ANNOUNCING

MPI Indium DTPA In 111
(Pentetate Indium Disodium In 111)
In Cisternography

Cisternography presents the dynamics of CSF flow

When you need to know function—
cisternography is useful in the evaluation of:
• Patients who may need ventricular shunts
• Shunt patency and/or site of blockage
• Patients with symptoms of "normal pressure" hydrocephalus
• Patients with symptoms of "communicating" hydrocephalus
• CSF rhinorrhea patients

See us at the SNM Meeting in Miami Beach at Island 21
CLINICAL CRITERIA

"An ideal radiopharmaceutical for cisternography would satisfy the following criteria: (I) physiologically governed by CSF flow, (II) adequate half-life for desirable period of study, (III) photons suitable for scanning, (IV) low radiation dose, (V) least probable chemical toxicity, and (VI) controlled pharmaceutical quality. Chelated "In satisfies all these conditions."1

COMPARISON OF TWO RADIOPHARMACEUTICALS USED IN EVALUATION OF CEREBROSPINAL FLUID PATHWAYS2

<table>
<thead>
<tr>
<th></th>
<th>153Yb DTPA</th>
<th>111In DTPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Half-Life</td>
<td>32 days</td>
<td>2.8 days</td>
</tr>
<tr>
<td>Biological Half-Life</td>
<td>12 hours</td>
<td>10 hours</td>
</tr>
<tr>
<td>Useful Photons (energy MeV)</td>
<td>0.177, 0.198</td>
<td>0.173, 0.247</td>
</tr>
<tr>
<td>Useful Photons (% disintegration)</td>
<td>0.57</td>
<td>1.85</td>
</tr>
<tr>
<td>Whole Body Dose</td>
<td>0.069/500 μCi</td>
<td>0.039/500 μCi</td>
</tr>
<tr>
<td>Spinal Cord Surface Dose (rads)</td>
<td>8.0/500 μCi</td>
<td>1.9/500 μCi</td>
</tr>
</tbody>
</table>


DESCRIPTION: MPI Indium DTPA In 111 is a diagnostic drug for intrathecal use. It is available as a sterile, pyrogenic, isotonic, aqueous solution, buffered to pH 7 to 8. At calibration time each milliliter contains 1 millicurie of Pentetate Indium Disodium In 111 (no-carrier-added), 20 to 50 micrograms of pentetic acid, and sodium bicarbonate for pH adjustment. The drug is to be discarded after single use. Radiouacnic purity at calibration time is at least 99.0% with less than 0.1% Indium In 114m and 0.1% Zinc Zn 65. The concentration of each radionuclidic contaminant changes with time. Graph 1 shows maximum concentration of each radionuclidic impurity as a function of time.

INDICATIONS AND USAGE: Pentetate Indium Disodium In 111 is recommended for use in radionuclide cisternography.

CONTRAINDICATIONS: None known.

WARNINGS: The contents of the vial are radioactive. Adequate shielding of the preparation must be maintained at all times.

Since the drug is excreted by the kidneys, caution should be exercised in patients with severely impaired renal function.

PRECAUTIONS: Pentetate Indium Disodium In 111, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize external radiation exposure to clinical personnel, and to minimize radiation exposure to the patients consistent with proper patient management.

Do not use after the expiration time and date (7 days after calibration time) stated on the label.

Discard vial after a single use. Do not use if contents are turbid.

Carcinogenesis, Mutagenesis, Impairment of Fertility

No long-term animal studies have been performed to evaluate carcinogenic potential, or whether Pentetate Indium Disodium In 111 affects fertility in males or females.

Pregnancy Category C

Animal reproductive studies have not been conducted with MPI Indium DTPA In 111. It is also not known whether Pentetate Indium Disodium In 111 can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. Pentetate Indium Disodium In 111 should be given to a pregnant woman only if clearly needed.

PRECAUTIONS: Ideally, examinations using radiopharmaceuticals, especially those elective 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

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 Pentetate Indium Disodium In 111 is administered to a nursing mother.

Pediatric Use

Safety and effectiveness in children have not been established.

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.

ADVERSE REACTIONS: Aseptic meningitis and pyrogenic reactions have been rarely (less than 0.4%) observed following cisternography with Pentetate Indium Disodium In 111.

HOW SUPPLIED: Pentetate Indium Disodium In 111 (no-carrier-added) is supplied in single dose glass vials, each containing 1.5 ml of solution with a concentration of 1 millicurie per ml and a total activity of 1.5 milliecc per vial at calibration time.
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(Nurse)
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**Kit for the Preparation of Technetium Tc 99m Sulfur Colloid Injection**

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**INDICATIONS AND USAGE:** Technetium Tc 99m Sulfur Colloid Injection is used as an agent for imaging areas of functioning reticuloendothelial cells in the liver, spleen, and bone marrow.

**CONTRAINDICATIONS:** None known.

**WARNINGS:** The contents of the two syringes, one syringe containing the sodium thiosulfate solution and the second syringe containing the appropriate buffer solution, are intended only for use in the preparation of the Technetium Tc 99m Sulfur Colloid Injection and are not to be directly administered to the patient.

The contents of the kit are not radioactive. However, after the Sodium Pertechnetate Tc 99m is added, adequate shielding of the final preparation must be maintained.

**PRECAUTIONS:** The components of the kit are sterile and pyrogen-free. It is essential that the user follows the directions carefully and adheres to strict aseptic procedures during preparation of the colloid.

The stability of the colloidal preparation may be decreased in the presence of polyvalent cations, thus resulting in the agglomeration of the individual colloidal particles. These larger particles are likely to be trapped by the pulmonary capillary bed following intravenous injection.

It is recommended that Sodium Pertechnetate Tc 99m solutions containing more than 10 micrograms/ml of aluminum ion not be used for formulation of the Technetium Tc 99m Sulfur Colloid Injection. The Sodium Pertechnetate Tc 99m solution must also be free of any traces of oxidizing agents such as peroxides and hypoiodites.

Technetium Tc 99m Sulfur Colloid Injection is physically unstable and as such the particles will settle with time. Failure to agitate the vial adequately before use may result in non-uniform distribution of radioactivity.

It is also recommended that because of the increasing probability of agglomeration with aging, a batch of Technetium Tc 99m Sulfur Colloid Injection not be used after six hours from the time of formulation.

The preparation contains no bacteriostatic preservative.

**TECHNETIUM 99m TSC KIT FOR THE PREPARATION OF TECHNETIUM Tc 99m SULFUR COLLOID INJECTION**

For complete prescribing information consult package insert, a summary of which follows:

**Pregnancy Category C:** Animal reproduction studies have not been conducted with Technetium Tc 99m Sulfur Colloid. It is also not known whether Technetium Tc 99m Sulfur Colloid can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Technetium Tc 99m Sulfur Colloid should be given to a pregnant woman only if clearly needed.

- **Hypersensitivity Reactions:** Hypersensitivity reactions, including anaphylaxis, have been reported in patients receiving sulfur colloid preparations.
- **Bone:** Injections should not be undertaken while a pacemaker is on a drug since many drugs and excreted in human milk.
- **Safety and effectiveness in children have not been established.**

Technetium Tc 99m Sulfur Colloid Injection, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize external radiation exposure to clinical personnel. Also, care should be taken to minimize radiation exposure to patients, consistent with proper patient management.

**ADVERSE REACTIONS:** Hypersensitivity reactions, including anaphylaxis, have been reported in patients receiving sulfur colloid preparations.

One death and several cases of lung and soft tissue uptake other than RES have been reported in the association with the use of Technetium Tc 99m Sulfur Colloid Injection.

**HOW SUPPLIED:** The TECHNETIUM 99m SULFUR COLLOID KIT is supplied as a sterile pyrogen-free kit consisting of: five reconstituted vials containing 0.5 ml 1.0 N hydrochloric acid in water; five sterile syringes (marked "A"); each containing 1.7 mg sodium thiosulfate anhydrous in 1.7 ml aqueous solution; five sterile syringes (marked "B"); each containing 1.9 mg sodium pertechnetate in 1.9 ml aqueous buffer solution; one syringe of sterile 0.9% sodium chloride in 2.1 ml aqueous buffer solution containing 17 mg sodium ascorbate.

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Assistant Professor of Radiology
V.A. Hospital, Denver, CO

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Novo is proud of its pioneering role in the development of this clinical milestone, and proud to define today’s state of the art while developing systems for tomorrow.

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The Novo Cerebrograph quantifies data on various functional and hemodynamic changes within the brain through measurement of regional Cerebral Blood Flow (rCBF). This multidetector system yields results frequently unobtainable by other methods. The rCBF technique is used to study a broad range of pathological conditions, including cerebrovascular disease, head trauma, and dementia states. It is also used in neuropsychology to quantify changes in cortical activation during higher mental functions.

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For a reprint of the papers cited here plus more information about TechnecScan PYP, just call your Mallinckrodt sales representative or call 800-325-8181 toll free. (In Missouri, 314-895-2405 collect)

For brief summary see opposite page.

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The Technologist Section of the Society of Nuclear Medicine announces...

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The Curriculum Guide will prove invaluable as a reference for current and pertinent information in nuclear medicine technology and related disciplines.

Loose-leaf Format; 8½ x 11; 336 pp.

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Does not accumulate in choroid plexus
Rapid clearance rate of DTPA allows:
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Easy two-step procedure

Kit contains 10 multidose reaction vials.

For further information, call Technical Customer Service, 609-921-4100.

See next page for brief summary.
TECHNEPLEX®
Technetium Tc 99m Pentetate Kit
DIAGNOSTIC—FOR INTRAVENOUS USE

DESCRIPTION: The kit consists of 10 multidose reaction vials, each containing a sterile, pyrogen-free lyophilized mixture of 10 mg pentetate calcium trisodium, 0.50 mg stannous chloride under a nitrogen atmosphere. When sterile, pyrogen-free sodium pertechnetate Tc 99m in isotonic saline is added to the vial, a chelated technetium Tc 99m pentetate is formed. The product as supplied is sterile and pyrogen-free.

INDICATIONS AND USAGE: Technetium Tc 99m pentetate may be used to perform kidney imaging, brain imaging, to assess renal perfusion, and to estimate glomerular filtration rate.

CONTRAINDICATIONS: None known.

WARNINGS: None known.

PRECAUTIONS: Contents of the vial are intended only for use in the preparation of technetium Tc 99m pentetate and are not to be administered directly to the patient except after the addition of sodium pertechnetate Tc 99m. The contents of the kit are not radioactive. However, after the sodium pertechnetate Tc 99m is added, adequate shielding of the final preparation must be maintained. Technetium Tc 99m pentetate as well as other radioactive drugs, must be handled with care, and appropriate safety measures should be used to minimize radiation exposure to the patients consistent with proper patient management and to ensure minimum radiation exposure to occupational workers.

To minimize radiation dose to the bladder, the patients should be encouraged to drink fluids and to void immediately before the examination, and for the next 4 to 6 hours thereafter, as often as possible.

Technetium Tc 99m pentetate should be formulated within 6 hours prior to clinical use for brain and kidney imaging, and for assessing renal perfusion. For estimating glomerular filtration rates Tc 99m pentetate should be used within 1 hour after formulation.

The components of the Technetium Tc 99m Pentetate Kit (Chelate) are supplied sterile and non-pyrogenic. Aseptic procedures normally employed in making additions and withdrawals from sterile, non-pyrogenic containers should be used during addition of pertechnetate solution and the withdrawal of doses for patient administration.

The labeling reactions involved in preparing the agent depend on maintaining the tin in the reduced state. Any oxidant present in the sodium pertechnetate Tc 99m supply may thus adversely affect the quality of the prepared agent. Hence, sodium pertechnetate Tc 99m containing oxidants, or other additives, should not be employed without first demonstrating that it is without adverse effect on the properties of the resulting agent.

Carcinogenesis, Mutagenesis, Impairment of Fertility: No long-term animal studies have been performed to evaluate carcinogenic potential or whether technetium Tc 99m pentetate affects fertility in males or females.

Pregnancy Category C: Animal reproductive studies have not been conducted with technetium Tc 99m pentetate. It is also not known whether technetium Tc 99m pentetate can cause fetal harm or affect reproductive capacity when administered to a pregnant woman. Technetium Tc 99m pentetate should be given to a pregnant woman only if clearly needed.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of childbearing capability should be performed during the first few (approx. 10) days following the onset of menses.

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

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

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.

ADVERSE REACTIONS: None specifically attributable to the use of technetium Tc 99m pentetate have been reported.

Drug Abuse and Dependence: There is no report of any drug abuse or dependence with this diagnostic agent.

Overdosage: Increased radiation exposure would be expected if an overdosage of the diagnostic agent occurred.

For complete prescribing information, consult package insert.

HOW SUPPLIED: Technene (Technetium Tc 99m Pentetate Kit) is supplied as a sterile, pyrogen-free kit containing 10 sterile multidose reaction vials and 20 pressure-sensitive labels.

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The Technologist Section of the Society of Nuclear Medicine announces . . .

CLINICAL EVALUATION METHODS GUIDE

This publication is designed to aid allied health and nuclear medicine technology educators in developing appropriate assessment instruments for evaluating student performance.

The 6 assessment tools described are: checklists, rating scales, anecdotal records, critical incident technique, questionnaires, and data forms.

While indispensable to professionals in nuclear medicine and related technology programs, the information contained herein will also be useful to those involved in personnel evaluation.

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Prepared by more than 50 recognized authorities in the field, this book will prove invaluable to practicing physicians and those preparing for certification.

**Note:** Since minor revisions have been included in the second printing, an erratum page is available to purchasers of the first printed edition. To obtain a free copy, please send a self-addressed stamped envelope to the address listed below.

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Please see following pages for print summary of research information.
**OSTEOLITE™**

Technetium Tc 99m Medronate Sodium Kit (MDP)

**INDICATIONS AND USAGE:** Technetium Tc 99m Medronate may be used as a bone imaging agent to delineate active or healed osteolytic disease.

**CONTRAINDICATIONS:** None known.

**WARNINGS:** This class of compound is known to complex cations such as calcium. Particular caution should be used with patients who have, or may be predisposed to, hypocalcemia (i.e., alkalosis).

**PRECAUTIONS:** Contents of the vial are intended only for use in the preparation of Technetium Tc 99m Medronate and are NOT to be administered directly to the patient. Technetium Tc 99m Medronate as well as any radioactive drugs must be handled with care and appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Also, care should be taken to minimize radiation exposure to the patients consistent with proper patient management.

To minimize radiation dose to the bladder, the patients should be encouraged to drink fluids and to void immediately before the examination and as often thereafter as possible for the next 4-6 hours. Technetium Tc 99m Medronate should be formulated within six (6) 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 Medronate affects fertility in males or females.

**Pregnancy Category C.** Animal reproductive studies have not been conducted with Technetium Tc 99m Medronate. It is also not known whether Technetium Tc 99m Medronate can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Technetium Tc 99m Medronate should be given to a pregnant woman only if clearly needed.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of childbearing capability should be performed during the first few days, and most closely following the onset of menses.

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

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

Radiochemicals 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.

**ADVERSE REACTIONS:** Although adverse reactions have not been reported that are specifically attributable to the use of Technetium Tc 99m Medronate, allergic dermatological manifestations (erythema) have been infrequently reported with other similar agents.

**DOSAGE AND ADMINISTRATION:** The suggested dose range for i.v. administration, after reconstitution with oxidant-free sodium pertechnetate Tc 99m injection, is 5-10 mCi Technetium Tc 99m Medronate.

Scanning post-injection is optimal at about 1-4 hours after injection. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration. Radiochemical purity should be checked prior to patient administration.

**HOW SUPPLIED:** NEN's OSTEOLITE™ Technetium Tc 99m Medronate Kit is supplied as a set of five or thirty vials. Each nitrogen-flushed vial contains 0.5 mL of a solution which contains: 37 MBq Medronate Disodium 10 mg
total Sannous and Stannic Chloride—1 mg
Stannous Chloride (SnCl2·2H2O) (minimum) 0.5 mg

Prior to reconstitution of the solution, the pH is adjusted to between 7.0-7.5 using hydrochloric acid and/or sodium hydroxide solution. The components of the vials are lyophilized and stored under nitrogen. Store at room temperature (15-30°C) before and after reconstitution.

The components of the Technetium Tc 99m Medronate Kit are supplied sterile and non-pyrogenic. Aseptic procedures normally employed in making additions and withdrawals from sterile, non-pyrogenic containers should be used during addition and withdrawal of pertechnetate solution and the withdrawal of doses for patient administration.

Technetium Tc 99m Medronate is prepared by adding 2-8 mL of oxidant-free sodium pertechnetate Tc 99m solution to the vial and shaking for about one minute. Shielding should be utilized when preparing the Technetium Tc 99m Medronate.

Catalog Number NRP-420 (5-Vial Kit)
Catalog Number NRP-420C (30-Vial Kit)

December 1981

New England Nuclear

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Volume 23, Number 6  41A
Heavyweight

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HDP shows unusually high adsorption to bone. In a clinical comparison, Osteoscan-HDP averaged 21% higher bone uptake than the MDP-based agent.¹

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No bone agent clears the blood faster. Only 6% of Osteoscan-HDP remains in the blood two hours after injection.² Osteoscan-HDP’s rapid blood clearance contributes to the overall quality of the image and permits flexibility in scheduling patient scans from 1 to 4 hours post-injection.

**Scan data:**
The two scans above are of a 56-year-old female patient with breast cancer. Scan: abnormal activity in right ischial ramus. Instrument: General Electric MaxiCamera™ 535; total counts: 2000K; dose: 20.8 mCi; 5'5", 175 lb; dose-to-image time: 2.25 hours
Notice excellent bone delineation in this obese patient.

**References:**
HDP offers a high tumor-to-normal bone ratio. This results in high resolution scans capable of demonstrating subtle skeletal metastases and fractures with no sacrifice in overall image quality.

Scan data:
The two scans above are of a 79-year-old male patient with adenocarcinoma-prostate. Scan: multiple lesions. Instrument: Picker 4/15 Gamma Camera; information density: 3000; dose: 15 mCi; dose-to-image time: 3 hours IVP revealed mass in right kidney causing retention.

Unexcelled image quality

Osteoscan-HDP's high bone uptake and rapid blood clearance permit clear visualization of skeletal detail even in difficult-to-scan elderly patients.

High lesion sensitivity

See for yourself

To order Osteoscan-HDP, or for further information, call or write Procter & Gamble, Professional Services, P.O. Box 85507, Cincinnati, Ohio 45201, (513) 977-5547.

Please see the following page for a brief summary of prescribing information.
INDICATIONS AND USAGE
OSTEOSCAN-HDP (Technetium Tc99m Oxidronate Kit) is a diagnostic skeletal imaging agent used to demonstrate areas of altered osteogenesis.

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 and urine. 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 its administration, skeletal retention is approximately 50% of the injected dose. OSTEOSCAN-HDP exhibits its greatest affinity for areas of altered osteogenesis and actively metabolizing bone.

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 hypocalcemia (e.g., alkalosis).

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 imaging results are obtained one to four hours after administration.

OSTEOSCAN-HDP is administered as well as other radiopharmaceuticals, must be handled with care, and appropriate safety measures should be used to minimize radiation exposure to the patient and personnel. Radiopharmaceuticals should be used only by physicians who are qualified by specific training in the safe use and handling of radionuclides and whose experience and training have been approved by the appropriate government agency charged with the use of radionuclides. To minimize radiation dose to the patient, the patient should be encouraged to drink fluids and to void immediately before the examination and as often thereafter as possible for the next four to six hours.

Carcinogenesis, Mutagenesis, 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 and the patient is under the care of a physician that has been informed of the potential hazards.

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 that are specifically attributable to the use of Technetium Tc99m Oxidronate, allergic dermatological manifestations (erythema) have been infrequently reported in reported studies with similar agents.

DOSE 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 with 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.

HOW SUPPLIED
OSTEOSCAN-HDP is supplied as a lyophilized powder packaged in vials. Each vial contains 5.0 mg oxodronate sodium and 0.24 mg stannous chloride as active ingredients, and 0.84 mg gentisic acid as a stabilizer. Kits containing 5 or 30 vials are available. The NDC number for this product is NDC: 37000-407-01. The drug can be stored at room temperature both prior to and following reconstitution with ADDITIVE-FREE sodium pertechnetate Tc99m.

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THE JOURNAL OF NUCLEAR MEDICINE

November, 1981
46A
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For detailed information, see Technical Notes: “Refrigerated Charcoal Trap For Xe-133”, in the Nov./Dec. 1981 issue of Medical Physics.

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