store the kit as supplied at 20-25°C (68-77°F) [See USP] prior to and 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.

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.
CHOLET®

Kit for the Preparation of Technetium Tc 99m Mebrofenin

For Diagnostic Use

DESCRIPTION
Each reaction vial contains a nonaactioactive, sterile, nonpyrogenic mixture of 45 mg mebrofenin, 0.54 mg (minimum) stannous fluoride dihydrate, SnF₂•2H₂O and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂•2H₂O), not more than 5.2 mg methylparaben, and 0.58 mg propylparaben. The pH is adjusted with sodium hydroxide to 5 to 7.5. The mixture of 45 mg mebrofenin, 0.54 mg (minimum) stannous fluoride dihydrate, SnF₂•2H₂O and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂•2H₂O) and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂•2H₂O) and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂•2H₂O) and 1.03 mg total tin, maximum (as stannous fluoride dihydrate, SnF₂•2H₂O) is lyophilized and sealed under nitrogen at the time of manufacture.

PHYSICAL CHARACTERISTICS

Technetium Tc 99m decays by isomeric transition with a physical half-life of 6.02 hours. The activity was cleared through the hepatobiliary system with visualization of the liver by 5 minutes and maximum liver uptake occurring at 11 minutes post-injection. Hepatic duct and gallbladder visualization occurred by 10 to 15 minutes and intestinal activity was visualized by 30 to 60 minutes in subjects with normal hepatobiliary function. The mean percent injected dose excreted in the urine during the first 3 hours was 1% (0.4 to 2.0%). Elevated serum bilirubin levels increase renal excretion of Tc 99m HIDA agents. In one study, 99m Mebrofenin was administered to patients having mean elevated serum bilirubin levels of 9.8 mg/dl (1.7 to 4.63 mg/dl), the mean percent injected dose excreted in the urine during the first 3 hours was 3% (0.2 to 11.5%). The mean percent injected dose excreted in the urine during 3 to 24 hours was 14.9% (0.4 to 34.8%).

When sterile, pyrogen-free sodium pertechnetate Tc 99m injection is added to the vial, the diagnostic agent Technetium Tc 99m Mebrofenin is formed for administration by intravenous injection. The pH of the reconstituted product is 4.2 to 5.7. The structure of mebrofenin (2,2’-[2-(3-Bromo-2,4,6-trimethylphenyl)amino]-2-oxoethyl)imidazolin 5-ium) bisacetic acid is shown in Table 1.

External Radiation
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 milliunits of this radionuclide, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of about 1,000.

INDICATIONS AND USAGE
Technetium Tc 99m Mebrofenin is indicated as a hepatobiliary imaging agent.

CONTRAINdications
Hypersensitivity to this compound.

WARNings
The theoretical possibility of allergic reactions should be considered in patients who receive multiple doses.

PRECAUTIONS

General
Contents of the reaction vial are intended only for use in the preparation of Technetium Tc 99m Mebrofenin and are not to be administered directly to the patient. Delayed or non-visualization of the gallbladder may occur in the immediate administration of the radiopharmaceutical or after prolonged fasting past the enteral feeding. Functional biliary obstruction may accompany chronic cholecystitis or pancreatitis. In addition, patients with hepatocellular disease may show non-visualization or delayed visualization of the gallbladder. Delayed intestinal transit may also be noted in such patients. Juvenile hepatitis may be associated with gallbladder non-visualization and the label 6.02 hours. As in the use of any radioactive material, care should be taken to minimize radiation exposure to the patient consistent with proper patient management and to ensure minimum radiation exposure to occupational workers.

Pediatric Use
Technetium Tc 99m Mebrofenin is excreted in human milk during lactation. Therefore, formula feedings should be substituted for breast feedings.

ADVERSE REACTIONS
Urticaria and rash have been rarely reported with the use of Technetium Tc 99m Mebrofenin since market introduction. Rare cases of chills and nausea have been reported with related compounds. Infrequent cases of fever have been reported in association with the use of this class of agents.

DOSEAGE AND ADMINISTRATION

The suggested intravenous dose range of Technetium Tc 99m Mebrofenin in the average patient (70 kg) is:

TABLE 1

<table>
<thead>
<tr>
<th>Activity (mCi)</th>
<th>Dose Range (mCi)</th>
<th>Dose Range (MBq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 to 80</td>
<td>0.74 to 3.09</td>
<td>2.84 to 11.6</td>
</tr>
<tr>
<td>80 to 160</td>
<td>3.09 to 6.18</td>
<td>11.6 to 23.02</td>
</tr>
</tbody>
</table>

The Technetium Tc 99m labeling reactions involved in preparing the agent depend on maintaining the stannous ion in the reduced state. Any oxidant present in the sodium pertechnetate Tc 99m supply may, thus, adversely affect the quality of the radiopharmaceutical. Hence, sodium pertechnetate Tc 99m containing oxidants should not be employed.

Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the safe use and handling of radionuclides.

As in the use of any radioactive material, care should be taken to minimize radiation exposure to the patient consistent with proper patient management and to ensure minimum radiation exposure to occupational workers.

To 99m Mebrofenin should be formulated no more than 18 hours prior to clinical use.

Carcinogenesis, Mutagenesis, Impairment of Fertility
No long term animal studies have been performed to evaluate carcinogenic potential or whether Technetium Tc 99m Mebrofenin may affect fertility in males or females.

Pregnancy
Animal reproduction studies have not been conducted with Technetium Tc 99m Mebrofenin. It is also not known whether Technetium Tc 99m Mebrofenin can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. Technetium Tc 99m Mebrofenin should be given to a pregnant woman only if the expected benefits to be gained clearly outweigh the potential hazards.

Nursing Mothers
Technetium Tc 99m is excreted in human milk during lactation. Therefore, formula feedings should be substituted for breast feedings.

Pediatric Use
Safety and effectiveness in children below the age of 18 have not been established.

Nonnaupediatric patient: 74-185 MBq (2-5 mCi)
Patient with serum bilirubin level greater than 1.5 mg/dL: 111-370 MBq (3-10 mCi)