Technetium Tc 99m Generator

Secondary shield to further reduce radiation

5cc and 10cc elution vials

Elution vial shield

Adaptors for various elution vials

Sterile needle pack and labels furnished with each generator

20ml elution vials available on request
TECHNETIUM Tc 99m GENERATORS for the Production of Sodium Pertechnetate Tc 99m

DESCRIPTION: The Tc 99m Generator is prepared with a fixed volume of Molybdenum Mo 99 as the source for Technetium Tc 99m. A single dose of Tc 99m is administered to each patient and is used for all clinical purposes. The Tc 99m is produced by the generator and is available in the generator column.

INDICATIONS AND USAGE: Sodium Pertechnetate Tc 99m is used in adults and children for brain imaging including cerebrovascular angiography, thyroid imaging, parathyroid imaging, and renal imaging. Sodium Pertechnetate Tc 99m is also used in adults and children for vesico-ureteral reflux imaging. Sodium Pertechnetate Tc 99m is used in adults and children for brain imaging including cerebrovascular angiography, thyroid imaging, parathyroid imaging, and renal imaging.

CONTRAINDICATIONS: None known.

WARNINGS: Radiation risks associated with the use of Sodium Pertechnetate Tc 99m are greater in children than in adults. In general, the younger the patient the greater the risk. Therefore, the Tc 99m should be used only if the benefit is greater than the risk. When administering the Tc 99m to children, the patient should be kept at a distance from the generator.

ADVERSE REACTIONS: Allergic reactions including anaphylaxis have been reported. The patient should be kept at a distance from the generator when administering the Tc 99m to children.

June, 1983

Jointly manufactured by:
CINTICHEM, INC.
Tuxedo, N.Y. 10987

and

UNION CARBIDE CORPORATION
Tuxedo, N.Y. 10987

Pregnancy Category C

Animal reproductive studies have not been conducted with Tc 99m. It is also not known whether Tc 99m may affect fertility in male or female animals.
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Edited and with contributions by William F. Friedman, MD, Prof. and Chairman, Dept. of Pediatrics, UCLA Medical Center; J.H. Nicholson, Prof. of Pediatric Cardiology, UCLA School of Medicine; and Charles B. Higgins, MD, Prof. of Radiology and Chief, Magnetic Resonance Imaging, Univ. of California, San Francisco. About 320 pp., 274 illus. June 1984. About $39.50  #1287-3

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“Diagnostic Quality...” Skeletal Images in Two Hours!

Mallinckrodt OSTEOSCANN-HDP (Technetium Tc 99m Oxidronate Kit)

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Clinical Studies Verify the Two-Hour Advantage of OSTEOSCAN-HDP Over MDP in Skeletal Imaging

Higher Bone Uptake Than MDP at Two Hours

"Image quality is principally related to the absolute retention of the skeletal imaging agent on bone and the time available to allow the soft-tissue tracer component to be excreted by the kidneys." In clinical comparisons, OSTEOSCAN-HDP averaged 21% higher whole body retention than MDP and 99% higher than HEDP. Another comparative study showed that "HDP had a significantly greater bone/background ratio at 2 hours than MDP."  

Rapid Blood Clearance... Up to 16% Higher Bone to Soft-Tissue Ratios Than MDP

In clinical use of OSTEOSCAN-HDP, approximately 6% of the dose remained in the blood at two hours post-injection (No other bone-imaging agent clears faster). The resultant low soft-tissue levels permit early imaging and contribute to high-resolution images.

Side-by-Side Comparisons Rated HDP Images "Better" at Two Hours

In a controlled multi-center crossover study, HDP was found to give images of better quality than MDP at a dose-to-image time of two hours.

Diagnostic-quality skeletal images in two hours... an important contribution to departmental productivity and patient convenience.

References:

Scintiphotos courtesy of Howard J. Dworkin, MD, and William C. Porter, PharmD, WM Beaumont Hospital, Royal Oak, Michigan.
DESCRIPTION
OSTEOSCAN-HDP (Technetium Tc99m Oxidronate Kit) is supplied as a lyophilized powder packaged under nitrogen in vials for intravenous administration after reconstitution with ADDITIVE-FREE sodium pertechnetate Tc99m. Each vial contains 2.0 mg oxodronate sodium and 0.16 mg stannous chloride as active ingredients, and 0.56 mg genisic acid as a stabilizer. The contents of the vial are sterile and non-pyrogenic.

This radiopharmaceutical agent when reconstituted with ADDITIVE-FREE sodium pertechnetate Tc99m forms a complex of unknown structure.

Physical Characteristics
Technetium Tc99m decays by isomeric transition with a physical half-life of 6.02 hours. Photons that are useful for detection and imaging studies are listed in Table I.

Table I. Principal Radiation Emission Data

<table>
<thead>
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<th>Radiation</th>
<th>Mean % Disintegration</th>
<th>Mean Energy (keV)</th>
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<tbody>
<tr>
<td>Gamma-2</td>
<td>88.96</td>
<td>140.5</td>
</tr>
</tbody>
</table>

External Radiation
The external gamma ray constant for Technetium Tc99m is 0.8 R/mCi/m-in at 1 cm. The first half-value layer is 0.2 mm 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 II. To facilitate control of the radiation exposure from millicurie amounts of this radionuclide the use of a 2.5 mm thickness of Pb will attenuate the radiation emitted by a factor of about 1,000.

Table II. Radiation Attenuation by Lead Shielding

<table>
<thead>
<tr>
<th>Shield Thickness (Pb) mm</th>
<th>Coefficient of Attenuation</th>
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<tr>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1.6</td>
<td>0.05</td>
</tr>
<tr>
<td>2.5</td>
<td>0.03</td>
</tr>
<tr>
<td>3.3</td>
<td>0.02</td>
</tr>
</tbody>
</table>

To correct for physical decay of this radionuclide, the factors that remain at selected intervals of time of calibration are shown in Table III.

Table III. Physical Decay Chart; Tc99m, half-life 6.02 hours

<table>
<thead>
<tr>
<th>Hours</th>
<th>Fraction Remaining</th>
<th>Hours</th>
<th>Fraction Remaining</th>
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<tr>
<td>0</td>
<td>1.000</td>
<td>5</td>
<td>0.562</td>
</tr>
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<td>1</td>
<td>0.562</td>
<td>4</td>
<td>0.501</td>
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<td>0.501</td>
<td>3</td>
<td>0.447</td>
</tr>
<tr>
<td>3</td>
<td>0.388</td>
<td>2</td>
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<tr>
<td>6</td>
<td>0.251</td>
<td>2</td>
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</tr>
<tr>
<td>7</td>
<td>0.186</td>
<td>4</td>
<td>0.163</td>
</tr>
</tbody>
</table>

*Calibration Time

CLINICAL PHARMACOLOGY
During the 24 hours following injection, Technetium Tc99m-labeled OSTEOSCAN-HDP is rapidly cleared from blood and other non-osseous tissues and accumulates in the skeleton. In humans, blood levels are about 10% of the injected dose at one hour post-injection and continue to fall to about 6%, 4% and 3% at 2, 3, and 4 hours respectively when measured at 24 hours following administration. Skeletal retention is approximately 50% of the injected dose OSTEOSCAN-HDP exhibits its greatest affinity for areas of altered osteoid activity and actively metabolism bone.

INDICATIONS AND USAGE
OSTEOSCAN-HDP (Technetium Tc99m Oxidronate Kit) is a diagnostic skeletal imaging agent used to demonstrate areas of altered osteogenesis.

CONTRAINDICATIONS
None known.

WARNINGS
This class of compounds is known to complex cations such as calcium. Particular caution should be used with patients who have, or who may be predisposed to hypercalcemia (e.g., alkalinosis).

PRECAUTIONS
General
Contents of the vial are intended only for use in the preparation of Technetium Tc99m Oxidronate and are NOT to be administered directly to the patient. Technetium Tc99m Oxidronate should be formulated within eight (8) hours prior to clinical use. Optimal results are obtained one to four hours after administration. Technetium Tc99m Oxidronate as well as other radiopharmaceuticals, must be handled with care, and appropriate safety measures should be used to minimize radiation exposure to the personnel consistent with proper patient management.

Radiopharmaceutic should be used only by physicians who are qualified by specific training in the safe handling and use of radionuclides, and whose experience and training have been approved by the appropriate government agency. The use of the radionuclides to minimize radiation dose to the bladder, the patient should be encouraged to drink fluids and to void immediately, and as often thereafter as possible for the next four to six hours.

Carcinogenicity, Mutagenicity, Impairment of Fertility
No long-term animal studies have been performed to evaluate carcinogenic potential or whether Technetium Tc99m Oxidronate affects fertility in males and females.

Pregnancy—Category C
Animal reproduction studies have not been conducted with Technetium Tc99m Oxidronate. It is also not known whether Technetium Tc99m Oxidronate can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Technetium Tc99m Oxidronate should be given to a pregnant woman only if clearly needed. Ideally, examinations, using radiopharmaceuticals, especially those that are electively in nature, of a woman of childbearing capability should be performed during the first few (approximately 10 days) following the onset of menses.

Nursing Mothers
Technetium Tc99m is excreted in human milk during lactation. Therefore, formula feedings should be substituted for breast feedings.

Pediatric Use
Safety and effectiveness in children have not been established.

ADVERSE REACTIONS
Although adverse reactions have not been reported, it is specifically attributable to the use of Technetium Tc99m Oxidronate, allergic dermatological manifestations (erythema) have been infrequently reported with similar agents.

DOSEAGE AND ADMINISTRATION
General Instructions
The recommended adult dose of Technetium Tc99m-labeled OSTEOSCAN-HDP is 15 mCi with a range of 10 to 20 mCi. The activity of each dose should be measured by a suitable radiation calibration system just prior to administration. The dose should be given intravenously by slow injection. For optimal results imaging should be done 1-4 hours post-injection.

Radiation Dosimetry
The estimated absorbed radiation dose to an average patient (70 kg) from an intravenous injection of 20 microliters of Technetium Tc99m-labeled OSTEOSCAN-HDP is shown in Table IV.

Table IV. Absorbed Radiation Dose

<table>
<thead>
<tr>
<th>Tissues</th>
<th>(rad/20 mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Body</td>
<td>0.13</td>
</tr>
<tr>
<td>Bone Total</td>
<td>0.70</td>
</tr>
<tr>
<td>Red Marrow</td>
<td>0.56</td>
</tr>
<tr>
<td>Kidneys</td>
<td>0.80</td>
</tr>
<tr>
<td>Liver</td>
<td>0.06</td>
</tr>
<tr>
<td>Bladder Wall</td>
<td></td>
</tr>
<tr>
<td>2 hr void</td>
<td>2.60</td>
</tr>
<tr>
<td>4 hr void</td>
<td>6.20</td>
</tr>
<tr>
<td>Urethra</td>
<td></td>
</tr>
<tr>
<td>2 hr void</td>
<td>0.24</td>
</tr>
<tr>
<td>4 hr void</td>
<td>0.34</td>
</tr>
<tr>
<td>Testes</td>
<td></td>
</tr>
<tr>
<td>2 hr void</td>
<td>0.16</td>
</tr>
<tr>
<td>4 hr void</td>
<td>0.22</td>
</tr>
</tbody>
</table>

*Method of calculation: S = Absorbed Dose per Unit Cumulated Activity Selected Radionuclides and Organs. MILR Pamphlet No. 1, 1975

Preparations for Use
All procedures are best conducted using waterproof gloves. Use shielded syringes during transport and administration of Tc99m solutions.

1. Remove metal disc from OSTEOSCAN-HDP vial and clean top by swabbing with alcohol. Note: do not use a single patient, see unit dose preparation method below.

2. Place vial in lead shield. Add 3.6 ml of sodium pertechnetate Tc99m solution and secure with a lead lead cover. In choosing the amount of Tc99m radioactivity to be used, the number of doses desired, the activity of each dose (recommended adult dose 15 mCi with a range of 10-20 mCi) and radioactive decay must be taken into account. The recommended maximum amount of Tc99m radioactivity to be added to the vial is 200 mCi.

Note: The contents of the vial are now radioactive. Maintain adequate shielding using the lead shield and fitted lead cover during the entire of the radioactive preparation.

3. Shake the vial for approximately 30 seconds to assure complete dissolution.

4. Record the time, date of preparation and the activity of the Tc99m-labeled OSTEOSCAN-HDP on the radiation label and affix this label to the shield.

5. Use within eight (8) hours of preparation. Refrigeration of the radiolabeled complex is not necessary. Discard excess material in accordance with Nuclear Regulatory Commission or equivalent state regulations pertaining to the disposal of radioactive wastes.

HOW SUPPLIED
OSTEOSCAN-HDP is supplied as a lyophilized powder in vials. Each vial contains 2.0 mg oxodronate sodium and 0.16 mg stannous chloride as active ingredients, and 0.56 mg genisic acid as stabilizer. Kits containing 5 vials (NDC 00019-N099-DO) or 30 vials (NDC 00019-N099-DO) are available. The drug can be stored at room temperature prior to and following reconstitution with ADDITIVE-FREE sodium pertechnetate Tc99m.

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by Philip J. Robbins

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That simply isn’t true. In fact, over two million people have had cancer and survived to lead happy, normal lives.
And not only can cancer be beaten, it can also be prevented.
There are definite precautions that have been proven to decrease your risk of getting certain cancers.
Ask your local American Cancer Society to send you a free booklet about cancer risks.
Learn the facts about cancer.
And make not knowing the risks, one less risk.

AMERICAN CANCER SOCIETY
How you live may save your life.

This space contributed as a public service.
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The finest R-wave Triggering device available for computerized gated cardiac studies.

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NUCLEAR MEDICINE PHYSICIAN. Experienced Nuclear Medicine Physician in expanding progressive private in vivo and in vitro NM competent laboratory. Applicant should be board certified by ABNM or board eligible in Nuclear Medicine with preferably two years internal medicine residency training. Medical school association or affiliation possible if desired. Please send resume to: Box 701, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR MEDICINE PHYSICIAN. Staff position available in the Section of Nuclear Medicine, Health Sciences Centre. This hospital is a tertiary care centre performing a full range of imaging and non-imaging studies. Applicants should be certified by the Royal College of Physicians and Surgeons of Canada and eligible to sit the Certification Examinations. Opportunities for research and academic title are available. This position—fellowship or residency eligible. Canadian citizens, landed immigrants, and others eligible for employment in Canada at the time of application are especially encouraged to apply. Send resume or call Dr. I. David Greenberg, Section of Nuclear Medicine, Health Sciences Centre, 700 William Avenue, Winnipeg, Manitoba, Canada R3E 0Z5; (204)787-3375.

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NUCLEAR MEDICINE TECHNOLOGIST. Position now available for an experienced Nuclear Medicine Technologist certified by SNM or registered technologist in a private progressive outpatient nuclear medicine laboratory in a large city in a large medical center in the Sun Belt. Knowledge of radioimmunoassay, imaging, computer, and nuclear cardiology in addition to supervisory, administrative, and teaching experience required. Please send resume to: Box 700, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR MEDICINE TECHNOLOGIST. The Veterans Administration Medical Center Danville, Illinois is recruiting for a Nuclear Medicine Technologist. Performs a full range of nuclear medicine duties including nuclear cardiology. The VA Medical Center, Danville, is affiliated with the University of Illinois School of Medicine. The Medical Center is 30 miles east of Champaign-Urbana, 150 miles south of Chicago, and 86 miles west of Indianapolis, Indiana. Excellent fringe benefits include annual and sick leave, health and life insurance and retirement. Salary range $20,965 to $27,255. Contact Richard Wheeler, Personnel Office, VA Medical Center, Danville, IL 60132. Tel: (217)442-8000 ext. 236. Equal Opportunity Employer.

NUCLEAR PHARMACIST. Thomas Jefferson University Hospital, a major tertiary-care urban teaching institution, is seeking a Pharmacist with training in nuclear pharmacy. The Nuclear Pharmacist is responsible for the preparation and quality control of all radiopharmaceuticals used in our nuclear medicine department. Teaching opportunities include instructing nuclear medicine technologists and pharmacy students in nuclear pharmacy concepts. This established position provides excellent opportunities for personal and professional growth, including participation in interdisciplinary radiopharmaceutical research. Employees enjoy a highly competitive package of salary and benefits. Applicants should forward a resume, preferably with letters of reference and a cover letter, to: M. Thakur, Ph.D., Dept. of Radiation Therapy, Thomas Jefferson University Hospital, 10th & Sansom Streets, Main Building, Philadelphia, PA 19107. Equal Opportunity Employer.

Positron Emission Tomography (PET). Unusual career opportunity for academically oriented PHYSICIST with research interest in PET instrumentation and image reconstruction/quantitation. Excellent computing and image processing facilities, full-time hardware, and software support. Background in medical physics helpful but not essential. Competitive salary, excellent benefits. For more information write to: D.A. Rottenberg, MD, Department of Neurology, Memorial Sloan-Kettering Cancer Center, 1275 York Avenue, New York, NY 10021, or call (212)794-7045, Equal Opportunity Employer.

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PERSONNEL DEPARTMENT
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6420 Clayton Road
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**VOLUME 25, NUMBER 7**
Faculty Position Available
RADIOPHARMACY

The University of New Mexico College of Pharmacy is now accepting applications for a position in Radiopharmacy at the Associate Professor/Professor level—depending on qualifications and experience. The position also entails directorship of the Centralized Radiopharmacy located on the UNM North Campus. Deadline for applications is August 1, 1984. The position is a tenure track, twelve-month appointment. Salary is open.

Academic requirements preferred for the position include a Bachelor of Science degree in Pharmacy and a M.S. or Ph.D. in Radiopharmacy or a related field. The individual will have primary responsibility for the undergraduate, residency, and a graduate M.S. degree program in Radiopharmacy. He/she will also have responsibility for supervising the operational activities of the Centralized Radiopharmacy which serves as a teaching laboratory, and services several hospitals in Albuquerque and the surrounding area.

Radiopharmacy facilities allow for both teaching and research, and its location provides for opportunities for interdisciplinary activities with the School of Medicine and the UNM Cancer Research Center.

The University of New Mexico is an Equal Opportunity Employer and an active participant in a state-wide Affirmative Action Program. Individuals interested in the above position should submit a curriculum vitae and accompanying letter to:

William B. Hladik III
Chairperson, Search Committee
College of Pharmacy
University of New Mexico
Albuquerque, NM 87131

RADIOCHEMIST

The Oak Ridge National Laboratory invites applications from experienced candidates with a Ph.D. or equivalent and a minimum of 1 to 2 years relevant experience in nuclear chemistry, radiochemistry, or related areas. The duties involve coordinating target fabrication, radionuclide production and processing, radiochemistry and radionuclide generator development. This position is within the Nuclear Medicine Group in the Health and Safety Research Division of ORNL.

ORNL offers an excellent benefits package and a generous relocation program plus a stimulating working environment. U.S. Citizenship required.

Qualified applicants should forward resume, three letters of recommendation, and academic transcripts to:

Mr. J.T. Atherton
Technical Employment Manager
Oak Ridge National Laboratory
Building 4500N
Oak Ridge, TN 37831

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Danny Thomas, Founder
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NUCLEAR MAGNETIC RESONANCE and Correlative Imaging Modalities

Edited by C. Leon Partain, PhD, MD

This multi-authored book contains state-of-the-art summaries on ultrasound, x-ray, computed tomography, and digital radiography in addition to NMR. The correlative aspects of each modality with nuclear medicine are investigated. Material devoted to NMR covers topics such as basic principles and instrumentation; considerations of site preparation; safety and quality control; pulse sequences and tissue contrast; and the current clinical results at certain hospital installations. Facts on the economic, legal, and political aspects of NMR are also included.

Anyone in nuclear medicine—from professional to student—interested in new technologies to ensure a quantitative, physical, and biochemical basis for accurate medical diagnosis will profit from reading this comprehensive publication.

HIGHLIGHTS FROM THE CONTENTS

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M.R. Willcott and Gary E. Martin

The Basis of Imaging and Chemical Analysis by NMR
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Magnet Systems: Resistive, Superconducting and Permanent
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Pulse Sequences for NMR Imaging Using Multidimensional Reconstruction Techniques
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Thallous Chloride TI 201

DESCRIPTION: Thallous Chloride TI 201 is supplied in isotonic solution as a sterile, nonpyrogenic diagnostic radiopharmaceutical for intravenous administration. Each unit dose contains 1 milliliter and each milliliter contains 2 millicuries of Thallous Chloride TI 201 at calibration time, pH adjusted to 5.0-8.0 with hydrochloric acid and/or sodium hydroxide. Contains no bacteriostatic preservative. Thallium TI 201 is a cyclotron produced and is essentially carrier-free. Radiouclide purity at calibration time is at least 99.0% with less than 1.0% Thallium TI 200,1.0% Thallium 202 and 0.2% Lead Pb 203. The concentration of each radionuclue contaminant changes with time.

INDICATION AND USAGE: Thallium TI 201 may be used in cardiac imaging to define the extent of myocardial infarction. It may also be useful in conjunction with exercise stress testing as an adjunct in the diagnosis of ischemic heart disease (atherosclerotic coronary artery disease).

CONTRAINDICATIONS: None known.

WARNINGS: When studying patients suspected or known to have myocardial infarction or ischemia, care should be taken to assure continuous clinical monitoring and treatment in accordance with safe, accepted procedure. Exercise stress testing should be performed only under the supervision of a qualified physician and in a laboratory equipped with appropriate resuscitation and support apparatus.

PRECAUTIONS

General

Do not use after the expiration time and date (4 days after calibration time) stated on the label.
Discard vial after single use. Do not use if contents are turbid.
The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.
Ideally, examinations using radiopharmaceuticals, especially those elective in nature on a woman of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses.

Thallous Chloride TI 201 as well as other radioactive drugs must be handled with care, and appropriate safety measures should be used to minimize radiation exposure to personnel. Also, care should be taken to minimize radiation exposure to the patient consistent with proper patient management.

Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the safe use and handling of radionuclides, and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

Carcinogenesis, Mutagenesis, Impairment of Fertility

No long-term animal studies have been performed to evaluate carcinogenic potential, mutagenicity potential, or whether Thallous Chloride TI 201 affects fertility in males or females.

Pregnancy Category C

Animal reproduction studies have not been conducted with Thallous Chloride TI 201. It is also not known whether Thallous Chloride TI 201 can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Thallous Chloride TI 201 should be given to a pregnant woman only if clearly needed.

Nursing Mothers

It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when Thallous Chloride TI 201 is administered to a nursing woman.

Pediatric Use

Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: Adverse reactions related to use of this agent have not been reported to date.

HOW SUPPLIED: Thallous Chloride TI 201 is supplied as a sterile, nonpyrogenic, isotonic solution in unit dose vials containing 1 milliliter. Each milliliter contains 2 millicuries of Thallous Chloride TI 201 at calibration time. Contains no bacteriostatic preservative.