Xenon

Xenon Xe 133

How you like it

When you like it
How you like it

MPI Xenon Xe 133 is now available in four product configurations—from unit dose to bulk:

- Ventilation Study System (V.S.S.)
- 10 mCi vials
- 20 mCi vials
- 1.3-1.7 Ci ampules (crushable and breaksealed)

When you like it

MPI Xenon Xe 133 delivery and calibration schedule—utmost convenience and optimal product use:

<table>
<thead>
<tr>
<th>Product</th>
<th>1st Rec.</th>
<th>Calibrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.S.S.</td>
<td>Monday</td>
<td>Thursday</td>
</tr>
<tr>
<td>10 &amp; 20 mCi vials</td>
<td>Monday</td>
<td>Thursday</td>
</tr>
<tr>
<td>1.3-1.7 Ci Ampules</td>
<td>Monday</td>
<td>Prior Friday</td>
</tr>
</tbody>
</table>

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

Xenon Xe 133-V.S.S. For the study of pulmonary ventilation.
Xenon Xe 133 Gas Ampule & MPI Xenon Xe 133 Gas Vial. For the study of pulmonary ventilation and assessment of cerebral blood flow.

DESCRIPTION: The Xenon Xe 133-Ventilation Study System consists of a sealed frangible capsule containing 10 millicuries ± 20% of Xenon Xe 133 gas at calibration time and date with less than 1% carrier xenon in air. Xenon Xe 133 Gas vials is supplied as a carrier-free gas in concentrations of 10 to 50 mCi per milliliter of gas for inhalation. Xenon Xe 133 Gas Ampule is supplied as a carrier-free gas in 4 ml crushable or break-sealed glass ampule in concentrations of 0.43 to 0.33 Ci/ml. Xenon Xe 133 is produced by fission of Uranium-235. It is chemically and physiologically related to elemental xenon, a non-radioactive monatomic gas which is physiologically inert except for anesthetic properties as high doses.

CONTRAINDICATIONS: None known.

WARNINGS: Xenon Xe 133 should not be administered to children or to patients who are pregnant, or to nursing mothers unless the benefits to be gained outweigh the potential hazards. Ideally, examinations using radio-pharmaceuticals, 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. Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. There are no well-controlled studies in pregnant women which allow any conclusions as to the safety of Xenon Xe 133 for the fetus. Xenon Xe 133 should be used in pregnant women only when clearly needed.

Concentrated Xenon Xe 133 gas supplied in ampule must be diluted to the activity range appropriate to the route of administration.

PRECAUTIONS: Xenon Xe 133 gas as well as other 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. Exhaled Xenon Xe 133 gas should be controlled in a manner that is in compliance with the appropriate regulations of the government agency authorized to license the use of radionuclides. Xenon Xe 133 gas delivery systems, i.e., respirators or spirometers, and associated tubing assemblies must be leakproof to avoid loss of radioactivity into the laboratory environment not specifically protected by exhaust systems. Xenon Xe 133 adheres to some plastics and rubber and should not be allowed to stand in tubing or respirator containers for such unrecognized loss of radioactivity from the dose for administration may render the study non-diagnostic.

ADVERSE REACTIONS: Adverse reactions specifically attributable to Xenon Xe 133 have not been reported.

HOW SUPPLIED: Each Ventilation Study System (V.S.S.) contains Xenon Xe 133 in a sealed frangible capsule containing 10 millicuries ± 20% at calibration time and date stated on the label. Each Xenon Xe 133 Gas ampule is supplied in 4 ml crushable or break-sealed ampules containing 0.43 to 0.33 Ci/ml. Each Xenon Xe 133 Gas vial contains 10 or 20 mCi of gas.

Safety, Convenience and Versatility

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medi+physics

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(415) 658-2184, Toll Free (Outside CA) (800) 227-0492, (Inside CA) (800) 772-2477
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Our mid-continental location means we can make most deliveries by truck. So for 90% of our customers in 45 states, the number one delivery problem—airline delays—is no problem at all. If there is a hitch, one quick call to our toll-free service number will straighten it out.

Mallinckrodt weekend generators are delivered no later than 8 AM every Monday. If you need midweek delivery, your generator will arrive by 8 AM Wednesday.

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For technical assistance it's 800-325-8181
(In Missouri, 314-895-2405 collect)

*In a recent independent survey of 400 nuclear medicine departments, data on file at Mallinckrodt.
NEN's five regional distribution centers—Atlanta, Boston, Chicago, Dallas, and Los Angeles—enable next-morning delivery to virtually any nuclear medicine department in the United States, 6 days a week. If you call us today, your order should arrive before 8:00 AM tomorrow. And if you're within one of our distribution center radiuses, our Medical Emergency Delivery Service (MEDS) can deliver your radiopharmaceutical order the same day, within hours of your call. That means thallium-201 is available whenever you require a study—even in the acute setting.

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THE STABLE SOLUTION TO YOUR BONE IMAGING NEEDS

"Tc-99m-MDP with ascorbate had a higher affinity for hydroxylapatite than did MDP without ascorbate."

"Based on these studies and previous shelf life studies, the authors conclude that Tc-99m-MDP with ascorbate is different and is the agent of choice."


• One Year Shelf Life
• No Refrigeration Required
• Full 6 Hour Use After Preparation
• Contains Ascorbic Acid as an Antioxidant

Technetium Tc 99m Medronate Kit

BRIEF SUMMARY OF PRESCRIBING INFORMATION

Indications and usage
Technetium Tc 99m Medronate may be used as a bone imaging agent to delineate areas of altered osteogenesis.

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 who may be predisposed to, hypocalcemia (i.e., alkalosis).

This radiopharmaceutical drug product should not be administered to children, to pregnant women, or to nursing mothers, unless the expected benefit to be gained outweighs the potential risk.

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.

Precautions
General
Technetium Tc 99m Medronate as well as other 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 patient should be encouraged to void when the examination is completed and as often thereafter as possible for the next 4-6 hours.

This preparation contains no bacteriostatic preservative. Technetium Tc 99m Medronate should be formulated within six (6) hours prior to clinical use.

Pregnancy category C
Adequate reproductive studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Technetium Tc 99m Medronate should be used in pregnant women only when clearly needed.

Nursing mothers
It is not known whether this drug is excreted in human milk. As a general rule nursing should not be undertaken while a patient is on the drug since many drugs are excreted in human milk.

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

Adverse reactions
No adverse reactions specifically attributable to the use of Technetium Tc 99m Medronate have been reported.

How supplied
Union Carbide's Technetium Tc 99m Medronate Kit is supplied as a sterile, pyrogen-free kit containing 5 vials.

Each 10 ml vial contains 10 mg medronic acid, 0.17 mg (minimum) stannous chloride (maximum stannous and stannic chloride 0.29 mg), and 2 mg ascorbic acid. The pH has been adjusted to 4-8 with either HCl or NaOH prior to lyophilization. Following lyophilization, the vials are sealed under a nitrogen atmosphere.

Product #17500502 Multidose vial shield with cap and retainer ring available separately.

For ordering, customer service, and technical information, call toll-free 800-431-1146 (in NYS call 800-942-1986).

CintiChem® MDP KIT

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Manufactured For:
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Technetium Tc 99m Albumin Aggregated Kit

The right size particles

Well tolerated by patients, it provides excellent images

Mallinckrodt's MAA typically has a particle size of 10 to 40 microns. This controlled particle size range, plus the fact that there is no tendency to agglomerate, gives you excellent lung perfusion images. TechneScan™ MAA is well-tolerated and excretion is virtually complete in 24 to 48 hours, with no evidence of antigenicity to date. This convenient one step procedure can be prepared in 20 minutes.

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For orders call:
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For technical assistance, it is 800-325-8181
(In Missouri, 314-895-2405 collect)

See brief summary on following page.

THE MALLINCKRODT COMMITMENT to Nuclear Medicine

MALLINCKRODT, INC., Post Office Box 5840, St. Louis, MO 63134

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WARNINGS
The possibility of allergic reactions should be considered in patients who receive multiple doses of Technenium Tc-99m Albumin. Reactions in individuals who have previously been exposed to Technenium Tc-99m may be more likely to occur. Appropriate personnel should be prepared to deal with such reactions. The possibility of anaphylactoid or other reactions such as urticaria should be considered in patients with a history of drug allergy, cardiovascular disease, asthma, or other chronic lung disease. These patients should be observed closely for at least one hour after injection.

PRECAUTIONS
In patients with severe renal impairment (creatinine clearance <30 mL/min), the use of Technenium Tc-99m Albumin may result in a longer half-life and a greater accumulation of activity in the kidneys. The clinical significance of this should be considered in the management of patients with severe renal impairment.

REACTANTS
Technenium Tc-99m Albumin may be administered concomitantly with other radiopharmaceuticals, including those administered in the same vascular access device. However, the potential for interactions between these agents should be considered, and appropriate monitoring and management should be implemented.

HOW SUPPLIED
Technenium Tc-99m Albumin is supplied as a sterile, lyophilized powder. The reconstitution solution is sterile, pyrogen-free, sodium chloride, and may contain sodium bicarbonate. The reconstituted solution is a clear, colorless solution.

DIRECTIONS
Reconstitute with the provided diluent to a concentration of 10 mCi/mL and store at room temperature for up to 24 hours. Administer by intravenous injection over a period of 1 to 2 minutes. After injection, the patient should be observed for at least 30 minutes. If clinical signs of anaphylaxis or other adverse reactions occur, appropriate medical assistance should be provided.

PROCEDURE
The procedure should be performed in a radiation control area, and appropriate shielding and safety precautions should be observed. The patient should be placed in the supine position and the injection site should be cleansed with an antiseptic solution. The injection should be administered slowly over a period of 1 to 2 minutes. The patient should be observed for at least 30 minutes after the injection for any signs of adverse reactions. If any adverse reactions occur, appropriate medical assistance should be provided.

INSTRUCTIONS FOR DISCARDING USED CONTAINERS
Technenium Tc-99m Albumin is a radioactive substance and should be handled and disposed of according to established procedures. The used container and any associated waste should be collected and disposed of in accordance with local regulations and guidelines. This includes proper packaging, transport, and disposal procedures.

For further information, contact the manufacturer or the local regulatory authority.

Table 2. Radiation Emission Data

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

Table 3. Radiation Attenuation by Lead Shielding

<table>
<thead>
<tr>
<th>Shield Thickness (mm)</th>
<th>Coefficient of Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>0.95</td>
<td>1.2</td>
</tr>
<tr>
<td>1.8</td>
<td>2.4</td>
</tr>
<tr>
<td>3.6</td>
<td>2.7</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Table 4. Absorbed Radiation Dose

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Radii (mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lungs</td>
<td>1.044</td>
</tr>
<tr>
<td>Liver</td>
<td>0.116</td>
</tr>
<tr>
<td>Spleen</td>
<td>0.107</td>
</tr>
<tr>
<td>Kidneys</td>
<td>0.252</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.544</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.036</td>
</tr>
<tr>
<td>Testes</td>
<td>0.029</td>
</tr>
<tr>
<td>Total Body</td>
<td>0.048</td>
</tr>
</tbody>
</table>

Table 5. Clinical Pharmacology

<table>
<thead>
<tr>
<th>Hours</th>
<th>Fraction Remaining</th>
<th>Fraction Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>1</td>
<td>0.881</td>
<td>0.398</td>
</tr>
<tr>
<td>2</td>
<td>0.708</td>
<td>0.282</td>
</tr>
<tr>
<td>3</td>
<td>0.632</td>
<td>0.251</td>
</tr>
<tr>
<td>4</td>
<td>0.562</td>
<td>0.126</td>
</tr>
<tr>
<td>5</td>
<td>0.501</td>
<td>0.063</td>
</tr>
<tr>
<td>6</td>
<td>0.447</td>
<td></td>
</tr>
</tbody>
</table>

Calibration Time

CLINICAL PHARMACOLOGY
Within 1-5 minutes of intravenous injection, over 90 percent of the technetium Tc-99m aggregated albumin particles are trapped in the capillaries and collected by the liver. Organ selectivity is a direct result of particle size. Below 1-10 microns, the albumin aggregates are taken up by the reticuloendothelial system. Above 10-15 microns, the aggregates become lodged in the lung capillaries by a purely mechanical process. Distribution of aggregated albumin in the liver is a function of regional pulmonary blood flow.

In animal tissue distribution studies, measurements of retained activity showed a lung to liver ratio of about 0.71 within the first 15 minutes. Elimination of the technetium Tc-99m aggregated albumin from the lungs occurs with a biological half-life of about of 0.7 hours. Comparative urological excretion studies showed an average of about 75% elimination of the injected Tc-99m doses 24 hours post-administration. Elimination of the technetium Tc-99m aggregated albumin from the normal and abnormal human lungs occurs with a biological half-life of about 10.8 hours. The effective half-life was estimated to be 3.8 hours for albumin.

Toxicology data are available on request.

INDICATIONS AND USAGE
Technenium MAA Tc-99m is indicated only for scintigraphic imaging of the lungs as an adjunct to other diagnostic procedures whenever information about pulmonary function is desired.

CONTRAINdications
Technenium MAA Tc-99m should not be administered to patients with severe pulmonary hyperperfusion.

The use of Technenium MAA Tc-99m is contraindicated in persons with a History of hypersensitivity reactions to products containing human serum albumin.
TechneScan® PYP®
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The only one approved for gated cardiac blood pool imaging

A valuable adjunct in the diagnosis of cardiac abnormalities.

With this "exclusive indication," TechneScan PYP gives you the additional diagnostic capability of dynamic studies of left ventricular function and wall motion and identification of ventricular aneurysm. This is in addition to the indication of TechneScan PYP as an adjunct in the diagnosis of acute myocardial infarction.

For more information about TechneScan PYP—and all the other organ-imaging kits available from Mallinckrodt—just call your Mallinckrodt representative.

For orders call:
800-325-3688 (In Missouri, 314-344-3890 collect)
For technical assistance, it is 800-325-8181
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See brief summary on following page.

THE MALLINCKRODT COMMITMENT
to Nuclear Medicine

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**CLINICAL BRIEF**

**PHARMACOLOGY**

When injected intravenously, Technetium Tc 99m has a specific affinity for areas of altered osteogenesis. It is also concentrated in the injured myocardium, primarily in areas of irreversibly damaged myocardial cells.

One to two hours after intravenous injection of Technetium Tc 99m, an estimated 40 to 50 percent of the injected dose has been taken up by the skeleton and approximately 0.01 to 0.02 percent per gram by acutely infarcted myocardium. Within a period of one hour, 10 to 11 percent remains in the vascular system, declining to approximately 2 to 3 percent twenty-four hours post-injection. The average urinary excretion was observed to be about 40 percent of the administered dose after 24 hours.

Technetium Tc 99m also has an affinity for red blood cells. When administered 30 minutes prior to the intravenous administration of sodium pertechnetate Tc 99m approximately 76 percent of the injected activity remains in the blood pool providing excellent images of the cardiac chambers.

**INDICATIONS AND USAGE**

Technetium Tc 99m is a skeletal imaging agent used to demonstrate areas of altered osteogenesis, and a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction. As an adjunct in the diagnosis of confirmed myocardial infarction (ECG and serum enzyme positive), the incidence of false negative images has been found to be 6 percent. False negative images can also occur if made too early in the evolutionary phase of the infarct or too late in the resolution phase. In a limited study involving 22 patients in whom the ECG was positive and serum enzymes questionable or negative, but in whom the final diagnosis of acute myocardial infarction was made, the incidence of false negative images was 23 percent. The incidence of false positive images has been found to be 7 to 9 percent. False positive images have also been reported following coronary by-pass graft surgery, in unstable angina pectoris, old myocardial infarcts and in cardiac contusions.

Technetium Tc 99m is a blood pool imaging agent which may be used for gated cardiac blood pool imaging. When administered intravenously 30 minutes prior to the intravenous administration of sodium pertechnetate Tc 99m approximately 76 percent of the injected activity remains in the blood pool.

**CONTRAINDICATIONS**

None.

**WARNINGS**

This radiopharmaceutical should not be administered to patients who are pregnant or lactating unless the information to be gained outweighs the potential hazards.

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.

Warning: Preliminary studies indicate impairment of brain scans using pertechnetate Tc 99m which have been followed by bone scan. The impairment may result in false positives or false negatives. It is recommended, where feasible, that brain scans precede bone imaging procedures.

Radiopharmaceuticals should be used only by physicians who are qualified by specific training in the safe use and handling of radionuclides produced by nuclear reactor or particle accelerator and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

The Technetium Tc 99m kit must be maintained at refrigerated temperature until use.

The contents of the Technetium Tc 99m kit are intended for use in the preparation of Technetium Tc 99m Stannous Pyrophosphate. Technetium Tc 99m may also be reconstituted with sterile, pyrogen-free normal saline containing no preservatives and injected intravenously prior to the administration of sodium pertechnetate Tc 99m.

Sodium pertechnetate Tc 99m solutions containing an oxidizing agent are not suitable for use with the Technetium Tc 99m kit.

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**

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

**Bone Imaging**

Both prior to and following Technetium Tc 99m administration, patients should be encouraged to drink fluids. Patients should void as often as possible after the Technetium Tc 99m injection to minimize background interference from accumulation in the bladder and unnecessary exposure to radiation.

**Cardiac Imaging**

Patient's cardiac condition should be stable before beginning the cardiac imaging procedure.

If not contraindicated by the cardiac status, patients should be encouraged to ingest fluids and to void frequently in order to reduce unnecessary radiation exposure.

Interference from chest wall lesions such as breast tumors and healing rib fractures can be minimized by employing the three recommended projections.

**Blood Pool Imaging**

Technetium Tc 99m should be injected by direct venipuncture. Heparinized catheter systems should be avoided.

**ADVERSE REACTIONS**

None.

**HOW SUPPLIED**

Catalog Number: 094 Technetium Tc 99m Pyrophosphate Kit.

Kit Contains:

5—Stannous Pyrophosphate Reaction Vials (lyophilized) for the preparation of Technetium Tc 99m Stannous Pyrophosphate.

Reaction Vial Contains:

12.0 mg sodium pyrophosphate and 3.4 mg stannous chloride (lyophilized).

Hydrochloric acid is added for pH adjustment prior to lyophilization.

5—Radioassay Information String Tags.

For complete prescribing information, see package insert.
Yesterday, routine free T4 testing seemed almost impossible. Assays were often complex and lengthy and were not always an accurate measurement of free T4.

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but

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The performance and security of our products is assured by a stringent quality control program which never loses sight of the purpose of a product: an aid in diagnosis.

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NU TECH introduces HEX ARRAY

A series of collimators designed to optimize the clinical performance of today's generation of High Resolution Gamma Cameras and improve performance of older systems.

Round Holes lose efficiency/speed due to the large interstitial areas of lead that occur between individual circular openings.

Square Holes overcome this speed disadvantage, but distort image linearity and resolution due to differential bore sizes.

Hex Holes minimize the dimensional differences between the "Flats" and "Corners" of the bore. Linearity and resolution distortions are minimized. In addition the efficiency losses associated with the "dead lead" area in round hole designs are completely eliminated.

CONCLUSION: Clinical and Engineering Studies have conclusively demonstrated that the use of the HEX ARRAY technology has resulted in a line of collimators offering superior SENSITIVITY, RESOLUTION, AND LINEARITY.

ADDITIONAL INFORMATION WRITE OR CALL

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NUCLEAR TECHNOLOGIES

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New Haven, CT 06530
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The Ventilation Connection

Ventil-Con II + Vent-Al

Adds up to a complete Xenon ventilation system

When the Ventil-Con II and new Vent-Al are combined, you get a system which, for the first time, enables you to perform Xenon studies on mechanically vented (respirator) patients.

The RADX Ventil-Con II, recognized worldwide as the leading Xenon rebreathing system, was the first to offer:
- Automatic O₂ replenishment
- In-line autoclavable bacteriological filter
- Dry-rolling spirometer
- Xenon concentration meter
- Shielding equivalent to 1/8" lead
- Reuse of stored Xenon

The Ventil-Con design limits dead space to less than 25 ml, and has less than 0.2 in/H₂O resistance to normal breathing. Xenon trap with exhaust port detector/alarms is built in.

Now RADX is the first to develop the Vent-Al an accessory for the Ventil-Con, for performing Xenon studies on respirator patients. The Vent-Al may be field installed on any Ventil-Con or factory installed in a Xena-Con. Vent-Al provides electronically variable breaths/minute and breathing volumes.

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Another gamma camera breakthrough from Picker. Now, our innovative crystal design means you don’t have to compromise between resolution and sensitivity. You have your choice of two 61-tube gamma cameras with the crystal size that’s customized for your clinical needs.

And, you can operate them from our newly-designed 4C console.

Our best, the Dyna™ Camera
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The World Leader. Dyna Camera 4C/15/61 with 1/4” crystal offers you the ultimate in gamma camera resolution. You can detect small lesions better than ever before. It’s an ideal camera for tomographic myocardial imaging.

Better than their best.
Dyna Camera 4C/15/61—3/8” Crystal with added sensitivity. Dyna Camera 4C/15/61 with 3/8” crystal adds sensitivity to excellent resolution and linearity. Especially important with higher energy isotopes. The 3/8” crystal helps to maximize both patient comfort and throughput.

Our new 61-tube Dyna Cameras represent the sixth breakthrough in gamma camera technology by Picker in three years. With our 37-tube Dyna Camera 4C/15/37, we give you the widest choice of performance in the field. And our new human-engineered 4C console teams up with them for simple, reliable operation. It all adds up to better, surer, quicker diagnoses...increased patient throughput.

For more details on our gamma camera systems, write: Picker Corporation, 12 Clintonville Road, Northford, CT 06472, or Picker Corporation, 595 Miner Road, Highland Heights, Ohio 44143.

Picker
We'll do more for you.
Nuclear Pacific's optically clear Wrap Around shielding glasses provide 0.60 mm lead equivalent protection—as much radiation protection as a lead apron. Now you can confidently reduce the possibility of cataracts and still work comfortably without impaired vision. The lightweight (2.8 oz.) eyeglasses feature anti-reflection coated lenses that provide light transmission higher than standard optical glass.

Quality constructed for long life, every lens is tested to assure strict conformance to FDA impact resistance requirements. In recent Dose Reduction studies*, Nuclear Pacific's Wrap Arrounds had the highest dose reduction for direct as well as peripheral radiation sources. Nuclear Pacific also offers a standard style frame and clip-ons for regular glasses. Prescription lenses are available. Remember, for 30 years Nuclear Pacific has set the standard for visibility and protection in the radiation shielding industry.


*Study available upon request.
Quick Response

Call in your radiopharmaceutical orders by 2:30 PM today... get what you need by 8:00 AM tomorrow.

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Find out how our schedule can help keep your department on schedule. Call your Mallinckrodt representative or this toll-free number:

800-325-3688 (In Missouri, 314-344-3880 collect)
For technical assistance it's 800-325-8181
(In Missouri, 314-895-2405 collect)

THE

MALLINCKRODT COMMITMENT

to Nuclear Medicine

MALLINCKRODT, INC., Post Office Box 5840, St. Louis, MO 63134

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"With ADAC, you're not just buying a system. You're buying a company."
"That's not just an empty statement. That's a commitment. We're not in medical imaging simply to stay. We're in it to lead. Take Systems I–IV. It's the only nuclear medicine system that precisely meets your requirements as they change. You never have to buy less—or more—than you actually need. It's what you have a right to expect from the leader in medical imaging." CHARLES W. CANTONI, PRESIDENT

ADAC System I.
It processes and acquires. It has a Diagnostic Acquisition/Processing Console, a Computer Section, and a Winchester disc drive. It can easily be expanded to a System II.

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It processes one study while acquiring or processing another. It's a System I—plus a Remote Acquisition/Processing Terminal, a second Computer Section, and a second Winchester. It can easily be expanded to a System III.

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It processes and acquires in two places at once. It looks just like a System II. But there's more capability inside the Computer Section. It can easily be expanded to a System IV.

ADAC System IV.
It has a three-location option. With two Consoles and an expanded Computer Section, you can process and acquire in two places at once. Add an optional Remote Terminal and you can process and acquire studies at three locations.

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ADAC Laboratories, 255 San Geronimo Way, Sunnyvale, California 94086. (408) 736-1101

Medical Imaging Systems.
SCOPIX CR3
Universal CRT
Imaging Film
Up to now, if you wanted good CRT image recording from computed tomography, ultrasound and nuclear medicine equipment, you may have used several different "special purpose" imaging films.

We started with a conviction that a more convenient universal emulsion film was desirable and possible. The result is Agfa-Gevaert's new SCOPIX CR3 Universal CRT Imaging Film... the one film that does it all!

It is a film matched to the spectral emission of white, blue and green phosphors used for CRT displays and video monitors.

**Matched Response To All CRT Displays.**

The broad spectral sensitivity of SCOPIX CR3 Film ensures accurate and detailed recording from greyscale CRT and video monitors which use white, blue or green phosphors in their display tubes. It is the "blindness" to green phosphors which causes other films to exhibit higher grain and less definition.

**Image Quality and Support Second to None.**

Agfa-Gevaert Rex offers a complete line of superior, sensitometrically dependable X-ray films. All have the finest definition and image quality to help make precise diagnoses. And all offer appropriate speed for the desired technique. Whether it's general purpose radiology, or special procedures such as cinel fluorography, angiography or mammography, Agfa-Gevaert has the film to meet your diagnostic needs.

**SCOPIX CR3 Film**

The one film that does it all!

**Sharper Image**

Its higher speed allows CRT monitor intensity to be decreased, thus reducing the "halo" effect on the video screen and improving image definition.

SCOPIX CR3 Film is single-coated on GEVAR polyester base, with anti-halation layer. This combination enhances image detail and definition by preventing image parallax. It is suitable for all RP and manual film processing.

**With SCOPIX CR3 film...**

you purchase fewer film types and simplify film inventory; get improved and consistent quality and economy because one film does it all!

For additional information, contact your nearest Agfa-Gevaert Rex Representative or call 914-682-5650.

Photos courtesy Mt. Sinai Hospital, N.Y.
elscint’s tri-pex process and image quality

Tri-pex: another unique feature of the Apex Line
Until Apex, ideal gamma camera performance was never achieved. Good resolution meant poor uniformity—and vice versa. Even today, most manufacturers do the best they can with resolution, and cover up nonuniformity by a simple computer trick: artificial image modulation. Only Elscint solves the problem—with TRI-PEX, a unique triple correction that gives Apex the best combination of resolution, uniformity and linearity in Nuclear Medicine.

Elscint Inc.
138-160 Johnson Avenue,
Hackensack, N.J. 07602, U.S.A.
Call Toll Free: 800-631-1694

Elscint’s Unique TRI-PEX Process:

The Energy Correction
For each individual Apex camera, the energy over the entire field of view is measured. When an energy window is selected, the system automatically generates a set of “local windows.” During acquisition each event is selected or rejected according to the local window value.

The Displacement Correction
Spatial distortions are mapped over the entire field of view. During acquisition, a special bit-slice processor “returns” each displaced event to its original position, in real-time, as it appears.

The Sensitivity Correction
Any residual nonuniformity caused by variations in collimator sensitivity or by other intrinsic factors is corrected by quantifying sensitivity over the entire field of view. Nonuniformity is now eliminated by automatically normalizing the image count with the aid of a precise 256² reference matrix.

Elscint’s TRI-PEX process has a triple advantage, too:
- No loss of data through “count skipping.”
- No loss of detail through artificial image manipulation.
- Corrections automatically performed on-line with no additional post-acquisition processing time required.

The exceptional results achieved by Elscint’s TRI-PEX process are safeguarded by an exclusive electro-optical stabilization system which maintains constant circuit balance without human intervention.
New Kodak ortho M film

The speed to nip dot blooms in the bud.

Increasing the brightness of the image on your nuclear medicine monitor can result in undesirable dot "blooming" which diminishes the diagnostic value of the image. The new Kodak ortho M film has the high speed necessary to reduce the need for increasing brightness levels, thus minimizing dot blooming. Kodak ortho M film is a single-emulsion film with high contrast and halation control which delivers crisp, sharp dots and clearly defined edges of dot concentration patterns. The film's orthochromatic sensitivity matches the phosphor emissions of blue and green cathode-ray tubes. Could you ask for more? Perhaps processing in 90 seconds? New ortho M film offers that, too.

Ask your Kodak Technical Sales Representative for a demonstration, or write Eastman Kodak Company, Department 740-B, Rochester, New York 14650.

TURNING ENERGY INTO IMAGES

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70 Ryan Street, Stamford, Connecticut 06907
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TechneScan MDP
Technetium Tc 99m Medronate Sodium Kit

Earlier images

with high target-to-background ratio.

When injected intravenously, TechneScan MDP clears rapidly from blood and soft tissue to accumulate in the skeleton and gives a high contrast image as early as two hours after administration.

The TechneScan MDP Kit is designed for quick, easy preparation and is supplied complete.

For more information about TechneScan MDP — and all the other organ-imaging kits available from Mallinckrodt — just call your Mallinckrodt representative.

For orders call:
800-325-3688 (In Missouri, 314-344-3688 collect)
For technical assistance, it's 800-325-8181
(In Missouri, 314-895-2405 collect)

See brief summary on following page.

THE MALLINCKRODT COMMITMENT to Nuclear Medicine

MALLINCKRODT, INC., Post Office Box 5840, St. Louis, MO 63134

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DESCRIPTION

The kit consists of reaction vials which contain the sterile, non-pyrogenic, non-radioactive ingredients necessary to produce technetium Tc 99m medronate for diagnostic use by intravenous injection. Each 10 ml reaction vial contains 10 mg medronate acid, 0.8 mg fine crystalline cloroxine acid, 0.64 mg maximum tin in lyophilized form under an atmosphere of nitrogen. Sodium hydroxide or hydrochloric acid has been used for pH adjustments. The addition of sodium perchlorate Tc 99m sterile solution produces a rapid labeling which is essentially quantitative and which remains stable in vitro throughout the useful life of the preparation. No bacteriostatic preservative is present.

The precise structure of the reaction vial complex or of its technetium labeled form is not known at this time.

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 listed in Table I.

<table>
<thead>
<tr>
<th>External Radiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Tc-99m</td>
</tr>
<tr>
<td>Source: Tc-99m</td>
</tr>
</tbody>
</table>

TABLE I.

<table>
<thead>
<tr>
<th>TABLE I. PRINCIPAL RADIATION EMISSION DATA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation</td>
<td>Mean % Disintegration</td>
</tr>
<tr>
<td>Gamma-2</td>
<td>88.96</td>
</tr>
</tbody>
</table>

External Radiation

The specific gamma constant for Tc-99m is 0.8 R/mCi-hr at 1 cm. The first half value layer is 0.2 mm of Pb. To facilitate control of the radiation exposure from milliecs amounts of this radionuclide, the use of a 2.7 mm thickness of Pb will attenuate the radiation emitted by a factor of about 1.000.

TABLE II.

<table>
<thead>
<tr>
<th>TABLE II. RADIATION ATTENUATION BY LEAD SHIELDING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield Thickness (Pb) mm</td>
<td>Coefficient of Attenuation</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>0.95</td>
<td>10^2</td>
</tr>
<tr>
<td>1.8</td>
<td>10^3</td>
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<tr>
<td>2.7</td>
<td>10^4</td>
</tr>
<tr>
<td>3.6</td>
<td>10^5</td>
</tr>
<tr>
<td>4.5</td>
<td>10^6</td>
</tr>
</tbody>
</table>

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

TABLE III.

<table>
<thead>
<tr>
<th>TABLE III. PHYSICAL DECAY CHART: Tc 99m, half-life 6.02 hours</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td>Fraction Remaining</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>-5</td>
<td>1778</td>
</tr>
<tr>
<td>-4</td>
<td>1585</td>
</tr>
<tr>
<td>-3</td>
<td>1413</td>
</tr>
<tr>
<td>-2</td>
<td>1259</td>
</tr>
<tr>
<td>-1</td>
<td>1122</td>
</tr>
<tr>
<td>0*</td>
<td>1000</td>
</tr>
<tr>
<td>1</td>
<td>9091</td>
</tr>
<tr>
<td>2</td>
<td>8794</td>
</tr>
<tr>
<td>3</td>
<td>8708</td>
</tr>
<tr>
<td>4</td>
<td>8631</td>
</tr>
</tbody>
</table>

*Calibration time

CLINICAL PHARMACOLOGY

When injected intravenously technetium Tc 99m medronate is rapidly cleared from the blood and accumulates in the skeleton and urine. The skeletal uptake is bilaterally symmetrical being greater in the axial skeleton than in the long bones. Areas of abnormal osteogenesis show altered uptake making it possible to visualize a variety of osseous lesions.

Studies in humans show that following intravenous injection of 10% of the injected dose remains in the bloodstream at the end of one hour. This value continues to drop rapidly being down to about 5% at 2 hours. The resultant disappearance curve appears to be tri-exponential. The two last components accounting for all but a few percent of the activity excited.

Conversely, there is a rapid deposition in bone and rapid urinary excretion. The rapid blood clearance provides bone to soft-tissue ratios which favor early imaging.

INDICATIONS AND USAGE

Technetium Tc 99m medronate is a skeletal imaging agent used to demonstrate areas of altered osteogenesis as seen for example in metastatic bone disease. Paget's disease, arthritic disease and osteomyelitis.

CONTRAINDICATIONS

None known at present.

WARNINGS

This radiopharmaceutical should not be administered to children or to patients who are pregnant or to nursing mothers unless the benefits are judged to outweigh the potential hazards.

Ideally examinations using radiopharmaceuticals, especially those elective in nature, in women of childbearing capacity should be performed during the first few (approximately 10) days following the onset of menses.

This class of compound is known to contain cations such as calcium, strontium. Particular caution should be used with patients who have or who may be predisposed to, hypercalceemia (i.e., alkaloosis).

PRECAUTIONS

General

The finding of an abnormal concentration of radioactivity implies the existence of underlying pathology, but further study is required to distinguish benign from malignant lesions.

Technetium Tc-99m medronate 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.

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

The preparation contains no bacteriostatic preservatives. Therefore, after labeling with technetium Tc-99m the solution should be stored at 2-8°C and discarded after 6 hours.

The image quality may be adversely affected by obesity, old age and impaired renal function.

Carcinogenesis

No long term animal studies have been performed to evaluate carcinogenic potential.

Pregnancy

Adverse reproductive studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. There have been no studies in pregnant women. Technetium Tc-99m medronate should be used in pregnant women only when clearly needed.

Nursing Mothers

It is not known whether this drug is excreted in human milk. As a general rule nursing should not be undertaken while a patient is on the drug since many drugs are excreted in human milk.

Pediatric Use

Safety and effectiveness in children have not been established.

ADVERSE REACTIONS

At present adverse reactions have not been reported that are specifically attributable to the use of technetium Tc-99m medronate.

DOSE AND ADMINISTRATION

The recommended adult dose is 10 to 20 mCi (200 - 400 uCi/kg) by slow intravenous injection over a period of 30 seconds. Optimum scanning time is 1 to 4 hours post-injection. The patient should be encouraged to drink fluids before and after the examination and to void immediately before imaging is started. This is to minimize the contribution of the bladder content to the image.

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

Racial pharmacists 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.

Radiation Dosimetry

The estimated absorbed radiation dose to an average patient (70 kg) from an intravenous injection of a maximum dose of 20 mCi of technetium Tc-99m medronate are shown in Table IV.


TABLE IV.

<table>
<thead>
<tr>
<th>TABLE IV. RADIATION DOSES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue</td>
<td>Absorbed Radiation Dose (rads/20 mCi)</td>
</tr>
<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>2.60</td>
</tr>
<tr>
<td>2 hr void</td>
<td>6.20</td>
</tr>
<tr>
<td>4.8 hr void</td>
<td>0.24</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.34</td>
</tr>
<tr>
<td>2 hr void</td>
<td>0.16</td>
</tr>
<tr>
<td>Testes</td>
<td>4.8 hr void</td>
</tr>
<tr>
<td>2 hr void</td>
<td>0.22</td>
</tr>
</tbody>
</table>

HOW SUPPLIED

Technescan MDP - Technetium Tc 99m Medronate Sodium Kit.

Product No O88

Each kit consists of 5 reaction vials, each vial containing in lyophilized form sterile and non-pyrogenic Medium Acid 10 mg

Mallinckrodt, Inc.

St. Louis, Missouri 63134

U.S.A.

By: MERCK FROSST LABORATORIES Kirkland (Montreal), Canada

Manufactured for: MALLINCKRODT, INC. St. Louis, Missouri 63134. U.S.A.
Announces An Ideal Radioisotope For The Study of Pulmonary Ventilation

- A half-life of 13 seconds and decay by isomeric Transition means low radiation exposure to patients and staff.
- The monoenergetic gamma emission of 191 keV is well suited for the gamma camera.
- No special radioactive gas collection or disposal system required.
- Completely portable system allows studies in ICU, CCU, and Post-Surgical departments with portable camera.
- Studies can be conducted on comatose, uncooperative, or mechanically vented patients.
- Distribution of radioactive gas is mainly to the lungs.
- Elaborate delivery system is not required.
- The only radioisotope that can be administered ON and OFF as needed.
- Easy to license when compared to Xenon Xe 133 gas.

MPI Krypton Kr 81m Gas Generator
The Pulmonary Profile

THE CONCEPT
The pulmonary profile is a series of matched perfusion and ventilation studies done consecutively on a patient using the MPI Krypton Kr 81m Gas Generator and Technetium Tc 99m Albumin Aggregated. Following administration of the two products you are able to switch the energy window on the gamma camera and scan the patient in the same position for each of the isotopes before you move the patient to the next view. Thus, a complete series of matching views may be accumulated for any number of patient positions.

THE PURPOSE
To increase the diagnostic sensitivity and specificity of lung imaging procedures by providing an easy means of obtaining matched perfusion-ventilation images in one patient visit.

THE RESULT
A new patient study which combines ventilation and perfusion imaging procedures into one study called the Pulmonary Profile Study.

For information regarding the MPI Krypton Kr 81m Gas Generator Krypton Kr 81m please call Medi-Physics at (415) 658-2184, Outside California (800) 227-0492 or Inside California at (800) 772-2477.

DESCRIPTION: The Krypton Kr 81m Gas Generator consists of Rubidium Rb 81 fixed to a solid support from which the Krypton Kr 81m is eluted by passage of humidified oxygen or air through the generator. Other rubidium radio-isotopes which do not decay to radioactive Krypton Kr 81m in their decay are present in the generator (Rubidium Rb 82m, for example, is present at a concentration of 30-40%).

INDICATIONS AND USAGE: The Krypton Kr 81m Gas Generator is indicated for use in the study of pulmonary ventilation.

CONTRAINdications: None known.

WARNINGS: None known.

PRECAUTIONS:

General
The Krypton Kr 81m Gas Generator as well as other radioactive drugs, must be handled with care to minimize radiation exposure to clinical personnel. Also care should be taken to minimize radiation exposure to the patient consistent with proper patient management.

Carcinogenesis, Mutagenesis, Impairment of Fertility
No long-term animal studies have been performed to evaluate carcinogenic potential, mutagenicity potential, or whether Krypton Kr 81m gas affects fertility in males or females.

Pregnancy-C category C
Animal reproduction studies have not been conducted with Krypton Kr 81m gas. It is also not known whether Krypton Kr 81m gas can cause fetal harm when administered to a pregnant woman, or can affect reproduction capacity. Krypton Kr 81m gas 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 Krypton Kr 81m gas is administered to a nursing woman.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, in women of childbearing capability, should be performed during the first few (approximately ten) days following the onset of menses.

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: None known.

Dosage and Administration: The recommended dose range for Krypton Kr 81m is 1-10 millicuries and should be administered by continuous inhalation for a sufficient time to provide desired diagnostic information. The multiplication product of the radioactivity and the time of continuous inhalation of Krypton Kr 81m generally should not exceed 100 millicuries.

HOW SUPPLIED: The Krypton 81m Gas Generator is supplied in the form of Rubidium Rb 81, bound to a solid support, with an activity of 2-10 millicuries at calibration time. The generator is enclosed in a lead shielded filter assembly surrounded by a capped plastic canister to which a handle is affixed. The generator should be stored at room temperature. The generator expires 12 hours after date and time of calibration.
MPI
Thallous Chloride TI 201
Thallous Chloride TI 201

medi+physics™
5801 Christie Ave., Emeryville, Calif. 94608, (415) 658-2184

MPI Thallous Chloride TI 201 can be delivered with other
MPI products without an additional delivery charge.

PLEASE SEE FOLLOWING PAGE FOR BRIEF SUMMARY OF PRESCRIBING INFORMATION.
MPI Thallous Chloride TI 201 Injection
Thallous Chloride TI 201 Diagnostic—for Intravenous Use
For Imaging Myocardial Perfusion

DESCRIPTION MPI Thallous Chloride TI 201. Thallous Chloride TI 201 is supplied in isotonic solution as a sterile, nonpyrogenic radiopharmaceutical for intravenous administration. Each ml contains 1 mCi Thallium Chloride TI 201 at calibration time made isotonic with 9 mg sodium chloride and preserved with 0.9% (w/v) benzyl alcohol. The pH is adjusted to between 6.7-7.0 with hydrochloric acid and or sodium hydroxide. Thallium TI 201 is colorless produced. It is essentially carrier-free and contains no more than 1.0% Thallium TI 200 and no more than 0.1% Thallium TI 202.

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 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.

Pregnancy Category C

Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Thallous Chloride TI 201 should not be used in pregnant women except when benefits clearly outweigh the potential risks.

PRECAUTIONS Ideally, examinations using radiopharmaceutical drug products—especially those electively in nature—of women of childbearing capacity should be performed during the first ten 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, as a general rule nursing should not be undertaken when a patient is administered radioactive material.

Safety and effectiveness in children have not been established.

Carcinogenesis

No long-term animal studies have been performed to evaluate carcinogenic potential.

Data are not available concerning the effect on the quality of Thallium TI 201 scans of marked alterations in blood glucose, insulin or pH (such as is found in diabetes mellitus). Attention is directed to the fact that thallium is a potassium analog, and since the transport of potassium is affected by these factors, the possibility exists that the thallium may likewise be affected.

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

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 governmental agency authorized to license the use of radionuclides.

This drug should not be used six (6) days after the calibration date.

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

HOW SUPPLIED MPI Thallous Chloride TI 201. Thallous Chloride TI 201 is available in 2.0 mCi vials.

MIRD PAMPHLETS AVAILABLE
(Medical Internal Radiation Dose)

PAMPHLETS
1. (Revised) A revised schema for calculating the absorbed dose from biologically distributed radionuclides. ($5.25)
2. (Revised) Estimates of specific absorbed fractions for photon sources uniformly distributed in various organs of a heterogeneous phantom. ($7.75)
10. Radionuclide decay schemes and nuclear parameters for use in radiation-dose estimation. ($8.00)
11. 'S' absorbed dose per unit cumulated activity for selected radionuclides and organs. ($11.00)
12. Kinetic models for absorbed dose calculations. ($5.25)

SUPPLEMENTS
3. Includes the original pamphlet #5: “Estimates of absorbed fractions for monoenergetic photon sources uniformly distributed in various organs of a heterogeneous phantom.” ($1.50)
5. Includes 2 pamphlets: “Distribution of absorbed dose around point sources of electrons and beta particles in water and other media”; and “Absorbed fractions for small volumes containing photon-emitting radioactivity.” ($1.50)
6. Includes pamphlet 9: “Radiation dose to humans from "Se-75-Selenomethionine” ($3.00)

SPECIAL OFFER
All available MIRD pamphlets and supplements for only $25.00 plus $4.00 for shipping and handling.

MIRD Pamphlets and Supplements may be ordered from Book Order Dept., Society of Nuclear Medicine, 475 Park Avenue South, New York, NY 10016. All orders must be prepaid or accompanied by a purchase order. Checks must be in U.S. funds only, please.

Mail to: Book Order Dept., Society of Nuclear Medicine, 475 Park Avenue South, New York, NY 10016. Make checks payable to: Society of Nuclear Medicine, Inc. U.S. funds only, please.

PAMPHLETS SUPPLEMENTS SPECIAL OFFER

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<th>Pamphlet</th>
<th>Price</th>
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SHIPPING AND HANDLING CHARGES

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Thallium imaging in acute myocardial infarction

Lewis C. Becker, MD
Associate Professor of Medicine
Director, Nuclear Cardiology
The Johns Hopkins Medical Institutions
Baltimore, Maryland

One of the most significant findings to come from our clinical research over the past several years has been the observation that thallium-201 imaging, performed early after onset of symptoms, can reliably distinguish high-risk and low-risk groups of hemodynamically stable patients with acute myocardial infarction. The value of such a prognostic indicator in the management of acute MI is evident. Patients determined to be at low risk could be ambulated earlier and perhaps discharged sooner than in current practice; in the future, such patients might be placed early in a progressive-care-type unit rather than be maintained in the more expensive coronary care unit.

Patients at higher risk might be found to require more intensive monitoring for even longer periods than today. And following discharge, these patients could justifiably be subjected to much closer and long-lasting followup. Most important, reliable identification of patients at high risk would permit earlier initiation of aggressive treatment directed at limiting the extent of infarction.

Predicting mortality

Our recently reported study' covered 42 consecutive patients determined by conventional means (history, ECG, serum creatine kinase) to have suffered an acute MI. These were Killip class I or II patients—the largest group of MI patients, and those normally considered to be at relatively low risk. All 42 patients were admitted within 12 hours of onset of chest pain, and underwent thallium imaging within 15 hours of onset.

The thallium images—in the anterior, 40° LAO, and 60° LAO views—were interpreted both subjectively and by a computer-assisted quantitative technique. For each interpretive approach, scores for all views were summed to give a total "defect score"—the lower the score, the smaller the area of thallium defect, with a total defect score of 7 corresponding to reduction in thallium uptake involving approximately 40% of the left ventricle in at least two views. The total defect scores were then correlated with the patients' subsequent clinical course and with other clinical indices believed to have prognostic value—previous history of MI, anterior location of MI, alveolar infiltrates on admission, peak CK greater than 1,000 IU/liter, age, and sex.

Of the 42 patients, 35 survived the initial hospitalization. These survivors were followed for 6 to 20 months after discharge.

What were our results? Nonsurvivors had significantly larger thallium defects than survivors. The mean score for nonsurvivors was 14.3 vs 2.3 for survivors. In the 13 patients with a score greater than 7—ie, 40% or more involvement—the inhospital mortality was 46%; at 6 months it was 62%; and at last followup (mean 9 months) it was 92%. In the group of patients with a total defect score less than 7, the inhospital mortality was 3%; at 6 months and at last followup, it was, respectively, 7% and 7%.

These data conclusively showed that the thallium study performed within hours of admission could identify apparently stable MI patients at high-risk for mortality. In addition, when we compared the predictiveness of the thallium score with the other clinical indices—history, MI location, enzymes, etc—singly and in combination, the thallium study was significantly better.

We were, of course, very excited by our results. But, because this was a retrospective study, we felt it important to validate the findings prospectively. Over a 6-month period, we studied more than 90 consecutive patients admitted to the CCU with documented or strongly suspected MI. We applied the same scoring system and same dividing line (score 7)—and confirmed our ability to use thallium imaging to distinguish between high-risk and low-risk groups. The mortality rates of the two groups were almost identical to those established in the earlier retrospective study.
Irreversible damage and reversible ischemia

We believe the thallium study accurately predicts prognosis in MI patients because the size of the defect reflects the total hypoperfused mass of the left ventricular myocardium—both infarcted and ischemic areas. We know from observations of other investigators that the thallium defect tends to diminish with time after an acute MI. Thus the image recorded immediately after admission will show a larger defect than those recorded on serial followup over subsequent days. Our own pathologic studies have demonstrated that large thallium defects seen on post-MI images may be associated with small areas of infarction on postmortem examination.

Together, these findings strongly support the concept that areas of reduced or absent thallium on the initial post-MI images represent both ischemia and infarction, and that the “filling-in” seen on followup imaging represents resolution of ischemia due to resolution of coronary artery spasm or enlargement of coronary collaterals. Thus, the post-MI study identifies myocardium irreversibly damaged by the acute event, myocardium damaged by previous infarction, and surrounding areas of severe ischemia that are at risk for necrosis either immediately or at some future time.

Clinical implications

In our patients, the highest percentage of inpatient deaths was due to sudden pump failure—possibly due to the large total volume of compromised myocardium. Postdischarge deaths were generally related to a new ischemic event. In both of these high-risk groups, the thallium study might have helped in patient management decisions. For those patients who died while in the hospital, more aggressive support might have been indicated; those whose deaths occurred posthospitalization might have been identified as candidates for coronary artery bypass.

References

Please see following page for brief summary of prescribing information.
Thallous Chloride TI 201

INDICATIONS AND USAGE: Thallous Chloride TI 201 may be useful in myocardial perfusion imaging for the diagnosis and localization 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: In studying patients in whom myocardial infarction or ischemia is known or suspected, 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.

Radiopharmaceuticals and analogs of radiopharmaceutical drug products -- especially those elective in nature -- of women of childbearing capability should be performed during the first ten days following the onset of menstrual bleeding.

PRECAUTIONS: Data are not available concerning the effect of marked alterations in blood glucose, insulin, or pH (such as is found in diabetes mellitus) on the quality of thallium TI 201 scans. Attention is directed to the fact that thallium is a potassium analog, and since the transport of potassium is affected by these factors, the possibility exists that the thallium may likewise be affected.

Thallous Chloride TI 201, as all radioactive materials, must be handled with care and used with appropriate safety measures to minimize external radiation exposure to both personnel and patients. Care should always be taken to minimize radiation exposure to patients in a manner consistent with proper patient management.

No long-term animal studies have been performed to evaluate carcinogenic potential.

Adverse reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females. Its teratogenic potential, or other adverse effects on the fetus, Thallous Chloride TI 201 should be used in pregnant women only when clearly needed.

It is not known whether this drug is excreted in human milk. As a general rule nursing should not be undertaken when a patient is administered radioactive material.

Safety and effectiveness in children have not been established.

The expiration date of Thallous Chloride TI 201 is six days postcalibration.

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

DOSAGE AND ADMINISTRATION: The recommended adult (70kg) dose of Thallous Chloride TI 201 is 1.15mCi. Thallous Chloride TI 201 is intended for intravenous administration only.

For patients undergoing resting thallium studies, imaging is optimally begun within 10 to 20 minutes after injection. Several investigators have reported improved myocardial-to-background ratios when patients are injected in the fasting state or after briefly ambulating.

Best results with thallium imaging performed in conjunction with exercise stress testing appear to be obtained if the thallium is administered when the patient's heart rate reaches maximum strength and when the stress is continued for 30 seconds to one minute after injection. Imaging should begin within ten minutes post-injection since target-to-background ratio is optimum by that time. Several investigators have reported significant decreases in the target-to-background ratios of lesions attributable to transient ischemia by two hours after the completion of stress testing.

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

Radiopharmaceuticals should be used by persons with specific training in the safe use and handling of radionuclides produced by nuclear reactor or particle accelerator and whose experience and training have been approved by the appropriate government agencies authorized to license the use of radionuclides.

HOW SUPPLIED: Thallous Chloride TI 201 for intravenous administration is supplied as a sterile, non-pyrogenic solution containing at calibration time, 1mg/ml of Thallous TI 201, 2mg/ml sodium chloride, and 5mg/ml of benzyl alcohol. The pH is adjusted to between 4.5-5.5 with hydrochloric acid and/or sodium hydroxide solution. Vials are available in the following quantities of radioactivity: 1.5, 3.0, 4.5, 6.0 and 9.0 milliequivalents of Thallous TI 201.

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Catalog Number NRP-427 May 1980

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<td>• <strong>Exclusive Double Discrimination</strong> provides precise definition of R-wave.</td>
<td>• Computer is gated only on the R-Wave. High amplitude T-waves are ignored.</td>
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<tr>
<td>• ECG Strip Chart Recorder</td>
<td>• Provides permanent record of patient ECG. Insures proper lead placement.</td>
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<td>• Four digit LED Display</td>
<td>• Indicates R-R Interval or Heart Rate during stress studies.</td>
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<td>• Trigger Pulse LED</td>
<td>• Monitors presence of output signals to the computer.</td>
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<tr>
<td>• Unlimited Heart Rate Capability</td>
<td>• Both Heart Rate display and R-trigger pulses have unlimited tracking capability during stress studies.</td>
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<td>• Trigger Control</td>
<td>• Provides desired setting of R-wave amplitude discrimination.</td>
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<td>• Digital CRT Monitor</td>
<td>• Visual monitoring of ECG and R-wave trigger.</td>
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<td>• ONE YEAR WARRANTY</td>
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## MODEL

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<tr>
<td>AccuSync-V</td>
<td>R-Trigger pulse output, ECG output, Heart Rate/R-R int., Strip Chart Recorder, Digital CRT Monitor and Isolation Amplifier for patient safety.</td>
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<tr>
<td>AccuSync-I</td>
<td>All AccuSync-V features with the exception of Digital CRT Monitor.</td>
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<tr>
<td>AccuSync-II</td>
<td>All AccuSync-I features incorporated into a Module designed to fit into certain Mobile cameras.</td>
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<tr>
<td>AccuSync-III</td>
<td>All AccuSync-I features with the exception of the Strip Chart Recorder.</td>
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<tr>
<td>AccuSync-IV</td>
<td>All AccuSync-III features with the exception of the Heart Rate/R-R int. display.</td>
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**indications and usage**
Sodium Pertechnetate Tc 99m is used in adults as an agent for: brain imaging including cerebral radionuclide angiography, thyroid imaging, salivary gland imaging, placenta localization, and blood pool imaging including radionuclide angiography.

**contraindications**
None known.

**warnings**
Radiation risks associated with the use of Sodium Pertechnetate Tc 99m are greater in children than in adults and, in general, the younger the child the greater the risk owing to greater absorbed radiation doses and longer life expectancy. These greater risks should be taken firmly into account in all childbearing women.

This radiopharmaceutical preparation should not be administered to patients who are pregnant or to nursing mothers unless the expected benefits are to be gained outweigh the potential hazards.

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.

**precautions**
Sodium Pertechnetate Tc 99m, 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 other personnel. Radiopharmaceuticals should be used only by those 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 authorized to license the use of radionuclides.

To minimize radiation dose to the bladder, the patient should be encouraged to drink fluids and to void immediately before the examination and as often thereafter as possible for three days.

**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 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 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**
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 with similar agents.

**dosage 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.

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Peter T. Kirchner, M.D., Editor

The rapid growth of clinical nuclear medicine poses a formidable challenge to the physician who wants to maintain a high level of competence in all areas of nuclear medicine. To help the physician meet this challenge, the Society of Nuclear Medicine has prepared the NUCLEAR MEDICINE REVIEW SYLLABUS, a comprehensive review of the major scientific and clinical advances that have occurred since the early 1970's.

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The Department of Nuclear Medicine at Duke University will sponsor a special seminar dedicated to SPECT imaging techniques with rotating camera devices. This seminar will present the current status of SPECT imaging techniques through lectures and discussions in several categories: technical aspects, clinical experiences, radiopharmaceuticals, etc.

The seminar will be held at Duke University, Durham, North Carolina, on May 1 and 2, 1981.

The Program Directors are R. Edward Coleman, M.D. and Ronald J. Jaszczak, Ph.D. The faculty will consist of several physicians well-known and experienced in the field of SPECT throughout the world.

The course fee is $150.00 and A.M.A. credit may be obtained.

For further information, contact:
Ms. Terrie Hernandez
Manager of Professional Education
SIEMENS
2000 Nuclear Drive
Des Plaines, Illinois 60018
(312) 635-3100
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For more information write: Department of Radiologic Technology, College of Allied Health Professions, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154.

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Division of Nuclear Medicine

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School of Medicine

present

CLINICAL APPLICATIONS OF
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May 19—22, 1981
Sonesta Beach Hotel, Key Biscayne, Fla.
Registration: $250

This Seminar should be of interest to Nuclear and Neuro Physicians and Scientists, and others interested in the application of positron emission tomography in the study of human brain functions.

For further information contact:
Warren R. Janowitz, M.D., Program Chairman, Mount Sinai Medical Center, Div. of Nuc. Med., 4300 Alton Rd, Miami Beach, Florida 33140, (305) 674-2424.

ACCREDITATION: 15 Hours AMA Category I

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Contact: Robert C. Stadalnik, MD, Resident Recruit Chairman, Nuclear Medicine Department, UCDMC, 2315 Stockton Blvd., Rm. G-204, Sacramento, CA 95817
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Birdcage representation of the surface of the blood pool inside the left ventricle.
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†DEC Gamma 11 is a trademark of Digital Equipment Corporation.
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2. Davis MA and Jones AG. Sem Nucl Med 6:19, 1976

Please refer to the brief prescribing information on the following page.
AN-MDP (Technetium Tc 99m Medronate Kit)

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

INDICATIONS AND USAGE. Technetium Tc 99m Medronate may be used as a bone imaging agent to delineate 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 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 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.

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. Optimal imaging results are obtained 1–4 hours after administration.

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 and females.

Pregnancy Category C. Animal reproductive studies have not been conducted on 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 reproductive capacity. Technetium Tc 99m Medronate should be given to a pregnant woman only if clearly needed. Ideally, examinations using radiopharmaceuticals, especially those electively in nature, of a woman of childbearing capacity should be performed during the first few (approximately 10) days following the onset of menses.

Nursing Mothers. Technetium Tc 99m Medronate 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.

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. No adverse reactions specifically attributable to the use of Technetium Tc 99m Medronate have been reported.

DOSEAGE AND ADMINISTRATION. The suggested dose range for i.v. administration, after reconstitution with 0.9% sodium chloride injection, is 10–20 millicuries Technetium Tc 99m Medronate. Scanning is optimal at 1–4 hours post-injection. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.

HOW SUPPLIED. The AN-MDP® Technetium Tc 99m Medronate Kit is supplied either as a set of 5 or 30 sterile and pyrogen-free vials. Each nitrogen-flushed vial contains 10 millicuries Technetium Tc 99m Medronate in 0.8 ml saline. Each 5-vial kit contains a vial of 0.8 ml saline and 10 nitrogen-flushed vials. Each radiopharmaceutical is contained in sterile vials, and each vial is sealed under nitrogen to prevent contamination.

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