The Superior Nuclide For Thyroid Studies

Sodium Iodide I 123

I 123...
A Superior Thyroid Agent

Sodium Iodide I 123 is superior to I 131 because of its low radiation dose to the patient, its short half-life of 13.2 hours, and its imaging energy of 159 KeV.

Sodium Iodide I 123 is superior to Tc99m because it is trapped and organified by the thyroid gland and, therefore, will image the "cold," non-functioning nodule that may appear "hot" or "cold" with Tc99m.[1,2]

For a Consistent Quality Image.....Sodium Iodide I 123

medi+physics™

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[1]Steinbach, HL, Kundy, D, Moss M, et al: A comparison of three agents in thyroid uptake and scintigraphy. Scientific Exhibit, Society of Nuclear Medicine, Philadelphia, June 16-20, 1975.

[2]"Information for Physicians—Irradiation-Related Thyroid Cancer" prepared by the Division of Cancer Control and Rehabilitation National Cancer Institute, DHEW Publication No. (NIH) 77-1120, p.13.

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

SODIUM IODIDE I 123
CAPSULES AND SOLUTION FOR ORAL ADMINISTRATION

DESCRIPTION: Sodium iodide I 123 for diagnostic use is supplied as capsules and in vials as an aqueous solution for oral administration. At calibration time, each capsule has an activity of 100 microcuries and each vial contains solution with a total specific concentration of two millicuries per ml.

INDICATIONS: Sodium iodide I 123 is indicated for use in the diagnosis of thyroid function and imaging.

CONTRAINDICATIONS: None known.

WARNINGS: This radiopharmaceutical should not be administered to children or to patients who are pregnant or to nursing mothers unless the information to be gained outweighs the potential hazards. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, in women of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses. However, when studies of thyroid function are clinically indicated for members of these special population groups, use of I 123 would be preferable to the use of I 131 in order to minimize radiation dosage.

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. Sodium iodide I 123 should be used in pregnant women only when clearly needed.

PRECAUTIONS: Sodium iodide I 123, as well as other radioactive drugs, must be handled with care. Appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Care should also be taken to minimize radiation exposure to the patient consistent with proper patient management. The prescribed sodium iodide I 123 dose should be administered as soon as practicable in order to minimize the fraction of radiation exposure due to relative increase of radionuclidic contaminants with time. The uptake of I 123 may be decreased by recent administration of iodinated contrast materials, by intake of stable iodine in any form, or by thyroid, antithyroid, and certain other drugs. Accordingly, the patient should be questioned carefully regarding diet, previous medication, and procedures involving radiographic contrast media.

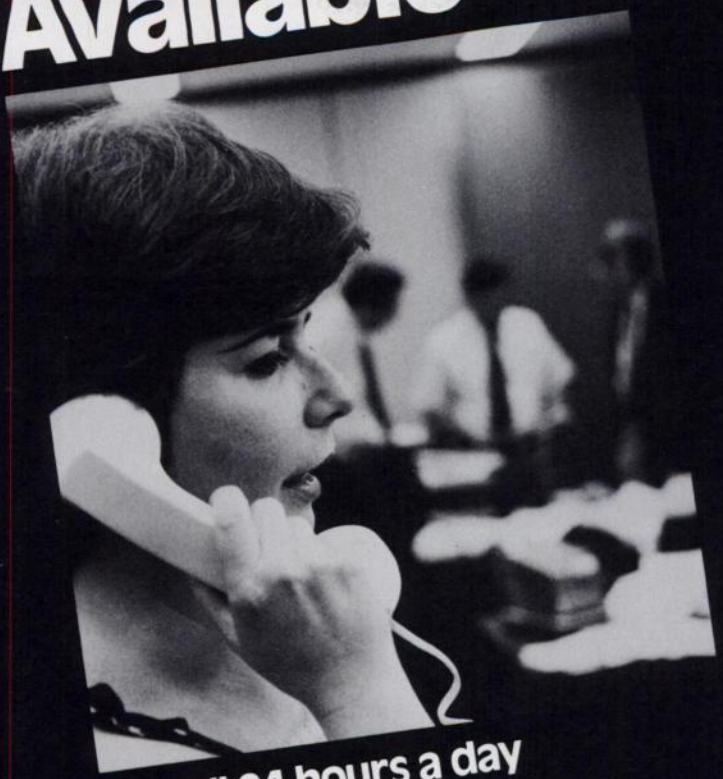
ADVERSE REACTIONS: There were nine adverse reactions reported in a series of 1,393 administrations. None of these were attributed to I 123. Five adverse reactions, consisting of gastric upset and vomiting, were attributed to a filler in the capsule. Two cases of headache and one case of nausea and weakness were attributed to the fasting state. One case of garlic odor on the breath was presumed to be attributable to the presence of tellurium.

DOSAGE AND ADMINISTRATION: The recommended oral dose range for diagnostic studies of thyroid function in the average adult patient (70 kg) is from 100 to 400 microcuries. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration. Concentration of I 123 in the thyroid gland should be measured in accordance with standardized procedures.

SPECIAL CONSIDERATION: 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.

HOW SUPPLIED: Sodium iodide I 123 for oral administration is supplied in aqueous solution in glass vials of 1mCi and in capsules of 100 μCi.

Always Available



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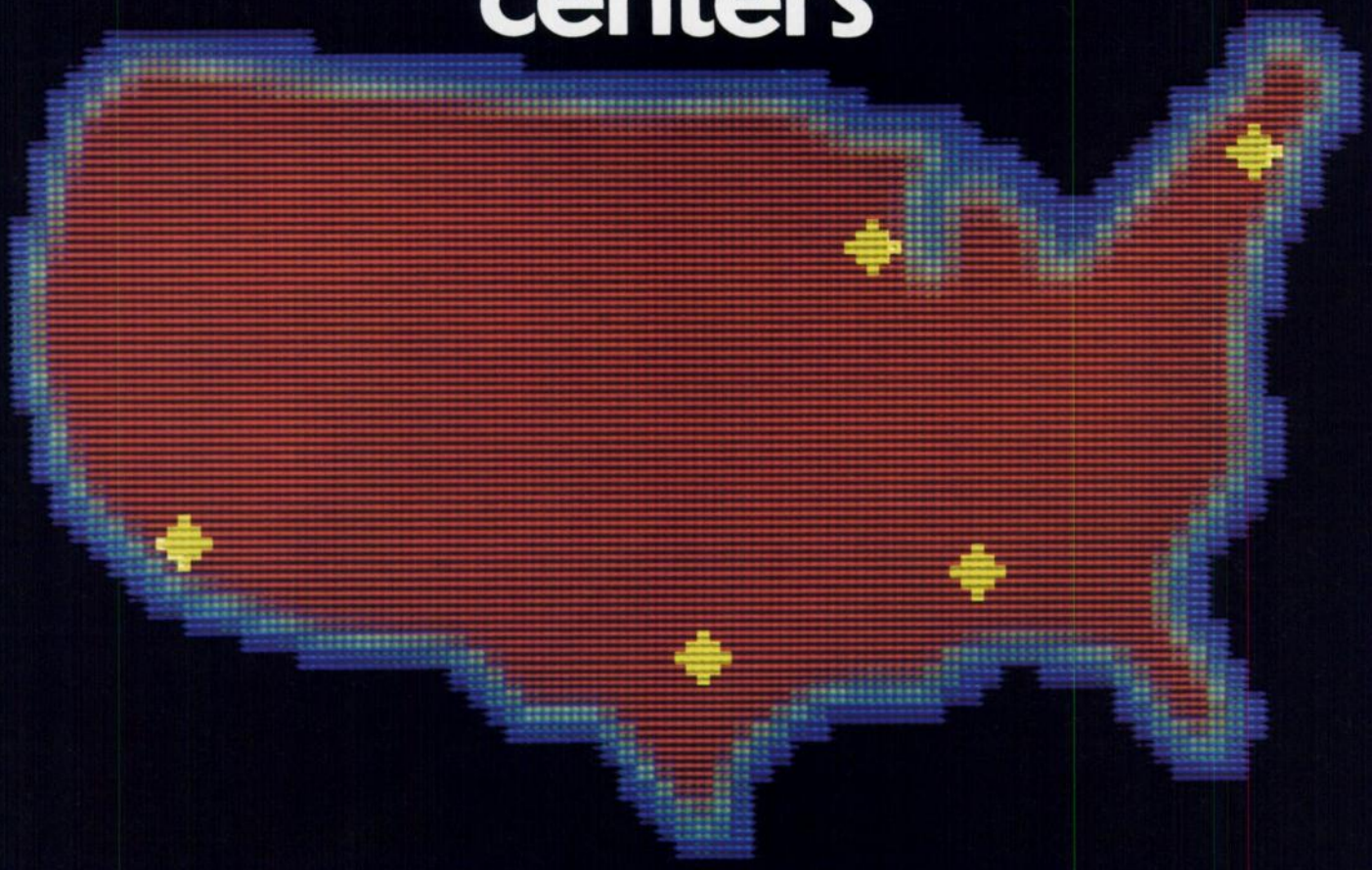

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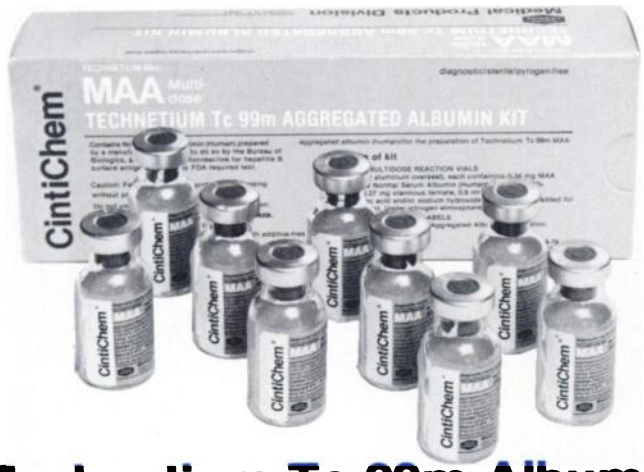

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TECHNETIUM 99m

Technetium Tc 99m Albumin Aggregated Kit

MAA

DIAGNOSTIC-FOR INTRAVENOUS USE

BRIEF SUMMARY OF PRESCRIBING INFORMATION

indications and usage

Technetium Tc 99m Aggregated Albumin is indicated as a lung imaging agent to be used as an adjunct in the evaluation of pulmonary perfusion.

contraindications

Technetium Tc 99m Aggregated Albumin should not be administered to patients with severe pulmonary hypertension.

The use of Technetium Tc 99m Aggregated Albumin is contraindicated in persons with a history of hypersensitivity reactions to products containing human serum albumin.

warnings

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

Theoretically the intravenous administration of any particulate material such as aggregated albumin imposes a temporary small mechanical impediment to blood flow. While this effect is probably physiologically insignificant in most patients, the administration of aggregated albumin is possibly hazardous in acute *cor pulmonale* and other states of severely impaired pulmonary blood flow.

This radiopharmaceutical preparation should not be administered to children, to pregnant women or lactating women unless the expected benefits to be gained outweigh the potential risks.

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

In cases of right-to-left cardiac shunt, additional risk may exist due to the rapid entry of aggregated albumin into the systemic circulation.

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.

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.

The contents of the vial 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 radiodiagnostic.

Technetium Tc 99m Aggregated Albumin 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 Aggregated Albumin not be used after eight hours from the time of preparation. Refrigerate at 2° to 8° C after preparation. If blood is withdrawn into the syringe, unnecessary delay prior to injection may result in clot formation *in situ*.

The contents of the vial are under a nitrogen atmosphere and should be protected from air. On preparation with Sodium Pertechnetate Tc 99m, the contents of the vial should be mixed by gentle inversion to avoid changes in particle size. Do not use if clumping or foaming of the contents is observed.

pregnancy category c

Animal reproduction studies have not been performed to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse affects on the fetus. Technetium Tc 99m Aggregated Albumin 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 while a patient is on a drug since many drugs are excreted in human milk.

Safety and effectiveness in children have not been established.

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

Radiopharmeceuticals 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.

adverse reactions

The literature contains reports of deaths occurring after the administration of aggregated albumin to patients with pre-existing severe pulmonary hypertension. Instances of hemodynamic or idiosyncratic reactions to preparations of Technetium Tc 99m labeled aggregated albumin have been reported.

Hypersensitivity reactions are possible whenever protein-containing materials such as Technetium Tc 99m labeled aggregated albumin are used in man. Epinephrine, antihistamines and corticosteroid agents should be available for use.

how supplied

kit contents

5 STERILE MULTIDOSE REACTION VIALS (10cc, silver aluminum overseal), each containing 0.34 mg MAA Aggregated Normal Serum Albumin (Human) $2.0 \times 10^6 \pm 25\%$ particles, 0.27 mg stannous tartrate, 0.6 ml of isotonic saline. Hydrochloric acid and/or sodium hydroxide may have been added for pH adjustment.

10 PRESSURE-SENSITIVE LABELS for final Technetium Tc 99m Aggregated Albumin preparation.

1 PACKAGE INSERT.

FOR FULL PREPARATION AND PRESCRIBING INFORMATION, SEE PACKAGE INSERT.

Notes: 1. See package insert for full preparation instructions. 2. Reg. U.S. Pat. Off. #3987157, Union Carbide Corporation, Oct. 19, 1976. 3. Refer to Union Carbide and competitive package inserts for full lung dosimetry information.

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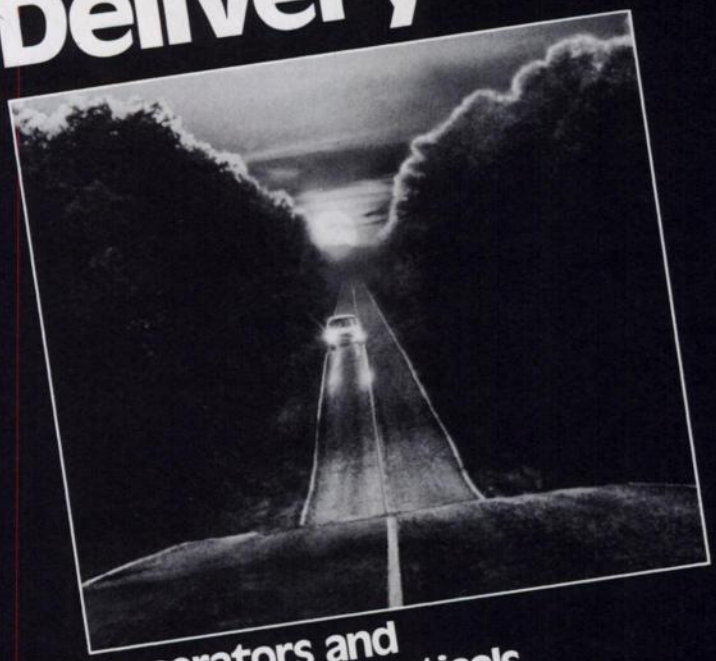

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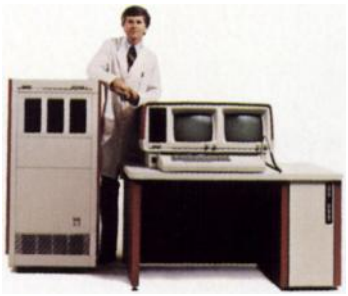

ADAC System II.

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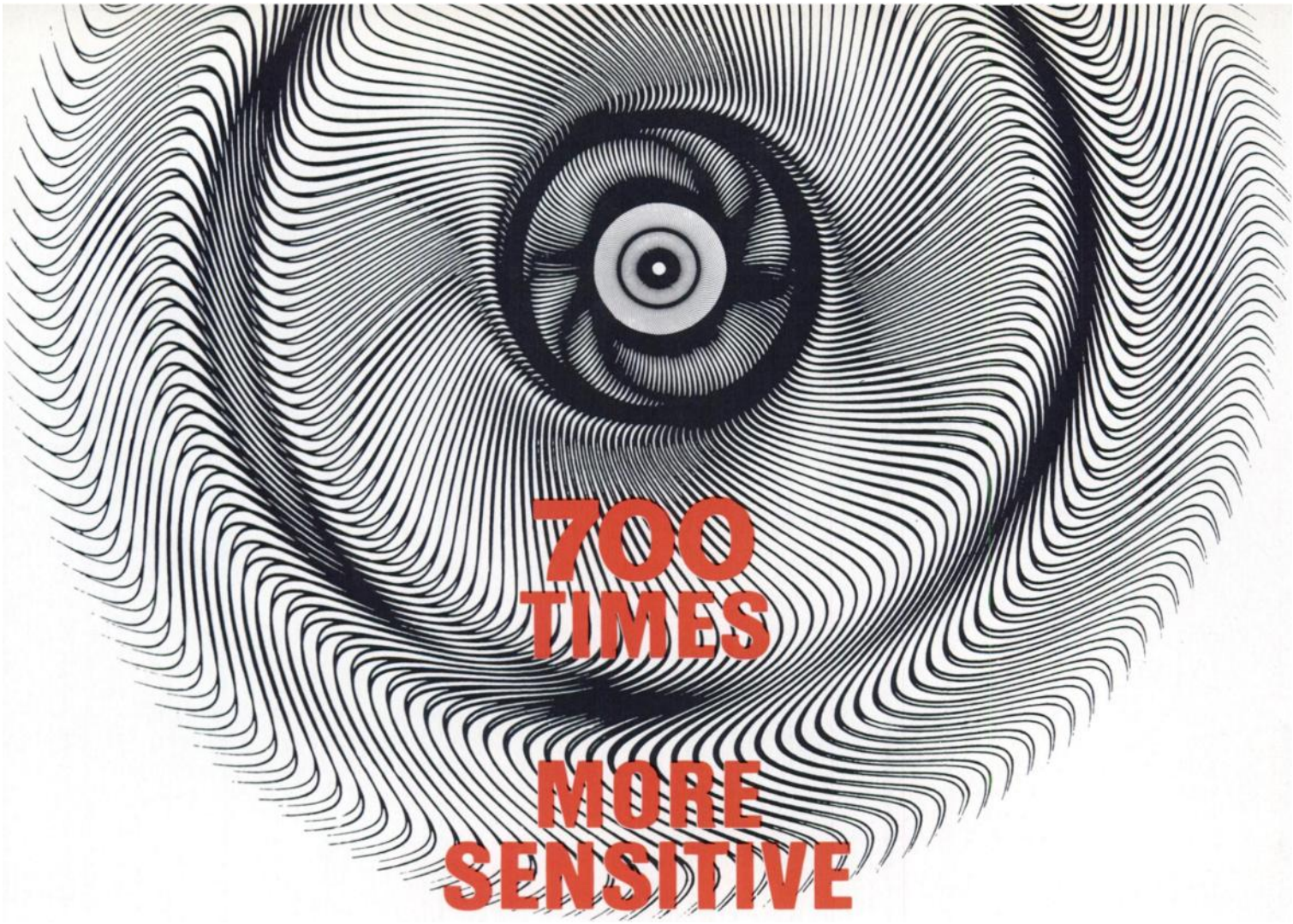

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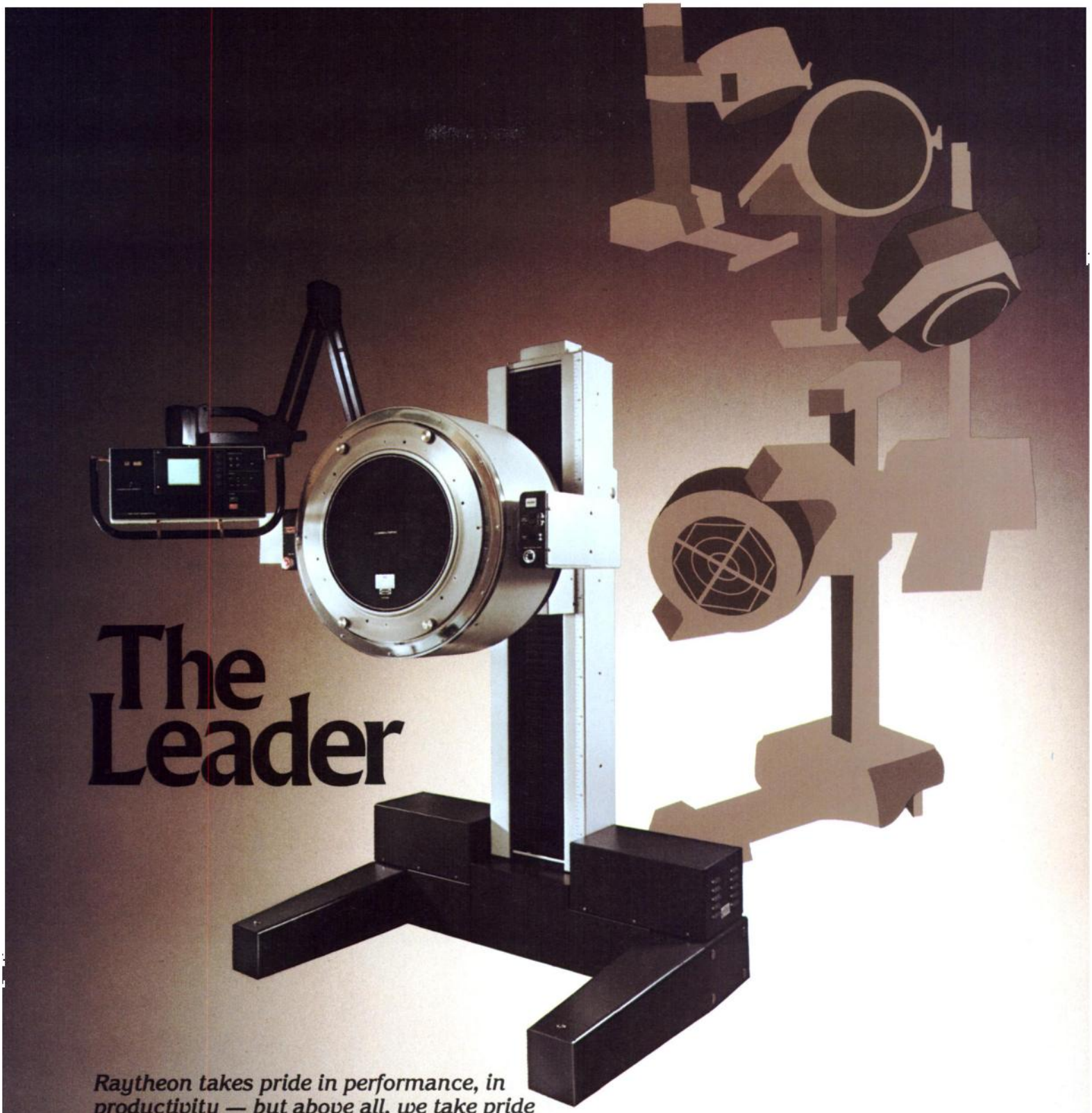

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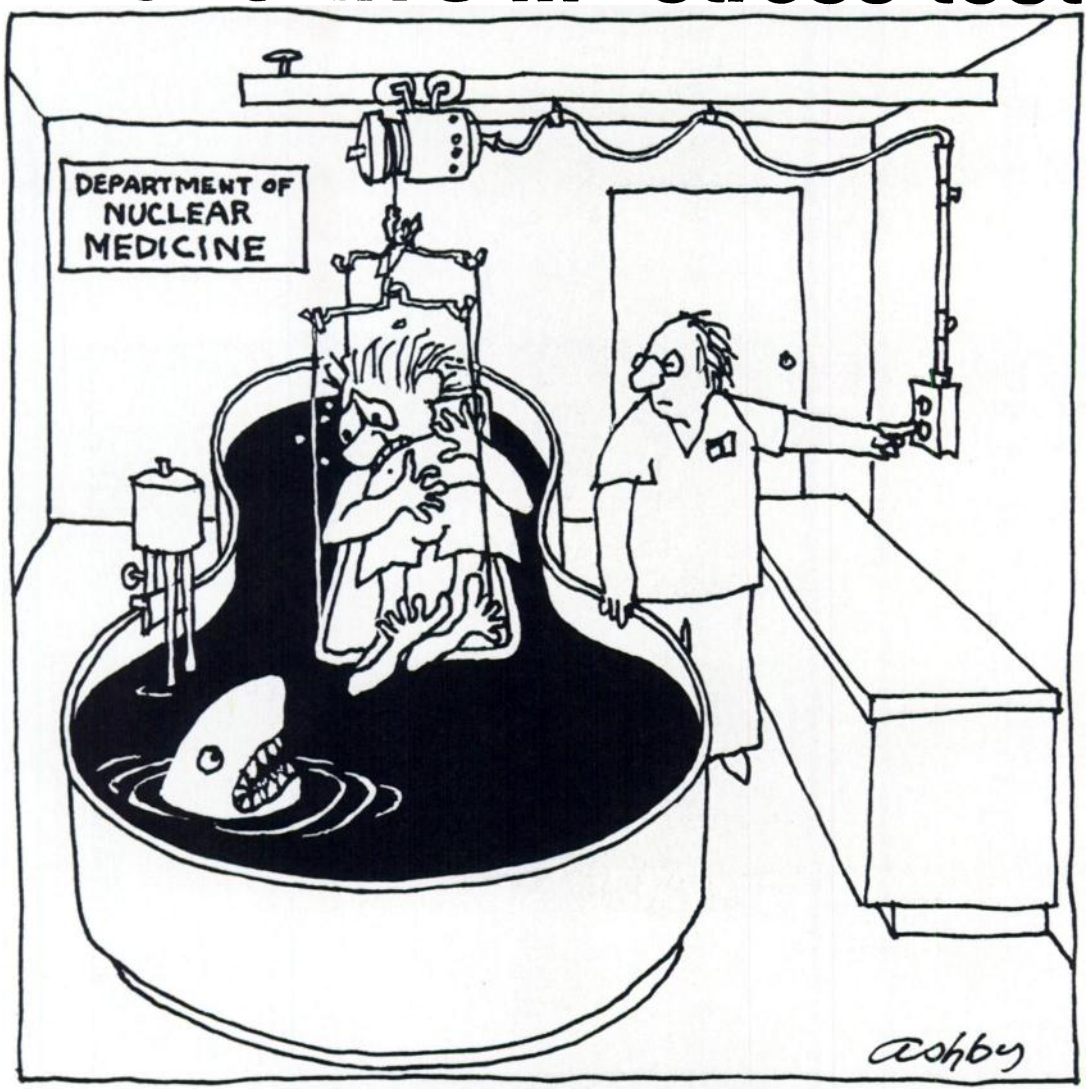

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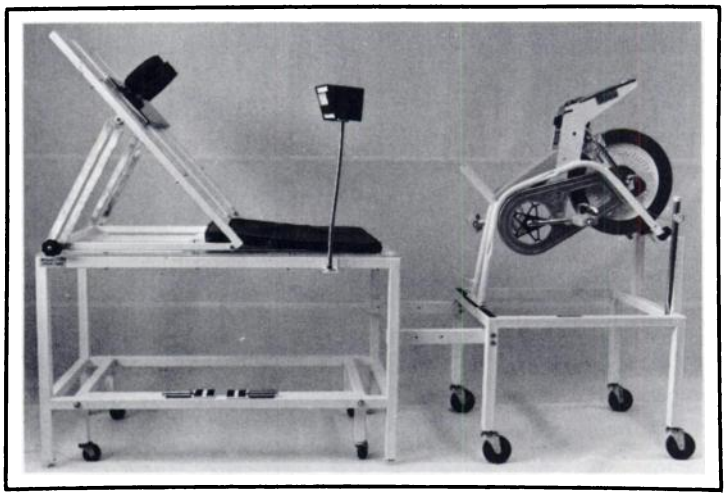

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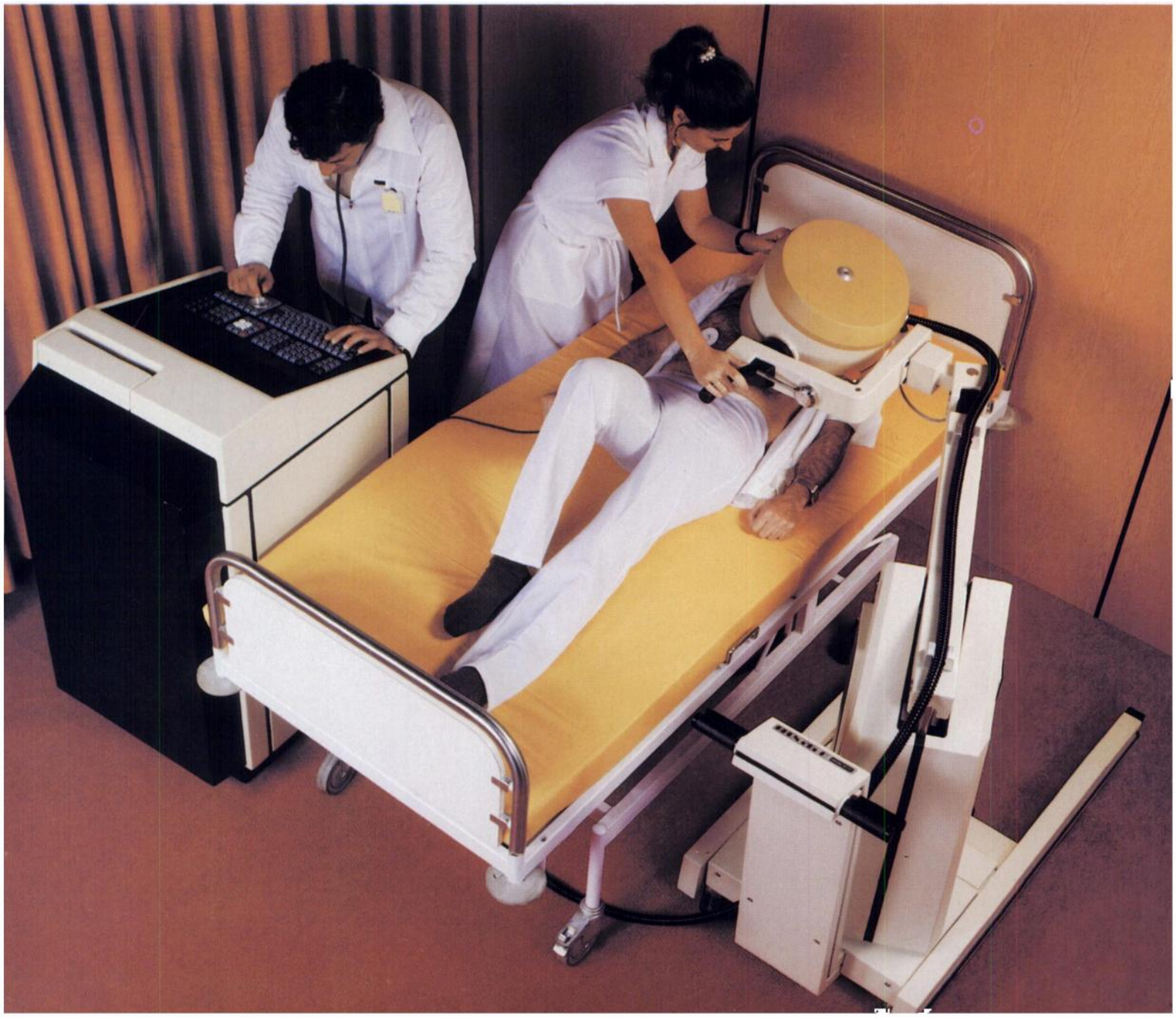

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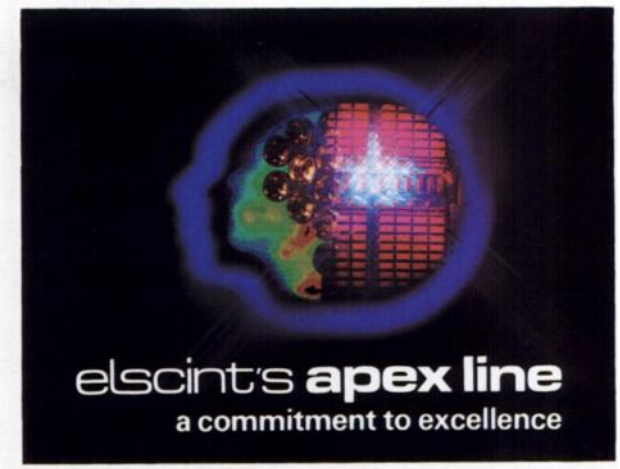

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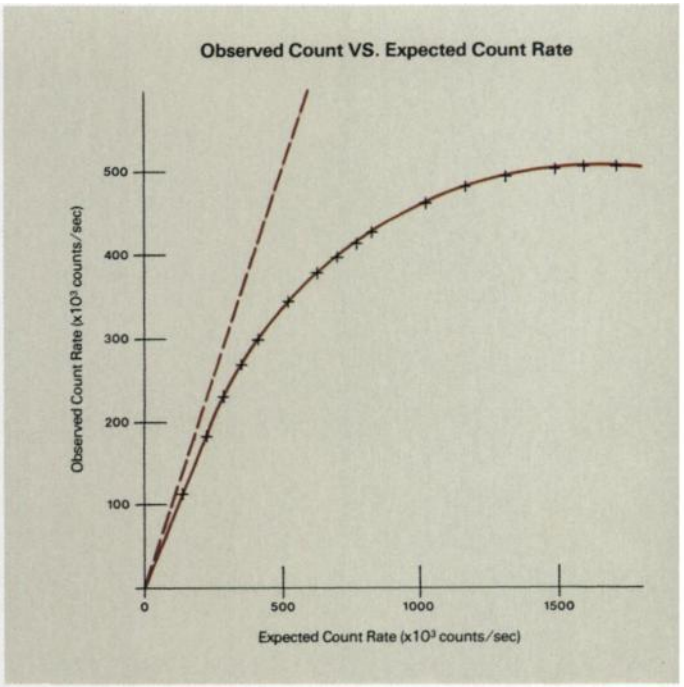

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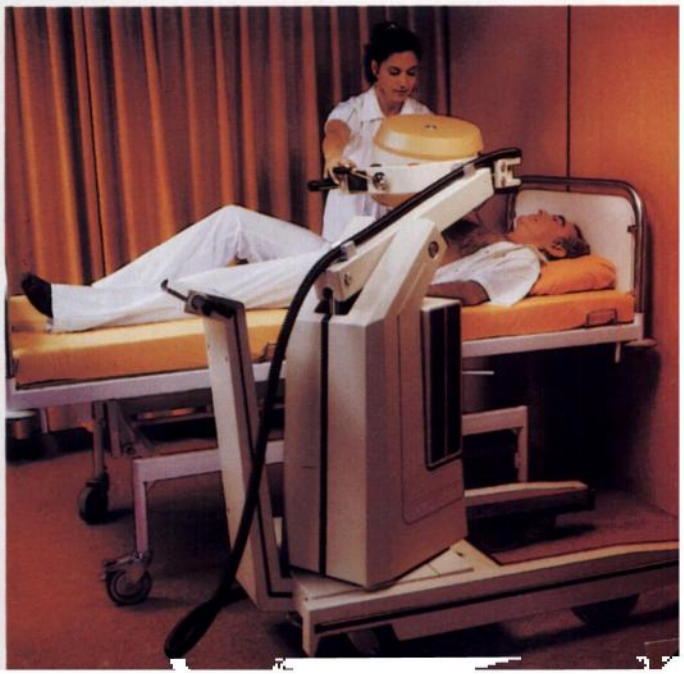
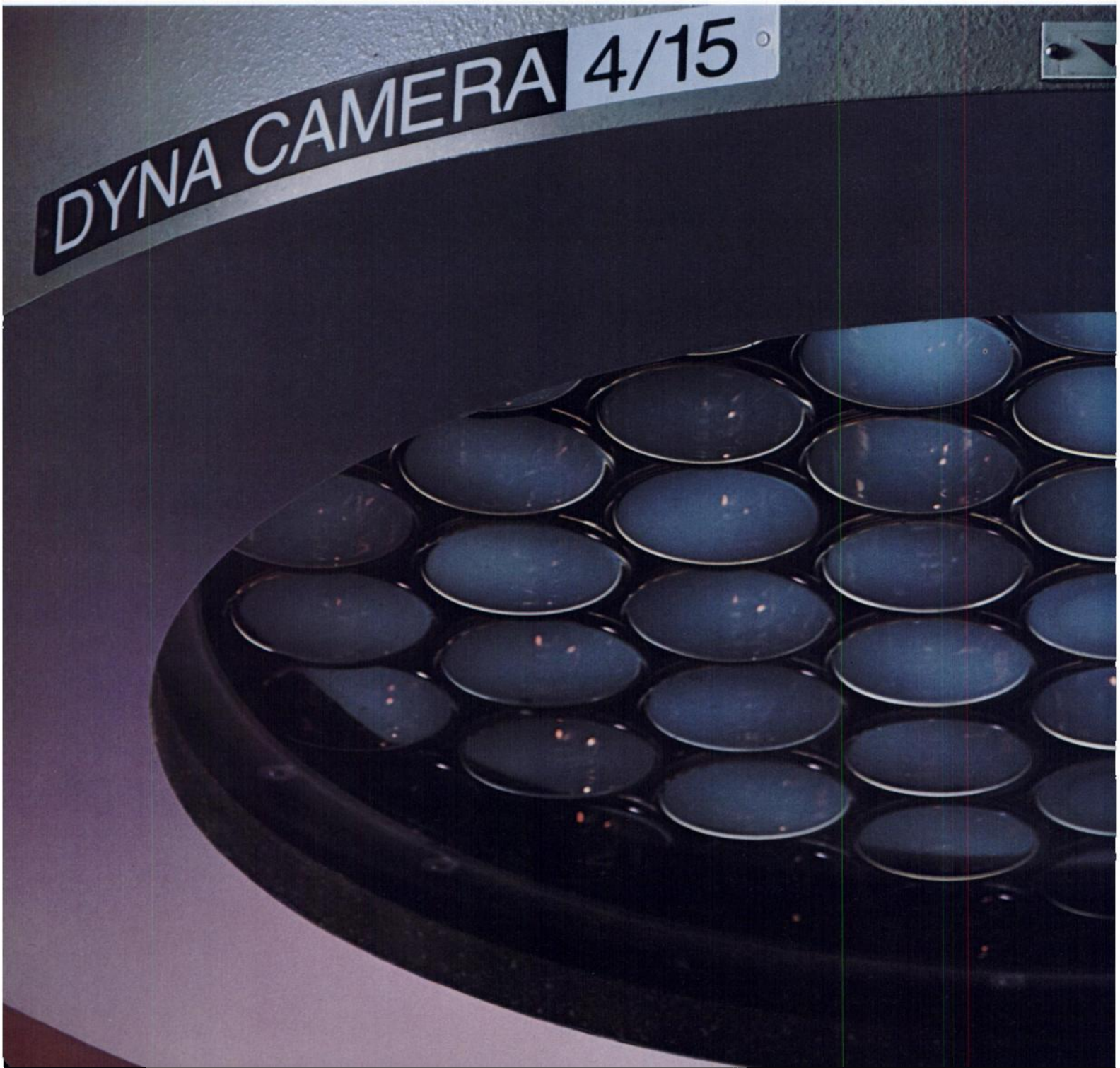


FIRST AGAIN.



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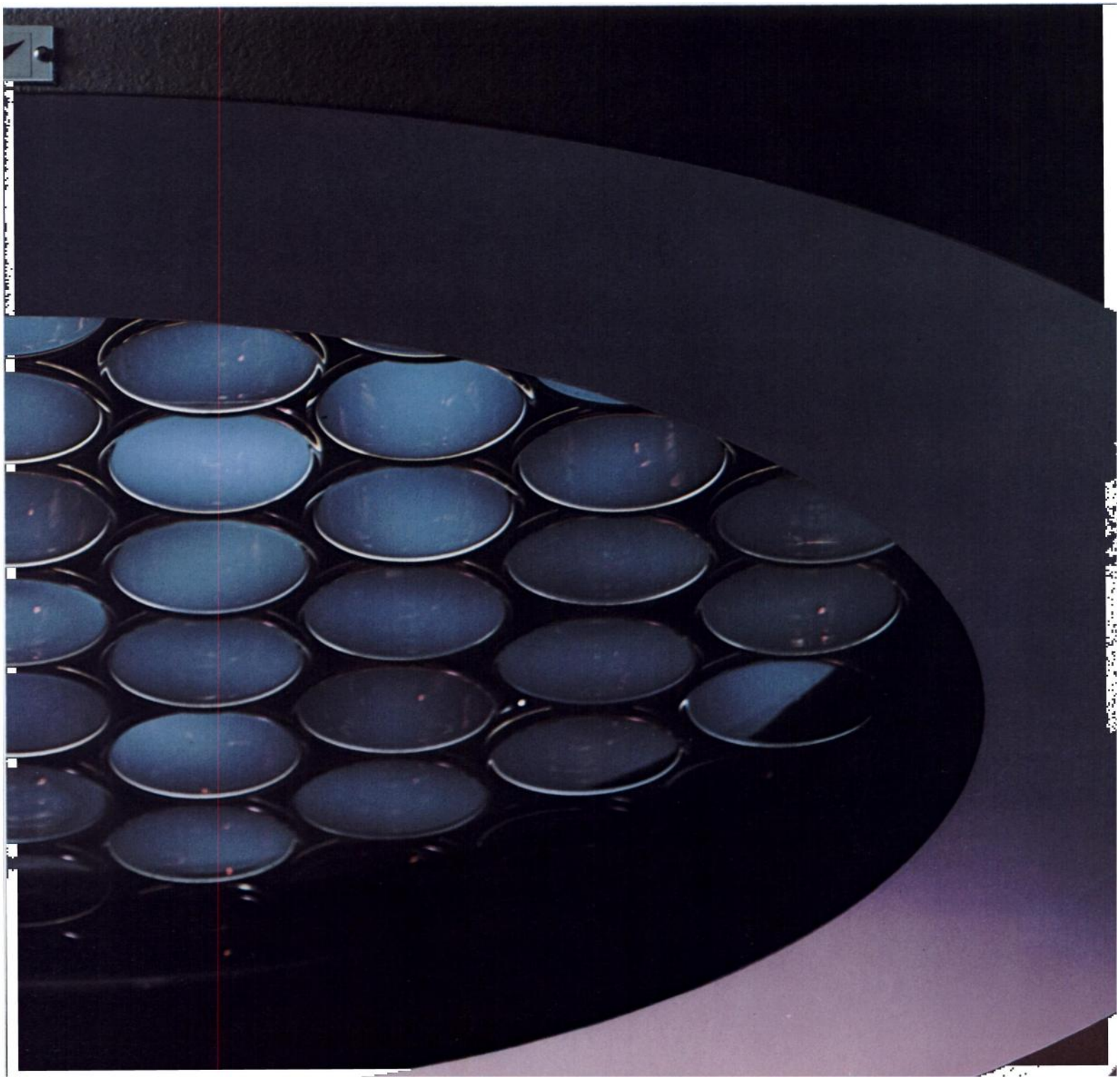

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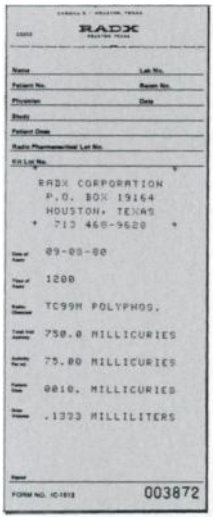
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Thallium imaging in acute myocardial infarction

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[1] 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.

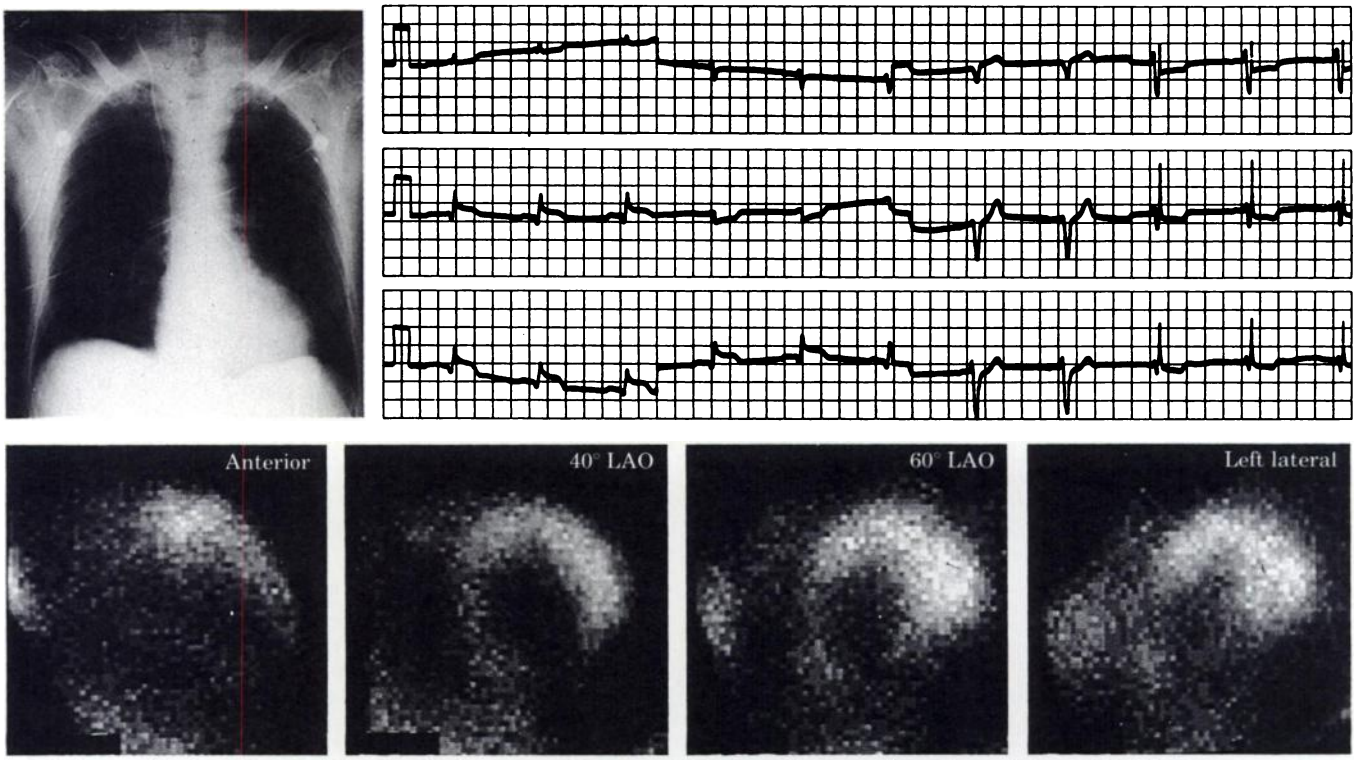
The thallium images—in the anterior, 40° LAO, and 60° LAO views—were interpreted both subjectively and by a computer-assisted quantitative technique.[2] For each interpretive approach, scores for all views were summed to give a total "defect score"—the lower the score, the smaller the area of thallium 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.



Admission studies in a 66-year-old male with known previous acute MI. The patient was hemodynamically stable. Chest X-ray showed slightly increased heart size, no pulmonary congestion. ECG showed ST elevation in II, III, and aV_F, indicative of acute inferior MI, as well as changes suggestive of old anterior wall damage. Thallium imaging disclosed markedly diminished uptake involving the inferior wall, apex, distal anterior wall, and septum. The total defect score was 40.7. The patient's condition gradually deteriorated, despite aggressive vasopressor administration. He died on the sixth postadmission day.

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 inhospital 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

1. Silverman KJ, Becker LC, Bulkley BH, *et al:* Value of early thallium-201 scintigraphy for predicting mortality in patients with acute myocardial infarction. *Circulation* 61, 996–1003, 1980.

2. Burow RD, Pond M, Schafer AW, Becker L: "Circumferential profiles:" A new method for computer analysis of thallium-201 myocardial perfusion images. *J Nucl Med* 20, 771–777, 1979.

Please see following page for brief summary of prescribing information.

Thallous Chloride Tl 201

INDICATIONS AND USAGE: Thallous Chloride Tl 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.

Ideally, examinations using 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 menses.

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 Tl 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 Tl 201, as all radioactive materials, must be handled with care and used with appropriate safety measures to minimize external radiation exposure to clinical personnel. Care should also 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.

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 Tl 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 for Thallous Chloride Tl 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 Tl 201 is 1-1.5mCi. Thallous Chloride Tl 201 is intended for intravenous administration only.

For patients undergoing resting thallium studies, imaging is optimally begun within 10-20 minutes after injection. Several investigators have reported improved myocardial-to-background ratios when patients are injected in the fasting state, in an upright posture, 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 reaches maximum stress 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 Tl 201 for intravenous administration is supplied as a sterile, non-pyrogenic solution containing at calibration time, 1mCi/ml of Thallous Tl 201, 9mg/ml sodium chloride, and 9mg/ml of benzyl alcohol. The pH is adjusted to between 4.5-6.5 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 millicuries of Thallous Tl 201.

The contents of the vial are radioactive. Adequate shielding and handling precautions must be maintained.

Catalog Number NRP-427 May 1980

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1. Subramanian G, McAfee JG, Blair RJ, Kallfelz FA, and Thomas FD: *J Nucl Med 16*:744, 1975
2. Davis MA and Jones AG: *Sem Nucl Med 6*:19, 1976

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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 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 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.

DOSAGE AND ADMINISTRATION. The suggested dose range for i.v. administration, after reconstitution with oxidant-free sodium pertechnetate Tc 99m Injection, to be employed in the average patient (70 Kg) is:

Bone imaging: 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 in lyophilized form: medronic acid 10 mg, stannous chloride (minimum) 0.51 mg, maximum total stannous and stannic chloride 1.01 mg. The pH is adjusted with HCl or NaOH solutions prior to lyophilization. Included in each 5-vial kit is one package insert and 10 radiation labels. Included in each 30-vial pack is one package insert and 60 radiation labels. Refrigeration is not necessary. Technetium Tc 99m Medronate Kits contain no preservative. Vials are sealed under nitrogen: air or oxygen is harmful to the contents of the vials and the vials should not be vented.

DESCRIPTION	CATALOG NUMBER
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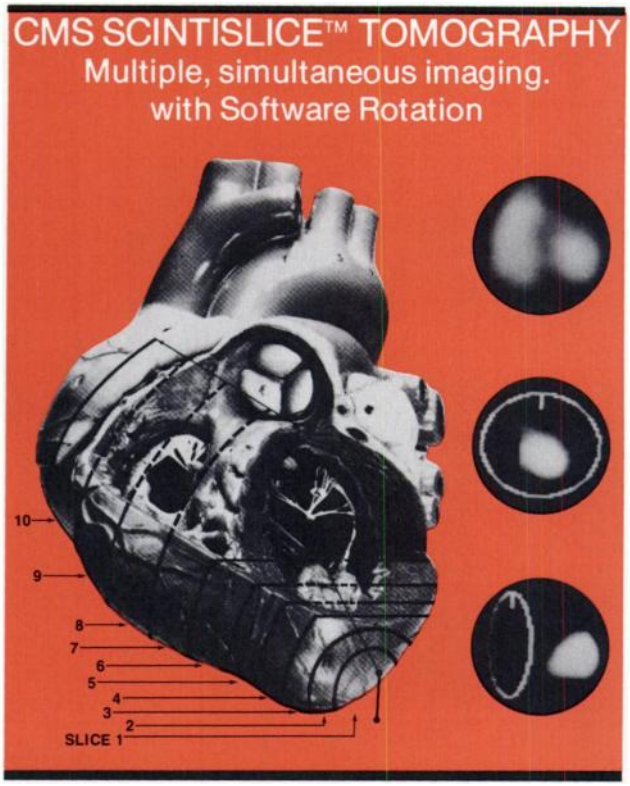

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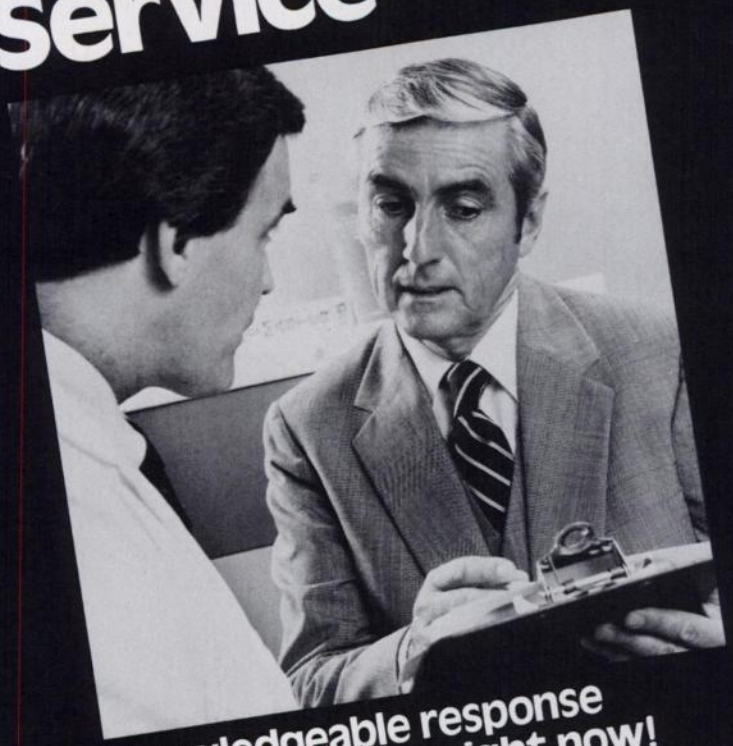

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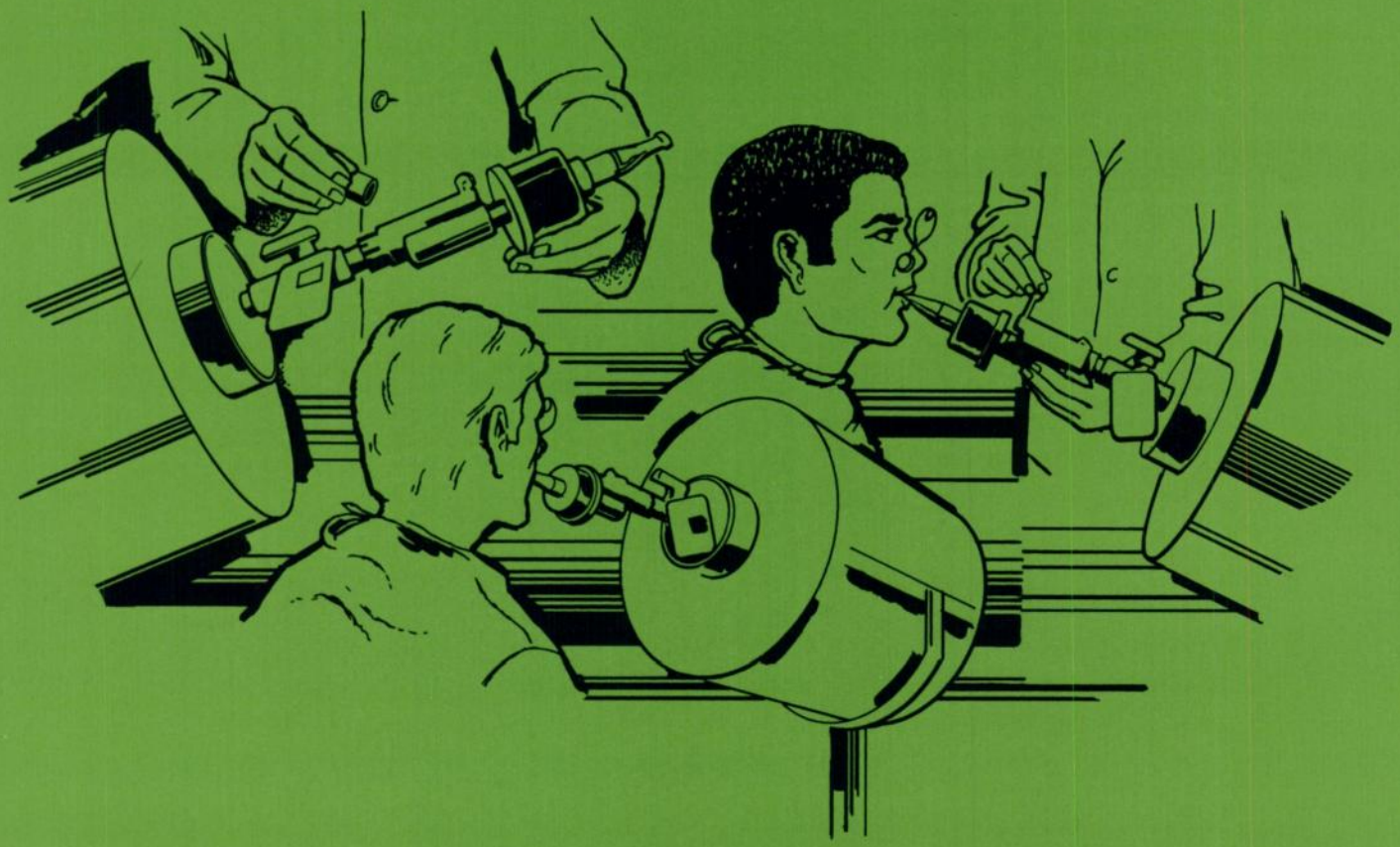

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DESCRIPTION: The Xenon Xe 133-Ventilation Study System consists of a sealed frangible capsule containing 10 millicuries ±20% of Xenon Xe 133 gas at calibration time and date with less than 1% carrier xenon in air.

INDICATIONS AND USAGE: Study of pulmonary ventilation.

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 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.

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.

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 and to 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 leak-proof to avoid loss of radioactivity into the laboratory environs 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.

DOSAGE AND ADMINISTRATION: The recommended activity range for pulmonary ventilation studies in the average patient (70 kg) is 2 to 20 millicuries (0.03 to 0.3 millicuries/kg).

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.

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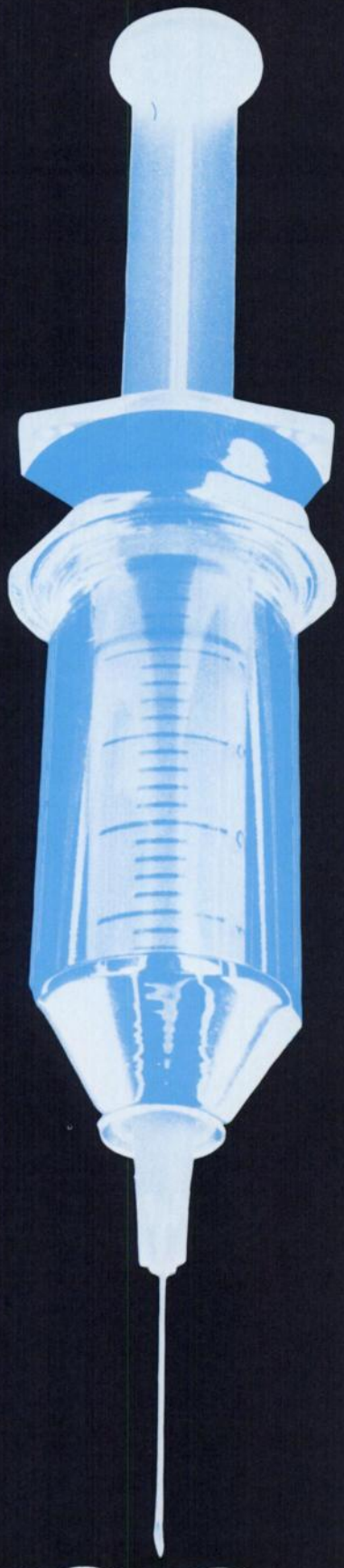

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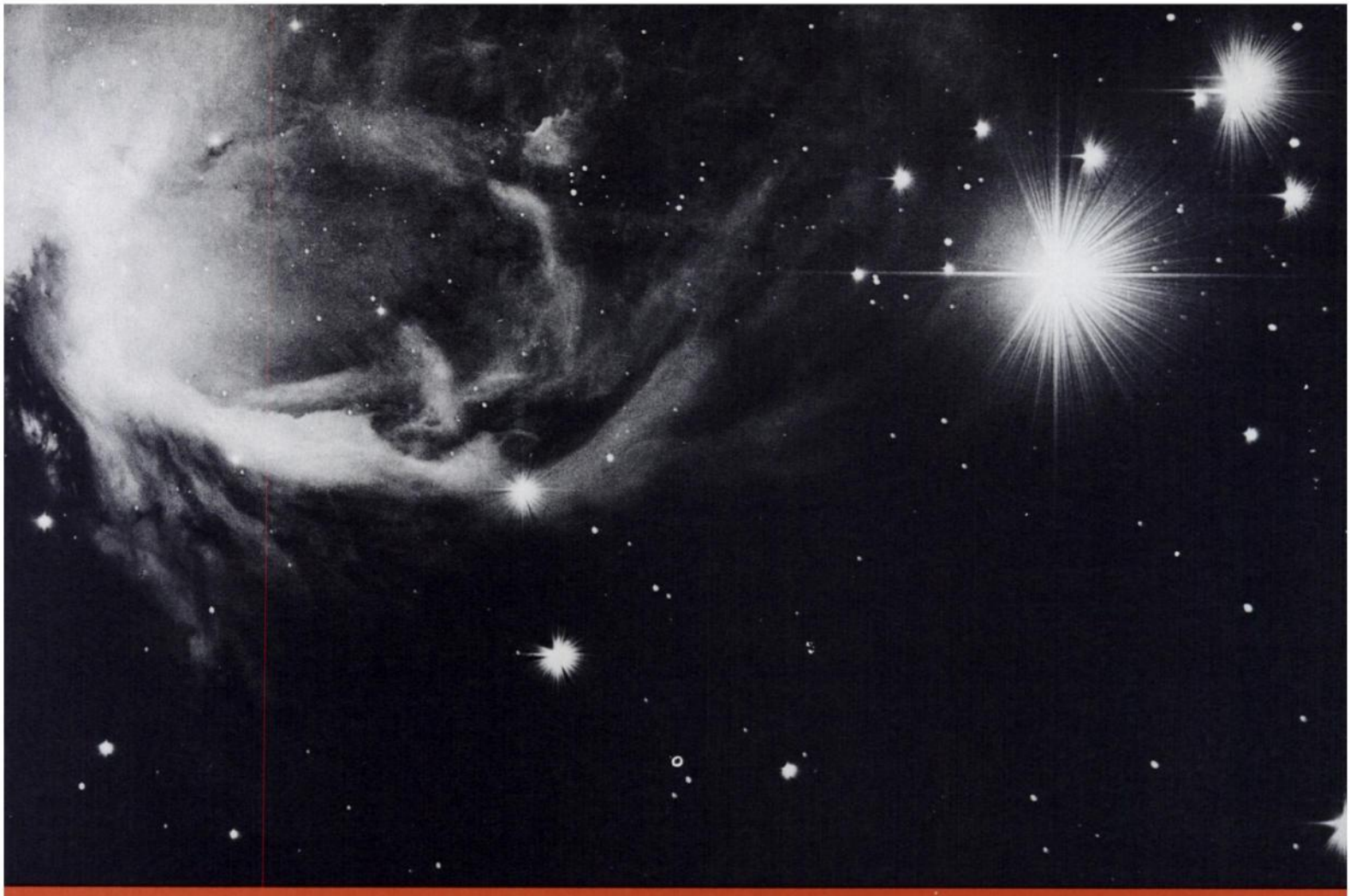

AN-MDP® Technetium Tc 99m Medronate Kit

SULFUR COLLOID Technetium Tc 99m Sulfur Colloid Kit

AN-MAA® Technetium Tc 99m Aggregated Albumin Kit

AN-DTPA® Technetium Tc 99m Pentetate Kit

LDO® Sodium Chloride Injection U.S.P. with Low Dissolved Oxygen

TECH® Quality Control Testing System

syncor™

Let us brighten your future. If you are a nuclear medicine professional, just fill out this coupon, mail it to us and we will send you a handy pocket flashlight. Small enough to fit in your pocket or purse, the light has a bright, far-reaching beam that will amaze you. For work, home or car, the pocket flashlight is yours *free*, just for letting us become acquainted with you. But hurry—this offer is limited to the first 1500 requests.

TO: Syncor International Corporation
12847 Arroyo Street
Sylmar, California 91342

Please send me a pocket flashlight. I am looking forward to knowing more about your products.

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Offer extended to nuclear medicine professionals until January 31, 1981; limit of one flashlight per original coupon.

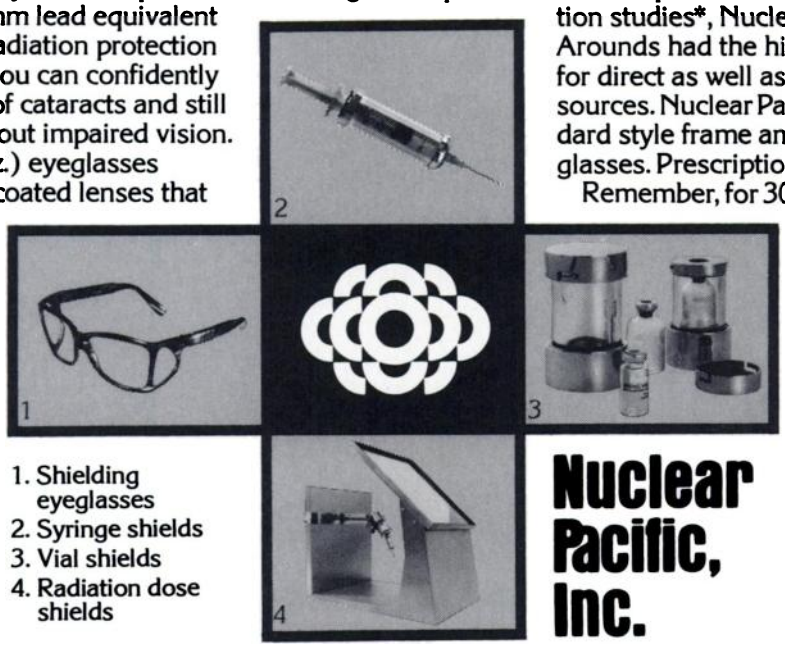
Keep your eyes safe from radiation...
comfortably and confidently.

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 Arounds 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.

Standard style and clip-ons: $155. Wrap Around: $197.



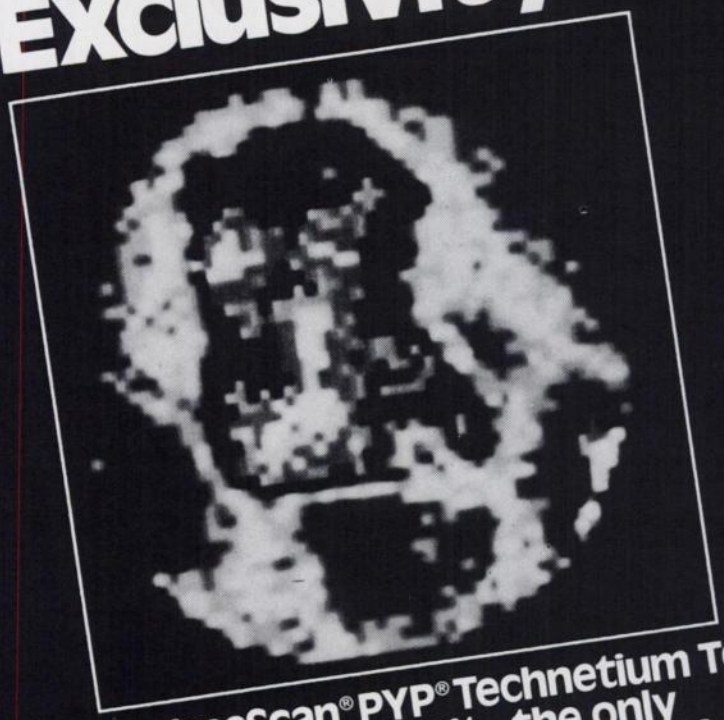
1. Shielding eyeglasses
2. Syringe shields
3. Vial shields
4. Radiation dose shields

*Study available upon request.

Nuclear Pacific, Inc.

6701 Sixth Ave. S., Seattle, WA 98108
(206) 763-2170

Diagnostic Exclusivity



TechneScan® PYP® Technetium Tc99m Pyrophosphate Kit...the only pyrophosphate kit indicated for gated cardiac blood pool imaging.

Mallinckrodt's TechneScan PYP is the only pyrophosphate kit available that gives you the additional diagnostic capability of an advanced method for the dynamic assessment of cardiac function.

Other indications in nuclear cardiology include use 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 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)

See brief summary on following page.

THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

TechneScan® PYP®

Technetium Tc-99m Pyrophosphate Kit

BRIEF SUMMARY

CLINICAL PHARMACOLOGY

When injected intravenously **TechneScan PYP 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 **TechneScan PYP 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 of 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.

TechneScan PYP 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

TechneScan PYP 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 enzymes 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.

TechneScan PYP 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 reports indicate impairment of brain scans using pertechnetate Tc-99m which have been preceded 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 **TechneScan PYP Kit** must be maintained at refrigerator temperature until use.

The contents of the **TechneScan PYP** reaction vial are intended for use in the preparation of Technetium Tc 99m Stannous Pyrophosphate. **TechneScan PYP** 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 **TechneScan PYP 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.

TechneScan PYP Tc 99m should not be used more than six hours after preparation.

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 insure minimum radiation exposure to occupational workers.

Bone Imaging

Both prior to and following **TechneScan PYP Tc 99m** administration, patients should be encouraged to drink fluids. Patients should void as often as possible after the **TechneScan PYP 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

TechneScan PYP should be injected by direct venipuncture. Heparinized catheter systems should be avoided.

ADVERSE REACTIONS

None.

HOW SUPPLIED

Catalog Number—*094* **TechneScan PYP 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:

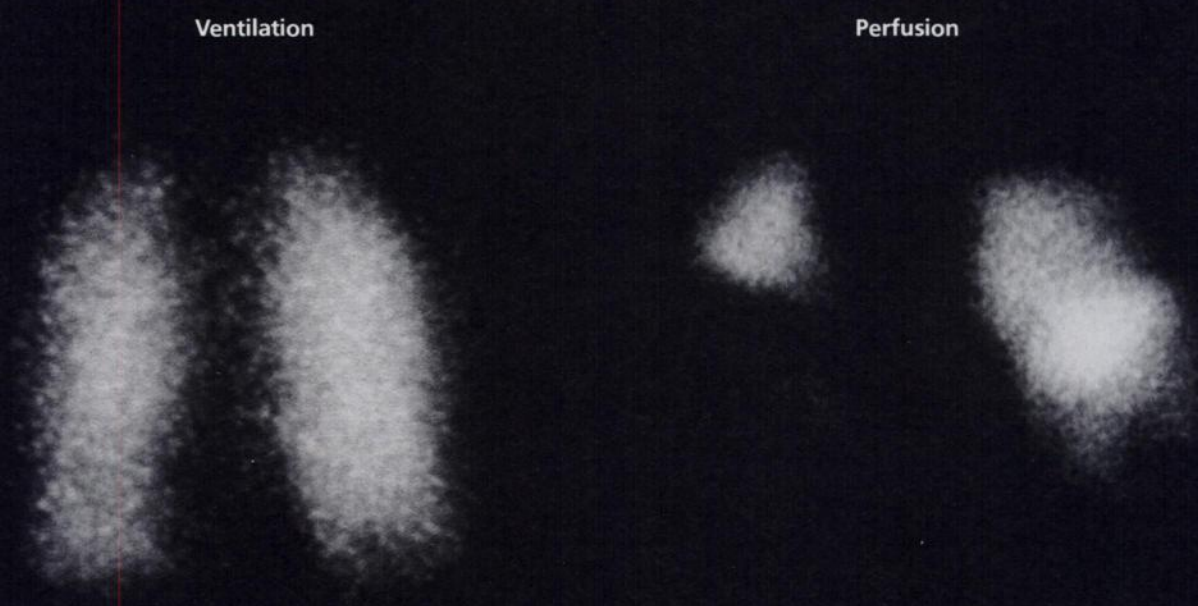
12.0 mg sodium pyrophosphate and 3.4 mg stannous chloride (lyophilized). Hydrochloric acid is added for pH adjustment prior to lyophilization.

5—Radioassay Information String Tags.

Mallinckrodt® Diagnostics

Mallinckrodt, Inc.
P.O. Box 5840, St. Louis, Missouri 63134

Lung



Diagnosis: normal ventilation, abnormal perfusion — pulmonary embolism

Imaging information: *Instrument:* Picker Model 4/15 Gamma Camera *Dose:* 15 mCi Xenon 133; 3 mCi PULMOLITE *Information density:* 1,000 counts/cm^2; 2,000 counts /cm^2

Xenon Xe 133 Gas
(CALIDOSE™) Dispensing System

PULMOLITE™
Technetium Tc 99m Aggregated Albumin Kit

NEN New England Nuclear®

Please see following page for brief prescribing information.

Xenon Xe 133 Gas

(CALIDOSE™) Dispensing System

INDICATIONS: Inhalation of xenon Xe 133 gas has proved valuable for the evaluation of pulmonary function and for imaging the lungs. It may also be applied to assessment of cerebral flow.

CONTRAINDICATIONS: To date, no known contraindications to the use of xenon Xe 133 gas have been reported.

WARNINGS: This radiopharmaceutical should not be administered to pregnant or lactating women unless the benefits 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 the menses.

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 governmental agency authorized to license the use of radionuclides.

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 insure minimum radiation exposure to occupational workers. Expired xenon Xe 133 gas should be controlled in a manner that is in compliance with the appropriate governmental agency regulations.

Xenon Xe 133 adheres to some plastics and rubber and should not be allowed to stand in tubing or respirator containers. Such unrecognized loss of radioactivity from the dose for administration may render the study nondiagnostic. Xenon Xe 133 gas delivery systems, ie, respirators or spirometers, and associated tubing assemblies must be leakproof to avoid loss of radioactivity into the laboratory environs not specifically protected by exhaust systems.

ADVERSE REACTIONS: To date, no adverse reactions based on the use of xenon Xe 133 gas have been reported.

DOSAGE AND ADMINISTRATION: Xenon Xe 133 gas is administered by inhalation from closed respirator systems or spirometers.

The suggested activity range employed for inhalation by the average adult patient (70kg) is:

Pulmonary function including imaging: 2-30 mCi in 3 liters of air.

Cerebral blood flow: 10-30 mCi in 3 liters of air.

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

HOW SUPPLIED: The xenon Xe 133 gas is supplied as part of the Calidose® system, consisting of 2 ml unit dose vials and the Calidose dispenser* for shielded dispensing.

Normally vials containing either 10 or 20 mCi/vial, packed up to 5 vials per shield tube, are supplied. Vial sets containing up to 100 mCi/vial are available.

Catalog Number NRP-127 *Patent Pending †JO 127 July 1975, Rev 1

PULMOLITE™

Technetium Tc 99m Aggregated Albumin Kit

INDICATIONS AND USAGE: Technetium Tc 99m aggregated albumin is indicated as a lung imaging agent to be used as an adjunct in the evaluation of pulmonary perfusion.

CONTRAINDICATIONS: Technetium Tc 99m aggregated albumin should not be administered to patients with severe pulmonary hypertension.

The use of Tc 99m aggregated albumin is contraindicated in persons with a history of hypersensitivity reactions to products containing human serum albumin.

WARNINGS: The possibility of allergic reactions should be considered in patients who receive multiple doses.

Theoretically, the intravenous administration of particulate material such as aggregated albumin imposes a temporary small mechanical impediment to blood flow. While this effect is probably physiologically insignificant in most patients the administration of aggregated albumin is possibily hazardous in acute cor pulmonale and other states of severely impaired pulmonary blood flow.

This radiopharmaceutical preparation should not be administered to children or to pregnant or lactating women unless the expected benefits to be gained outweigh the potential risks.

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: In cases of right-to-left cardiac shunt, additional risk may exist due to the rapid entry of aggregated albumin into the systemic circulation.

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.

The labeling reactions involved in preparing the agent depend on maintaining 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.

The contents of the vial are sterile and non-pyrogenic. It is essential that the user follow the directions carefully and adhere to strict aseptic procedures during preparation of the radiodiagnostic.

Technetium Tc 99m aggregated albumin is physically unstable and as such the particles will settle with time. Failure to mix the vial contents 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 aggregated albumin not be used after eight hours from the time of reconstitution. Refrigerate at 2° to 8°C after reconstitution. If blood is withdrawn into the syringe, unnecessary delay prior to injection may result in clot formation in situ.

The contents of the vial are under a nitrogen atmosphere and should be protected from air. Do not use if clumping or foaming of the contents is observed.

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. Technetium Tc 99m aggregated albumin 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 while a patient is on a drug since many drugs are excreted in human milk.

Safety and effectiveness in children have not been established.

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 the occupational worker.

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.

ADVERSE REACTIONS: The literature contains reports of deaths occurring after the administration of aggregated albumin to patients with pre-existing severe pulmonary hypertension. Instances of hemodynamic or idiosyncratic reactions to preparations of Tc 99m-labeled aggregated albumin have been reported.

Hypersensitivity reactions are possible whenever protein-containing materials such as Tc 99m-labeled aggregated albumin are used in man. Epinephrine, antihistamines and corticosteroid agents should be available for use.

DOSAGE AND ADMINISTRATION: The recommended intravenous dose range for the average patient (70kg) is 1 to 4 millicuries. The volume of the dose may vary from 0.2 to 1.3 ml.

The recommended number of aggregated albumin particles to be administered per dose is 200,000-700,000 with the suggested number being approximately 350,000.

For easy and accuracy in dispensing the prepared agent, it is recommended that prior to reconstitution, concentrated sodium pertechnetate Tc 99m be further diluted to a volume of 8ml with fresh, preservative-free sodium chloride injection (U.S.P.).

HOW SUPPLIED: PULMOLITE™ Technetium Tc 99m Aggregated Albumin Kit is supplied in kits of five (5) or thirty (30) vials, sterile and non-pyrogenic, each vial containing in lyophilized form:

Aggregated albumin (human)-1.0mg
Normal human serum albumin-10mg
Sodium chloride-10mg
Stannous chloride dihydrate, maximum-0.07mg

Each vial contains 3.6-6.5 x 10^6 aggregated albumin particles.

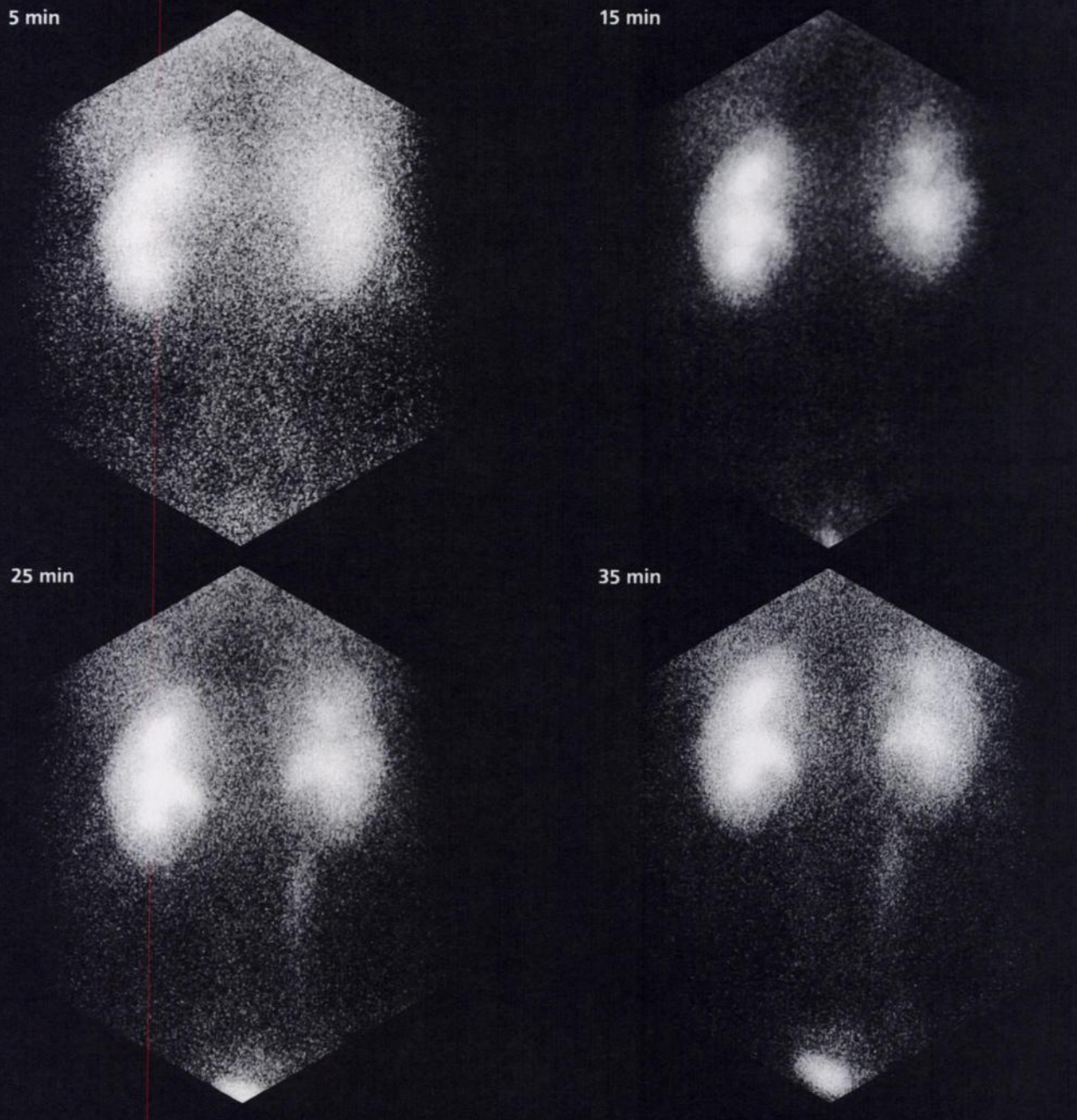
PULMOLITE contains no preservative; after reconstitution the shielded vial should be stored at 2° to 8°C.

Included in each five (5) vial kit is one (1) package insert and six (6) radiation labels. Included in each thirty (30) vial kit is one (1) package insert and thirty-six (36) radiation labels.

This reagent kit is approved for use by persons licensed by the U.S. Nuclear Regulatory Commission pursuant to Section 35.14 and 35.100 Group III of 10CFR 35 or under licenses of Agreement States.

Catalog Number NRP-415 **August 1976**

Kidney



Diagnosis: pyelonephritis of right upper pole

Imaging information: *Instrument:* Ohio Nuclear Sigma 410 Gamma Camera *Dose:* 15 mCi GLUCOSCAN
Counts/image: 800 K for first postflow images, then same time for succeeding images

GLUCOSCAN™

Technetium Tc 99m Gluceptate Sodium Kit

NEN New England Nuclear®

Please see following page for brief prescribing information.

GLUCOSCAN™
Technetium Tc 99m Gluceptate Sodium Kit

INDICATIONS AND USAGE: Technetium Tc 99m Gluceptate Sodium is used for brain imaging.

Technetium Tc 99m Gluceptate Sodium is indicated for renal perfusion imaging as an adjunct in the diagnosis, localization and evaluation of kidney disease. It may provide useful information about renal size, shape, and position and may delineate lesions affecting renal blood flow.

CONTRAINDICATIONS: None known.

WARNINGS: The contents of the GLUCOSCAN vial are intended only for use in the preparation of Technetium Tc 99m Gluceptate Sodium and are NOT to be directly administered to the patient.

Ideally examinations using radiopharmaceuticals – especially those elective in nature – of a woman of childbearing capability should be performed during the first ten days following the onset of the menses.

Dehydration and/or patient positioning may result in failure to visualize urinary excretory structures in the presence of normal function. Adequate patient fluid intake and repositioning may reduce the incidence of such false positive studies.

PRECAUTIONS: Technetium Tc 99m Gluceptate Sodium, as well as any radioactive agent, must be handled with care. Once sodium pertechnetate Tc 99m is added to the kit, appropriate safety measures should be used to minimize external radiation exposure to clinical personnel.

Care should also be taken to minimize radiation exposure to patients in a manner consistent with proper patient management.

The Technetium Tc 99m labeling reaction involved in preparing Technetium Tc 99m Gluceptate Sodium depends on the maintenance of tin in the divalent state. Any oxidant present in the sodium pertechnetate Tc 99m employed may adversely affect the quality of the prepared agent. Thus, sodium pertechnetate Tc 99m containing oxidants should not be used without first demonstrating that it is without adverse effect on the properties of the resulting agent.

The use of bacteriostatic sodium chloride as a diluent for sodium pertechnetate Tc 99m may adversely affect the biologic distribution of the prepared agent, and its use is not recommended.

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

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. Technetium Tc 99m Gluceptate Sodium 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.

ADVERSE REACTIONS: Although infrequent, erythema has been reported in association with the use of Technetium Tc 99m Gluceptate Sodium.

DOSAGE AND ADMINISTRATION: The recommended dose for the average (70kg) adult patient is 10-20 millicuries for both renal and brain imaging. Technetium Tc 99m Gluceptate Sodium is intended for intravenous administration only.

Technetium Tc 99m Gluceptate Sodium should be used within six hours after aseptic reconstitution with sodium pertechnetate Tc 99m. For optimal results, this time should be minimized. The reaction vial contains no bacteriostat.

Optimal results for both renal and brain imaging are obtained one hour after administration. Studies have shown that although optimal target-to-background ratios for brain lesions are obtained at two hours post-injection, there is no improvement in diagnostic efficacy after one hour.

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 governmental agencies authorized to license the use of radionuclides.

The components of the New England Nuclear GLUCOSCAN 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 of pertechnetate solution and the withdrawal of doses for patient administration.

HOW SUPPLIED: NEN's GLUCOSCAN Technetium Tc 99m Gluceptate Sodium Kit is supplied as a set of five or thirty vials, sterile and non-pyrogenic. Each vial contains in lyophilized form:

Gluceptate Sodium – 200mg
Maximum Tin – 0.07mg
Stannous Chloride (min.) – 0.06mg

Prior to lyophilization the pH is adjusted with hydrochloric acid and/or sodium hydroxide solution. Store at room temperature (15°-30°C). Included in each five vial kit is one package insert and six radiation labels. Included in each thirty vial kit is one package insert and thirty-six radiation labels.

The contents of the kit vials are not radioactive; however, after reconstitution with sodium pertechnetate Tc 99m the contents are radioactive and adequate shielding and handling precautions must be maintained.

This reagent kit is approved for use by persons licensed by the U.S. Nuclear Regulatory Commission pursuant to Section 35.14 and 35.100 Group III of 10 CFR or under equivalent licenses of Agreement States.

Catalog Number NRP-180 (5 vial kit) August 1978
Catalog Number NRP-180C (30 vial kit)

OSTEOLITE™
Technetium Tc 99m Medronate Sodium Kit (MDP)

INDICATIONS AND USAGE: Technetium Tc 99m OSTEOLITE may be used as a bone imaging agent to delineate areas of altered osteogenesis.

CONTRAINDICATIONS: None known.

WARNINGS: The contents of the OSTEOLITE vial are intended only for use in the preparation of Technetium Tc 99m medronate sodium and are NOT to be directly administered to the patient.

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

PRECAUTIONS: A thorough knowledge of the normal distribution of intravenously administered Technetium Tc 99m medronate sodium is essential in order to accurately interpret pathologic studies.

Technetium Tc 99m medronate sodium, as well as any radioactive agent, must be handled with care. Once sodium pertechnetate Tc 99m is added to the kit, appropriate safety measures should be used to minimize external radiation exposure to clinical personnel. Care should also be taken to minimize radiation exposure to patients in a manner consistent with proper patient management.

Since 50–75% of the administered dose is renally excreted, good patient hydration and frequent voiding for 4–6 hours post-injection will significantly reduce the bladder wall dose.

The Technetium Tc 99m labeling reaction involved in preparing Technetium Tc 99m medronate sodium depends on the maintenance of tin in the divalent state. Any oxidant present in the sodium pertechnetate Tc 99m employed may adversely affect the quality of the prepared agent. Thus, sodium pertechnetate Tc 99m containing oxidants should not be used without first demonstrating that it is without adverse effect on the properties of the resulting agent.

The use of bacteriostatic sodium chloride as a diluent for sodium pertechnetate Tc 99m may adversely affect the biologic distribution of the prepared agent, and its use is not recommended.

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. Technetium Tc 99m medronate sodium 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.

ADVERSE REACTIONS: None reported.

DOSAGE AND ADMINISTRATION: The recommended dose for the average 70kg adult patient is 15mCi with a range of 10-20mCi. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.

Optimal imaging results are obtained within one to four hours after administration.

OSTEOLITE should be used within six hours after aseptic reconstitution with sodium pertechnetate Tc 99m. For optimum results this time should be minimized.

The vial contains no bacteriostat.

Radiopharmaceuticals should be used by persons 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 governmental agencies authorized to license the use of radionuclides.

HOW SUPPLIED: NEN's OSTEOLITE™ Technetium Tc 99m Medronate Sodium Kit is supplied as a set of five or thirty vials, sterile and non-pyrogenic. Each nitrogen-flushed vial contains in lyophilized form:

Medronate Disodium – 10mg
Stannous Chloride Dihydrate – 0.85mg

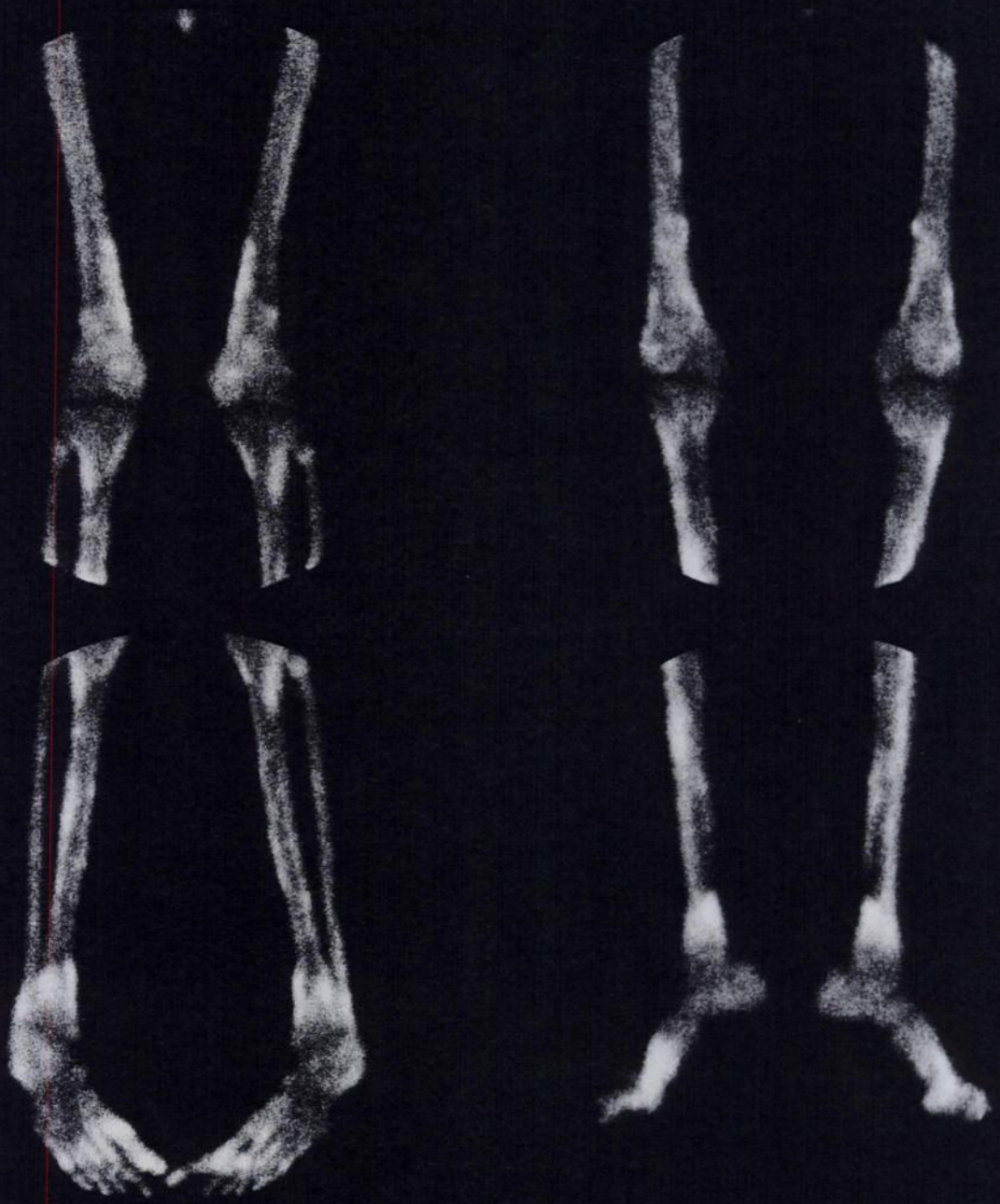
The pH is adjusted to between 7.0-7.5 with hydrochloric acid and/or sodium hydroxide solution. The contents of the vial were lyophilized under nitrogen. Store at room temperature (15°-30° C). Included in each five (5) vial kit is one (1) package insert and six (6) radiation labels. Included in each thirty (30) vial kit is one (1) package insert and thirty-six (36) radiation labels.

The contents of the kit vials are not radioactive; however, **after reconstitution with sodium pertechnetate Tc 99m the contents are radioactive and adequate shielding and handling precautions must be maintained.**

Do not use if there is a vacuum in the immediate drug container or if air is injected into the container when the dose is withdrawn.

Catalog Number NRP-420 (5 vial kit) April 1978
Catalog Number NRP-420C (30 vial kit)

Bone



Diagnosis: hypertrophic pulmonary osteoarthropathy

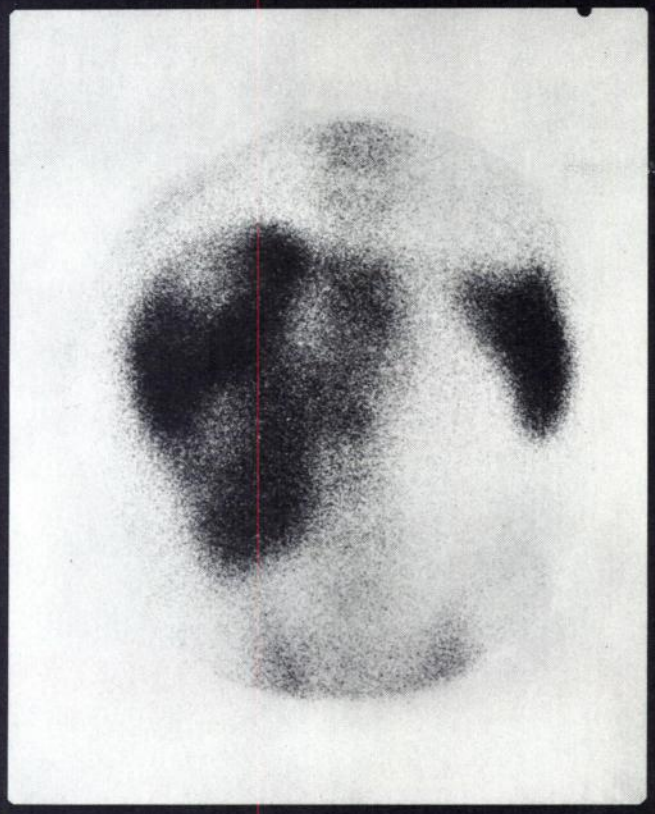
Imaging information: *Instrument:* GE MaxiCamera™ 535 *Dose:* 20 mCi OSTEOLITE
Scan time: 2.5-3.0 hours postinjection *Acquisition time:* 6 minutes/view

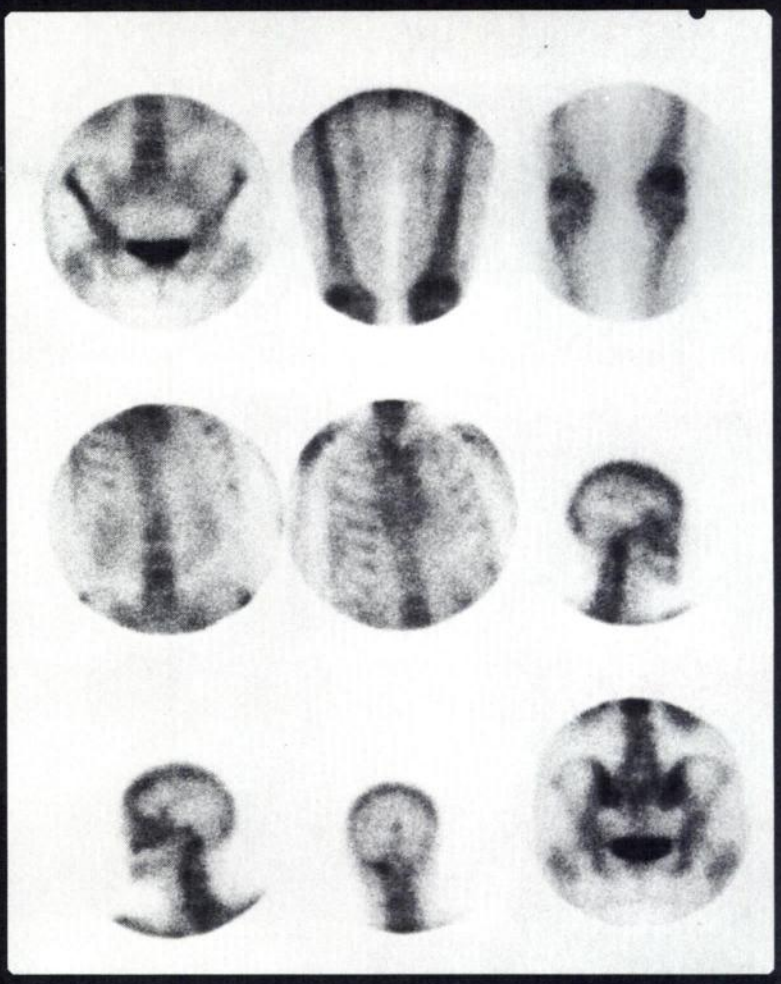
OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (MDP)

NEN New England Nuclear®

Please see the preceeding page for brief prescribing information.





INFORMATIVE. DURABLE.

Obtaining high-quality images in nuclear medicine requires both skilled personnel and valuable time. Reason enough to record the information you require on Kodak NMB or NMC film.

Sharp. Kodak NMB (blue base) and NMC (clear base) films feature single-coated emulsions to eliminate parallax. Since they are orthochromatic and, therefore, sensitive to both blue and green CRT phosphors, they record all the information on blue or green cathode-ray tubes. The built-in halation control provides for the imaging of crisp sharp dots, resulting in images with clearly defined edges.

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GENERATOR
TECHNETIUM Tc 99m GENERATOR
FOR THE PRODUCTION OF SODIUM PERTECHNETATE Tc 99m

description—The Union Carbide TECHNETIUM Tc 99m Generator provides a means of obtaining a sterile, pyrogen-free solution of Sodium Pertechnetate Tc 99m in isotonic saline from elution of the generator containing Molybdenum Mo 99. Hydrochloric acid and/or sodium hydroxide may have been used for pH adjustment. The carrier-free solution may be used as is, or with proper dilution to prepare the studies described herein. Over the life of the generator, an elution will contain a yield of 80% to 100% of the theoretical amount of Technetium Tc 99m available from the Molybdenum Mo 99 on the generator column.

physical characteristics

Technetium Tc 99m decays by isomeric transition with a physical half-life of 6.02 hours.[1] Photons that are useful for imaging studies and the principle radiations contributing to the internal dose rate are listed in Table I.

table I. principle radiation emission data

radiation	mean %/disintegration	mean energy (keV)
Gamma-2	88.96	140.5

[1]Martin, M.J., ed., Nuclear Decay Data for Selected Radionuclides, ORNL-5114, p. 24, March 1976.

external radiation

The specific gamma ray constant for Technetium Tc 99m is 0.8 R/millicurie-hour at 1 cm. The first half-value thickness of lead (Pb) for Technetium Tc 99m is 0.2 mm. A range of values for the relative attenuation of the radiation emitted by this radionuclide that results from interposition of various thicknesses of Pb is shown in Table II. For example, the use of 2.5 mm of Pb will decrease the external radiation exposure by a factor of 1,000.

table II. radiation attenuation by lead (Pb) shielding

shield thickness (Pb) mm	coefficient of attenuation
0.2	0.5
0.8	10^{-1}
1.6	10^{-2}
2.5	10^{-3}
3.3	10^{-4}

Molybdenum Mo 99 decays to Technetium Tc 99m with a Molybdenum Mo 99 half-life of 2.75 days. The physical decay characteristics of Molybdenum Mo 99 are such that only 86.8% of the decaying Molybdenum Mo 99 atoms form Technetium Tc 99m. Generator elutions may be made at any time, but the amount of Technetium Tc 99m available will depend on the interval from the last elution. Approximately 47% of maximum Technetium Tc 99m is reached after 6 hours and 95% after 24 hours. To correct for physical decay of each radionuclide, the fractions that remain at selected intervals of time are shown in Table III.

table III. physical decay chart

Molybdenum Mo 99 half-life 2.75 days		Technetium Tc 99m half-life 6.02 hours	
days	fraction remaining	hours	fraction remaining
0*	1.000	0	1.000
1	.777	1	.891
2	.604	2	.794
3	.469	3	.708
4	.365	4	.631
5	.284	5	.562
6	.220	6	.501
7	.171	7	.447
8	.133	8	.398
9	.103	9	.355
10	.080	10	.316
11	.063	11	.282
12	.049	12	.251
13	.038		

*Calibration time.

clinical pharmacology—Following intravenous administration, the pertechnetate ion distributes in the body similarly to the iodide ion, but it is not organified when trapped in the thyroid gland. Sodium Pertechnetate Tc 99m tends to accumuate in intracranial lesions with excessive neovascularity or an altered blood-brain barrier. It also concentrates in the thyroid gland, stomach and choroid plexus.

After intravascular administration, it remains in the circulatory system for sufficient time to permit blood pool, organ perfusion, and major vessel studies. It gradually equilibrates with the extracellular space. A fraction is promptly excreted via the kidneys.

indications and usage—Sodium Pertechnetate Tc 99m is used as an agent for brain imaging, thyroid imaging, salivary gland imaging, placenta localization and blood pool scans.

contraindications—None known.

warnings—This radiopharmaceutical preparation should not be administered to children or to patients who are pregnant or to nursing mothers unless the expected benefits 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 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.

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. Sodium Pertechnetate Tc 99m 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 while a patient is on a drug since many drugs are excreted in human milk.

Safety and effectiveness in children have not been established.

The generator should not be used after 16 days from the date and time of calibration.

At time of administration, the solution should be crystal clear.

adverse reactions—No adverse reactions have been reported with the use of this radiopharmaceutical.

dosage and administration—Sodium Pertechnetate Tc 99m is usually administered by intravascular injection, but can be given orally. The dosage employed varies with each diagnostic procedure. The suggested intravenous dose range employed in the average adult (70 kg) in millicuries of Sodium Pertechnetate Tc 99m for various diagnostic indications is as follows:

Brain Scan	10 to 20 millicuries
Thyroid Gland Scan	1 to 10 millicuries
Salivary Gland Scan	1 to 5 millicuries
Placenta Localization	1 to 3 millicuries
Blood Pool Scan	10 to 20 millicuries

NOTE: Up to 1 gram of reagent grade potassium perchlorate in a suitable base or capsule may be given orally prior to administration of Sodium Pertechnetate Tc 99m injection for brain scan, placenta localization and blood pool scan for the purpose of blocking uptake of Sodium Pertechnetate Tc 99m by the choroid plexus.

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

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.

radiation dosimetry

The estimated absorbed radiation doses[2] to an average patient (70kg) from an intravenous injection of a maximum dose of 20 millicuries of Sodium Pertechnetate Tc 99m distributed uniformly in the total body of subjects not pretreated with blocking agents such as $NaClO_4$, $KClO_4$, or iodide are shown in Table IV. For placental localization studies when a maximum dose of 3 millicuries is used it is assumed to be uniformally equilibrated between maternal and fetal tissues.

table IV. radiation doses

	absorbed radiation dose (rads/20 millicuries)		(rads/3 millicuries)
tissue	Resting Population	Active Population	
Bladder wall	1.06	1.70	
Gastrointestinal tract			
Stomach wall	5.00	1.02	
Upper large intestine wall	1.36	2.40	
Lower large intestine wall	1.22	2.20	
Red marrow	0.38	0.34	
Testes	0.18	0.18	
Ovaries	0.44	0.60	
Thyroid	2.60	2.60	
Whole-body	0.28	0.22	
* Brain	0.28	0.24	
* Placenta			0.05
* Fetus			0.05

*Method of Calculation: A Schema for Absorbed Dose Calculations for Biologically Distributed Radionuclides, Supplement No. 1, MIRD Pamphlet No. 1, *J. Nucl. Med.*, p. 7 (1968).

[2]Summary of Current Radiation Dose Estimates to Normal Humans From 99mTc as Sodium Pertechnetate, MIRD Dose Estimate Report No. 8, J. Nucl. Med., 17:1, 1976.

table V. Generator dosimetry readings

Technetium Tc 99m Generator
front side of Generator
measurements at 6:00 AM prior to elution

Generators up to 4140 mCi internal lead shield				Generators 4970 to 16600 mCi internal depleted uranium shield			
days from	mR/hr		mCi	days from	mR/hr		mCi
calibration	2"	12"	99Mo	calibration	2"	12"	99Mo
0*	425	57	4410	0*	174	33	16800
1	330	44	3430	1	135	26	13100
2	256	34	2660	2	105	20	10200
3	199	27	2070	3	81	16	7900
4	155	21	1610	4	63	12	6100
5	120	16	1250	5	49	9	4800
6	94	12	970	6	38	7	3200
7	73	10	750	7	30	6	2900

*Day of calibration at 12:00 hrs E.T. is the day of shipment from Tuxedo, N.Y.

table VI. elution vial radiation dosimetry

11440 millicuries of Tc 99m activity
20cc vial, 20ml of elution

vial distance from probe	dosimetry bare vial	dosimetry shielded vial*
contact	472000mR/hr	4.mR/hr
30.5 cm	13000mR/hr	0.8mR/hr

*Union Carbide Elution Vial Shield Cat. No. 17500500, Shield 6.35mm Lead.

how supplied—Sodium Pertechnetate Tc 99m is supplied as a Molybdenum Mo 99/Technetium Tc 99m generator in sizes from 830 millicuries up to 16,600 millicuries (in approximately 830 millicurie increments) of Molybdenum Mo 99 as of noon of the day of calibration. The TECHNETIUM Tc 99m GENERATOR consists of:

1) sterile generator, 2) Sodium Chloride Injection source, 3) 10 cc sterile evacuated vials, 4) sterile needles, 5) elution vial shield* 6) finishd drug labels. Elution vials in 5 cc and 20 cc sizes are available upon request.

*initial order only.

preparation

The following instructions must be carefully followed for optimum preparation of Sodium Pertechnetate Tc 99m.

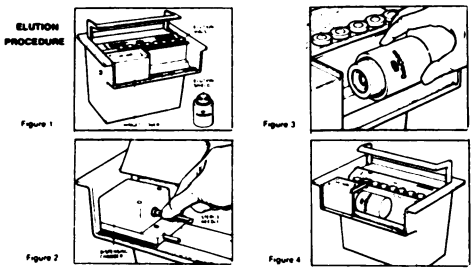
Union Carbide Generators are sterile and pyrogen-free at the time of shipment. Aseptic technique must be observed during the use of the generator to maintain a sterile and pyrogen-free system. Gloves should be worn during all elution procedures.

The sealed column and fluid path MUST NOT be removed from the shielding system:

***CAUTION:** It is recommended that elution vial shields be used when eluting the generators, shielded syringes be used when preparing formulations, and appropriate vial shields be used for the formulations.*

First Elution

1. Remove generator system and accessories from carton.
2. Lift hinged cover exposing dispenser end. Remove protective cap from dispenser end and attach a sterile needle—REMOVE PLASTIC NEEDLE COVER (Figure 2). Return cover to closed position.
3. Place an elution vial in the elution shield (Figure 1) and clean septum of elution vial with an antiseptic swab. Position elution shield on dispensing platform (Figure 3).
4. Rotate fluid path shut off valve several full turns counterclockwise until loose. Valve is located on left side of generator.
5. Slide elution shield to far left position (Figure 4). The dispensing needle will pierce the septum of the evacuated elution vial. The elution will begin immediately.
6. Step away to reduce your radiation exposure. Allow 3 to 5 minutes for complete elution.
   NOTE: If vacuum in elution vial is lost, i.e., no eluate present in vial, discard vial and use a new elution vial.
7. When elution is complete, slide elution shield to far right position. Remove elution shield, containing vial with Sodium Pertechnetate Tc 99m eluate, from dispensing platform.
8. Replace dispensing needle with sterile needle with plastic cover in place. DO NOT REMOVE COVER FROM NEEDLE until next elution.
9. Affix the pressure-sensitive label to the dose vial shield. Sodium Pertechnetate Tc 99m is ready for use. Maintain adequate shielding of the radioactive preparation.



storage

Store generator at room temperature (18-25°C).
Caution: Avoid Freezing.

subsequent elutions

1. Lift hinged cover exposing dispenser needle. Remove plastic needle cover from dispensing needle and discard. Return cover to closed position.
2. Repeat steps 3, 5, 6, 7, 8 and 9.

20 ml elutions—To use the larger size elution vial, remove the spacer in the elution shield and replace with the spacer designed for 20 cc vials.

The radioactivity concentration of the final Sodium Pertechnetate Tc 99m preparation may be calculated by using the following formula:

C = A/V where C equals radioactivity concentration of the Sodium Pertechnetate Tc 99m preparation (millicuries/ml),
A = Technetium Tc 99m activity added to the reaction mixture vessel (millicuries),
V = Total volume in the final mixture (ml).

Technetium Tc 99m assay procedure

1. Determine the equivalent Technetium Tc 99m value for a Cobalt Co 57 standard by multiplying the number of millicuries of Cobalt Co 57 standard by the appropriate equivalent factor. This equivalent value of Cobalt Co 57 for the standard need only be decayed daily for use as a secondary standard.
2. Place the standard in the chamber and record μ amp reading.
3. Transfer the Technetium Tc 99m sample from the shield to the chamber. Record the μ amp reading.
4. Calculate activity:

$$\frac{\mu \text{ amps of Tc 99m Sample}}{\mu \text{ amps of } {}^{57}\text{Co std.}} \times \text{millicuries Cobalt Co 57 std.} = \text{millicuries Technetium Tc 99m}$$

where millicuries Cobalt Co 57 std. = the equivalent millicurie value for Cobalt Co 57 from 1. above, corrected for decay.

direct readout procedure—A direct readout dose calibrator is used.

1. Determine the equivalent millicurie Technetium Tc 99m value for a Cobalt Co 57 std. using method 1. above. Correct millicurie value for decay.
2. Place Cobalt Co 57 standard in chamber and adjust the calibrator to the proper reading according to the manufacturer's instructions.
3. Transfer sample vial to chamber and read directly millicuries Technetium Tc 99m.

Molybdenum Mo 99 breakthrough test

1. Determine the amount of Technetium Tc 99m eluted (millicuries).
2. Place the Technetium Tc 99m elution in a lead container. Place lid on container and put the entire container in the chamber.
3. Record the amount of Molybdenum Mo 99 (microcuries) on the most sensitive scale.
4. Divide the microcuries Molybdenum Mo 99 by the millicuries Technetium Tc 99m. Correct for decay and shielding effect, if necessary.

The acceptable limit is 1.0 microcurie Molybdenum Mo 99/millicurie Technetium Tc 99m, not to exceed 5 microcuries per human dose at the time of injection.

disposal

The TECHNETIUM Tc 99m GENERATOR should not be discarded in ordinary trash within 70 days of the calibration date. Vials and needles used for eluting may be discarded after two (2) days. It is suggested that all identification labels be destroyed before discarding the generator or vials.

TECHNETIUM Tc 99m GENERATORS OF ≤ 4140 millicuries may be returned to the manufacturer; while those of 4970 to 16,600 millicuries must be returned to the manufacturer. Please refer to the instructions included with each shipment.

This generator is approved for use by persons licensed by the U.S. Nuclear Regulatory Commission pursuant to Sec. 35.14 and Sec. 35.100 Group III of 10 CFR Part 35 or under equivalent licenses of Agreement States.

L312-9

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Technetium Tc 99m Generators

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- A new sterile needle is utilized for each elution, reducing the chances of a septic or pyrogenic situation occurring in routine clinical usage. This method offers an advantage compared to competitive dry column systems where the needle assembly is used for the life of the product.
- Evacuated elution vials are available in 5 cc, 10 cc, and 20 cc volumes, allowing you to optimize the elution concentration to meet your needs.
- Optimum shielding design minimizes radiation to personnel and to work areas, maximizes protection with minimum weight.
- Rigid Quality Control testing, which includes an elution check on each Generator, assures that your UNION CARBIDE CINTICHEM® TECHNETIUM 99m GENERATOR meets our high internal specifications. Our experience obtained in over 19 years of involvement in Nuclear Medicine assures you of the highest quality product possible.
- CINTICHEM® CUSTOMER SERVICE is readily accessible on our toll free telephone numbers. Personnel in this department have in-depth backgrounds covering the research, development, technical, and clinical application aspects of Nuclear Medicine.

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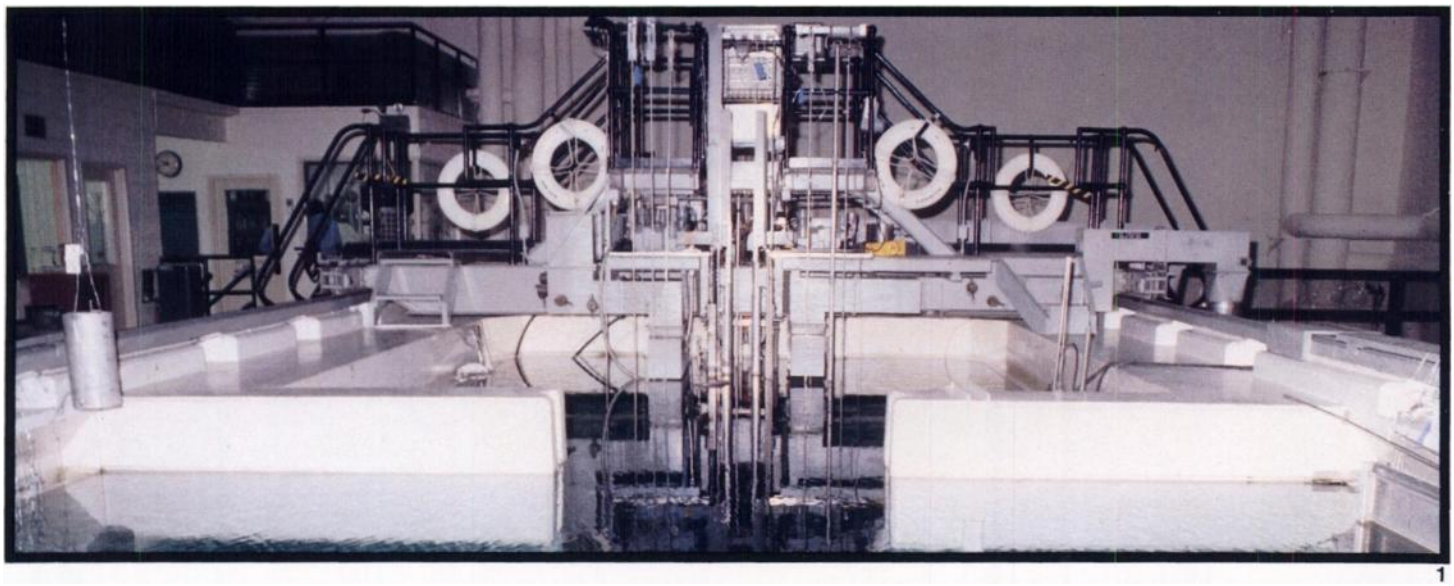

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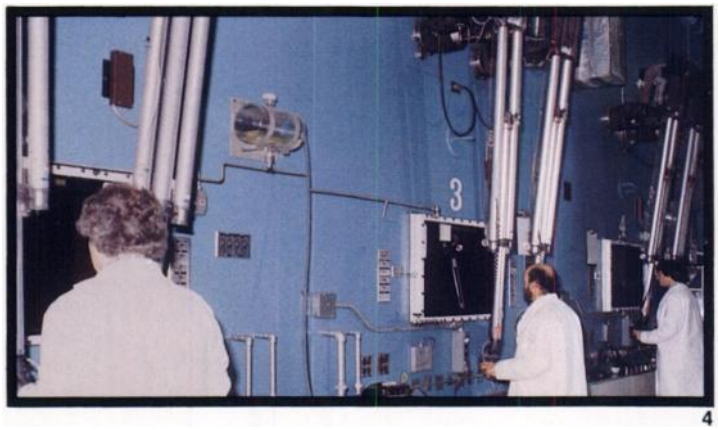

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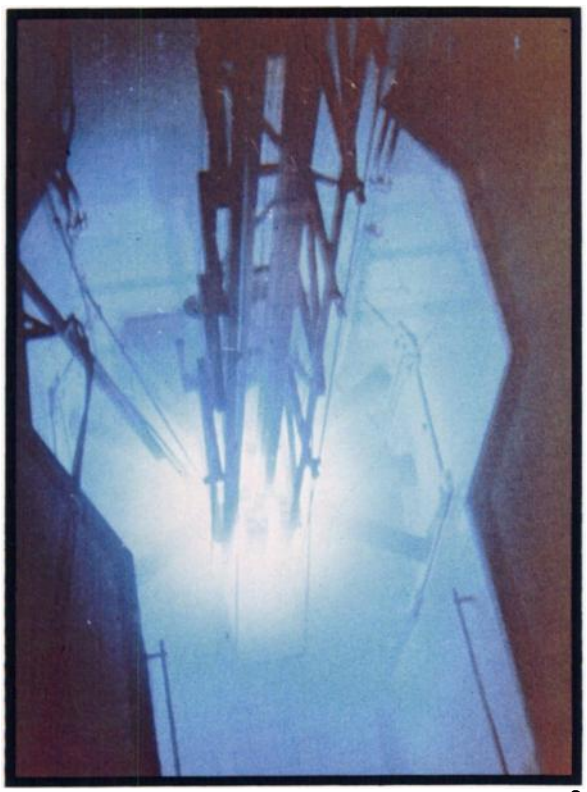

2

1 Union Carbide Nuclear Products Research Nuclear Reactor where radiochemicals such as Mo 99, Xe 133, I 125, and I 131 are manufactured.

2 Self-photograph of Union Carbide's 5 megawatt Research Nuclear Reactor in operation. This reactor is used to produce high specific activity fission Mo 99 for use in CintiChem® Technetium 99m Generators.

3 Research Nuclear Reactor control station, where our safe operating record of over 19 years is maintained by highly skilled and experienced Reactor Operators.

4 Radiochemical hot cells shielded with 4 feet of high density concrete and 4 feet of high density lead glass. High specific activity fission Mo 99 is prepared from reactor targets in these hot cells by skilled personnel using manipulators. The unique process used in the preparation of the Mo 99 is patented by Union Carbide for use in your CintiChem® Technetium 99m Generator.

5 One of radiopharmaceutical clean-room hot cells at Sterling Forest where Union Carbide CintiChem® Technetium 99m Generator columns are loaded with Sodium Molybdate solution by a unique proprietary process. This process provides for extremely pure eluate and high yields from your CintiChem® Technetium 99m Generator. The columns are then autoclaved to assure sterility.

6 Part of the clean-room in which the final CintiChem® Technetium 99m Generator assembly is performed.

7 Rigid Quality Control testing, which includes an elution check on each Generator, assures that your CintiChem® Technetium 99m Generator meets our high internal specifications. Our experience obtained in over 19 years of involvement in Nuclear Medicine assures you of the highest quality product possible.

8 CintiChem® Technetium 99m Generators coming off the production line and on their way to our customers.

9 Union Carbide Nuclear Products CintiChem® Technetium 99m Generator and CintiChem® diagnostic kits, both manufactured at the same Sterling Forest site, when used together can provide the optimum solutions to your imaging needs . . . FROM ATOM TO IMAGE.

FROM ATOM

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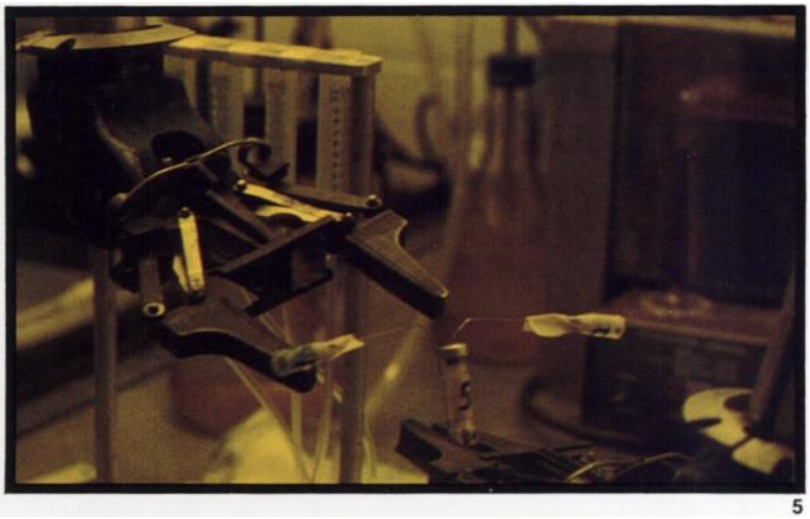
5



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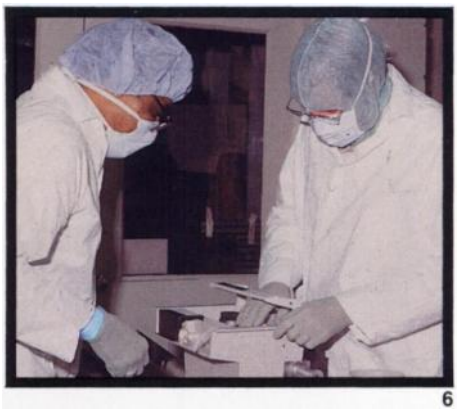

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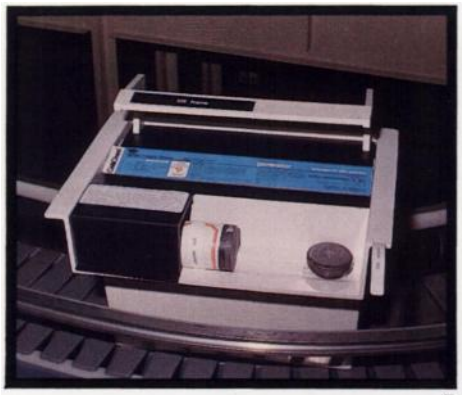

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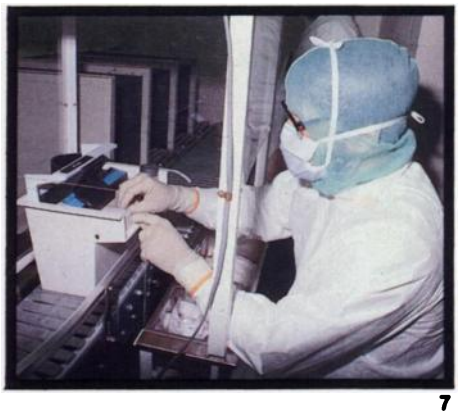

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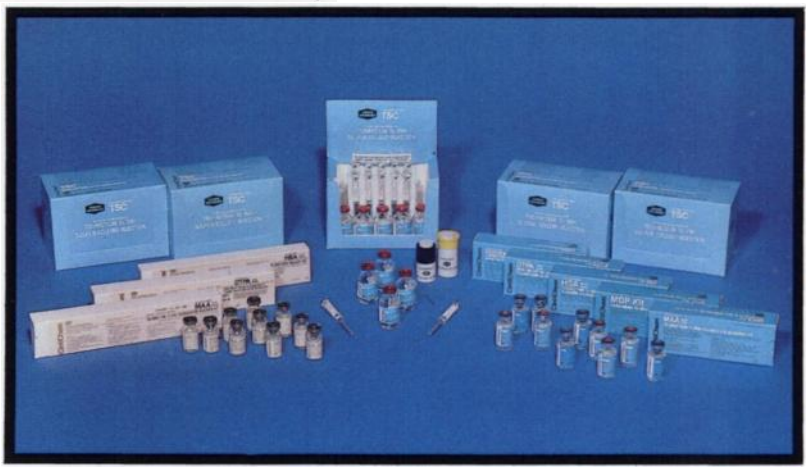
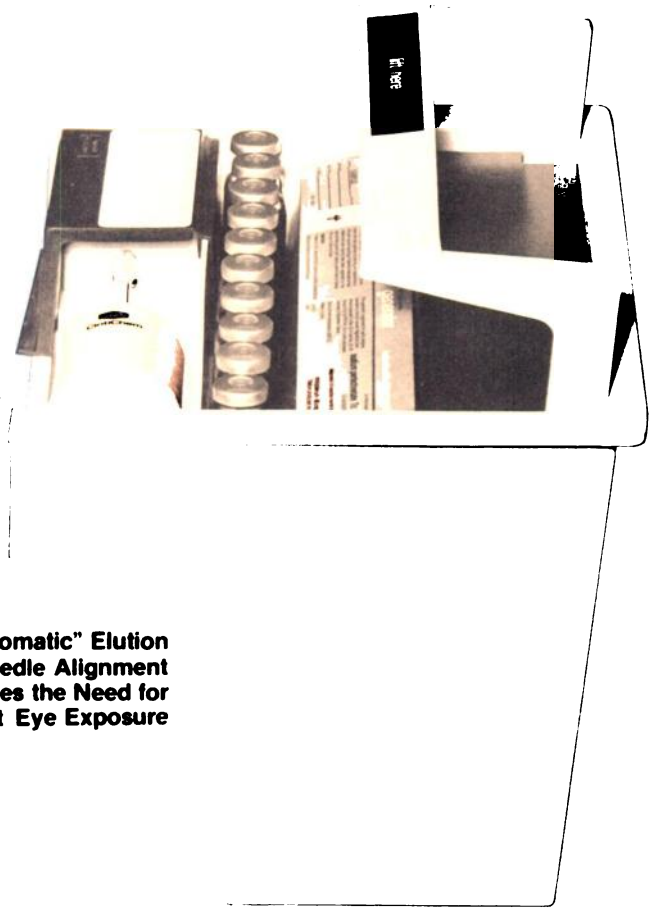


9

TO IMAGE

CintiChem®

Technetium Tc 99m Generators



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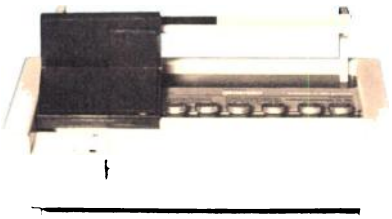

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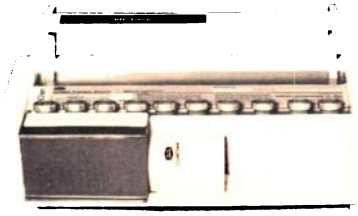

Elution Transfer Point Shielded Hood Maximizes Radiation Protection During the Elution Process Itself

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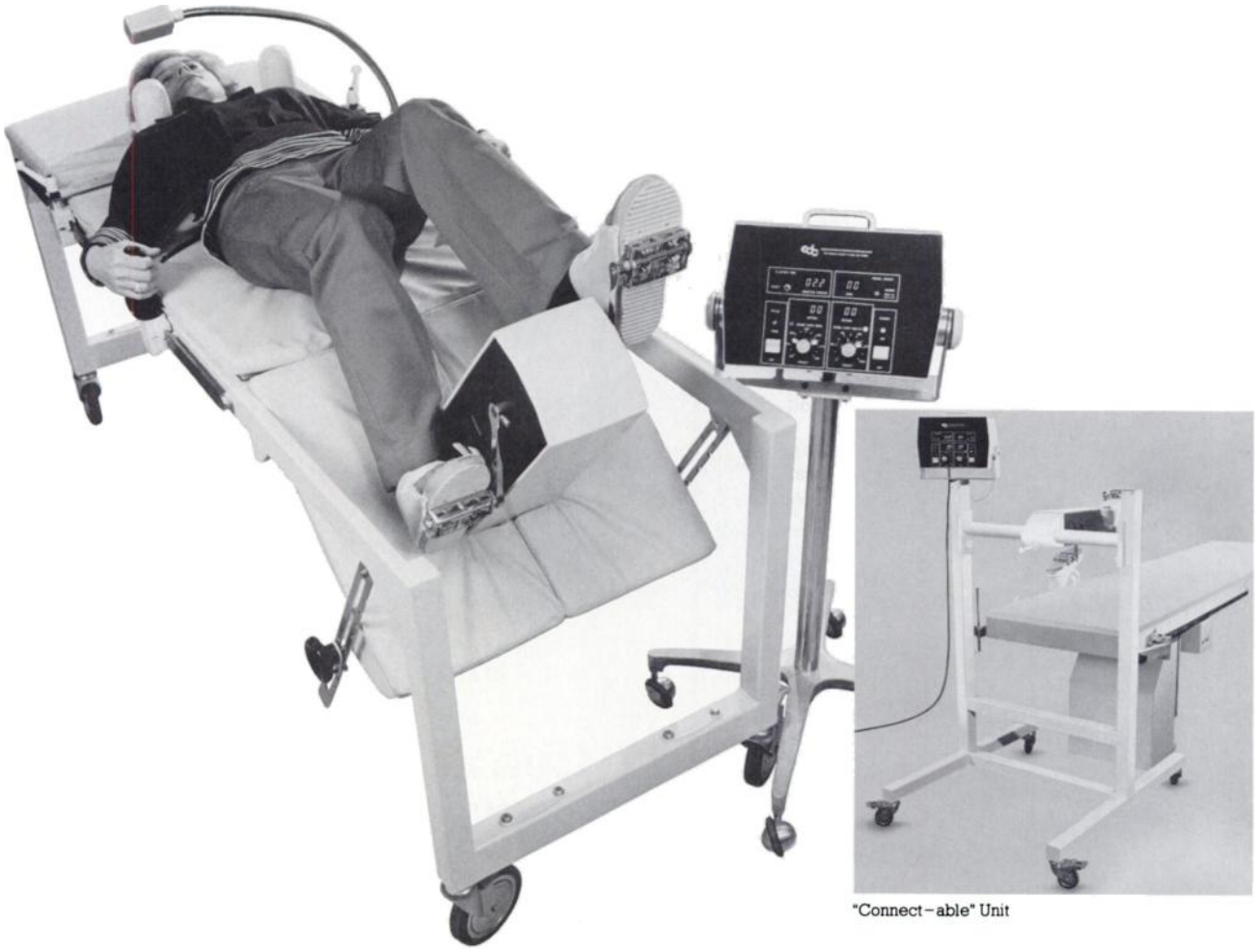

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Just one example of EDC's response to clinical problems – design solutions.

With your patient in a supine position, you may image continuously during myocardial stress perfusion scintigraphy or radionuclide exercise ventriculography. Add patient participation and eliminate incessant directions via a color-coded meter that allows self-monitoring of pedal speed.

A more relaxed, better-imaged patient. It adds up to better medicine.

The 8407 control console displays actual workload, pedal speed and elapsed time. Optional automatic heart-rate-control-of-workload enables the clinician to select the specific, individual heart rate at which cardiac stress imaging will be conducted.

The versatile table can be used for other nuclear imaging studies, radiology and ultrasound. Image from above or below table. Vary patient position – supine or sitting.

"Connect-able" Unit

To stay current and within your budget, attach the 8414 modular stress imaging unit to your present table for use in nuclear imaging or cardiac catheterization. The "Connect-able" includes multi-position ergometer and electronic control console with all options. Specially-designed casters provide easy mobility as well as rigid locking power.

EDC stress imaging systems ... for the progressive nuclear medicine department . . . for the cardiologist who demands the diagnostic sensitivity of stress imaging.

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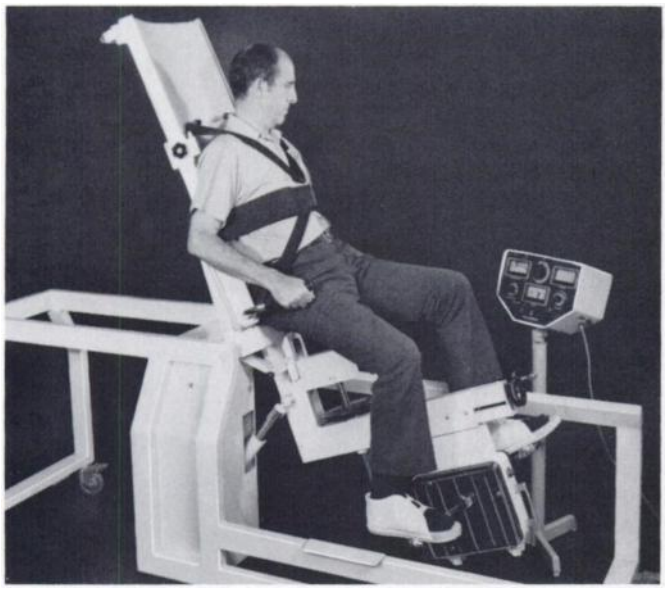
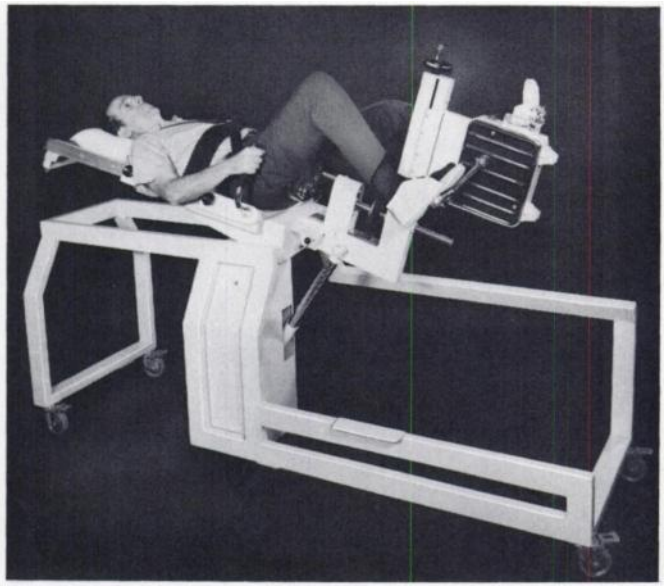
Tel. (617) 458-1456

UPRIGHT? SUPINE?

Get BOTH...and all positions between



Erect stress test position.



Supine stress test position. Far side of table is unobstructed to easily accommodate a gamma camera.

With this
Nuclear Cardiology Stress System*

- **Motorized patient positioning.**
- **Compatible with all cameras.**
- **Motion-free for high resolution.**
- **Converts to standard imaging table.**

Here is the most versatile, easy-to-operate, stress imaging table available. It permits radionuclide imaging under stress in ANY position, from supine to upright. Just flip a switch, and the patient is moved effortlessly to the desired position. Unlike with other stress tables, you are not restricted to supine imaging.

Whatever your nuclear cardiology requirements, this unique system fills them quickly and easily...full gamma camera clearance, complete mobility, motion-free stability, positive (but comfortable) patient restraints, unobstructed access to the patient and controls, choice of Collins or Quinton ergometers, and much more. The unit can even be used for conventional imaging.

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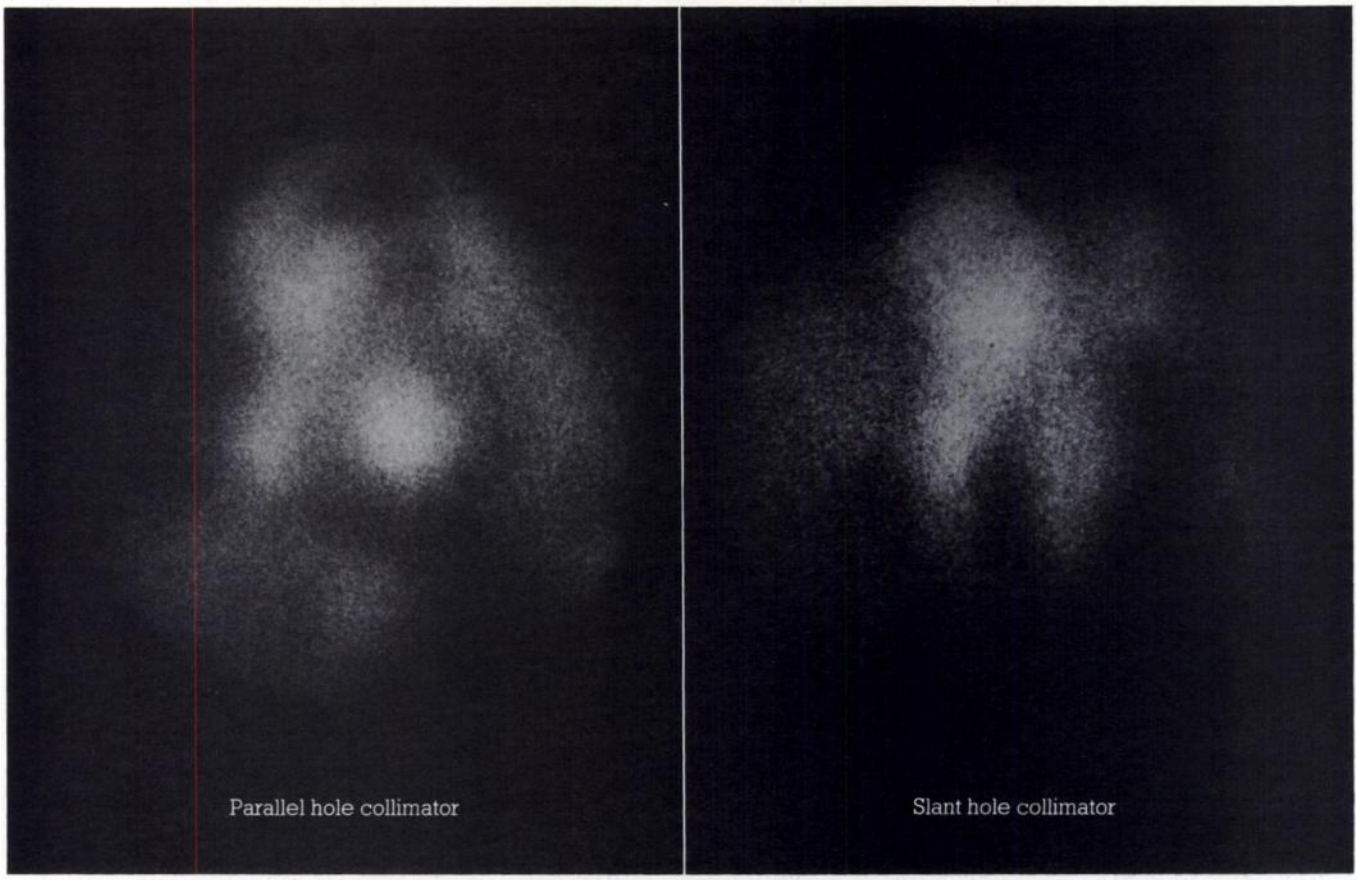
*Patent Pending



Improve your image with a different slant.

With the EDC Rotatable 30° Slant Hole Collimator, . . . achieve optimal clinical evaluation of left ventricular performance by imaging in the MLAO view.

During radionuclide ventriculography of the cardiac blood pool in the modified left anterior oblique (MLAO) view, EDC's slant hole collimator permits placement of the detector flat against the patient's chest because of the holes' 30° caudal angulation. The improved outcome, demonstrated by the above ungated cardiac images of a patient with aortic stenosis and left ventricular hypertrophy, includes:

- Complete resolution and separation of left ventricle and atrium.
- Viewing of ventricular septum normal to its longitudinal axis, with no foreshortening.
- Effective separation between the cardiac apex and base, as well as between distributions of the left anterior descending and left circumflex arteries.

A study by Dr. J. Anthony Parker,* Harvard Medical School, found that radionuclide ventriculography with the EDC 30° slant hole collimator provides "an accurate measure of

ejection fraction at equilibrium and a qualitative assessment of regional changes in ventricular volume."

Refined resolution of the cardiac apex is obtained in the RAO view. Other applications of the slant hole collimator include imaging of the spleen and posterior cranial fossa.

The EDC slant hole can be mounted on any commercial Anger scintillation camera. Rotatability of the slant hole inserts facilitates correct positioning. Computed tomography is made possible via indexing of the collimator with detents at up to 24 angles.

Other collimators available from EDC: Seven Pinhole, Bifocal Diverging, Div/Con, Parallel Hole.

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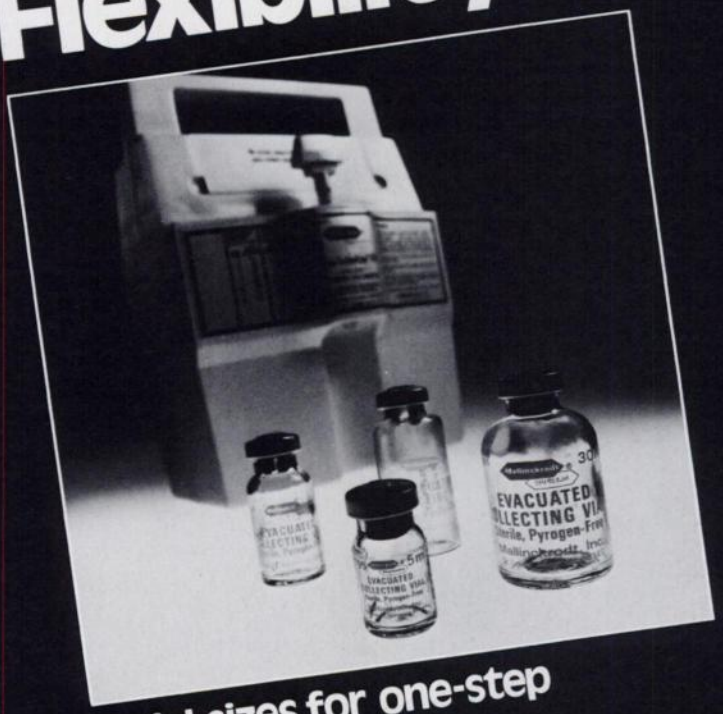
Tel. (617) 458-1456

*PARKER, J.A. et al: Radionuclide left ventriculography with the slant hole collimator. J Nucl Med 18:848-851, 1977.

Elution Flexibility



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POSITIONS OPEN

NUCLEAR MEDICINE TECHNOLOGIST-Registered or registry eligible technologist for full time position in modern 410-bed acute care hospital. Expanding section with nuclear cardiology. Contact: Personnel Department, St. Mary's Hospital, 1800 E. Lake Shore Drive, Decatur, IL. (217) 429-2966.

NUCLEAR MEDICINE TECHNOLOGIST Two positions available at Veterans Administration Medical Center, Fresno, California, affiliated with the University of California, San Francisco, Medical School. Applicants must possess bachelor's degree with major in Nuclear Medicine or physics, mathematics, computer sciences, chemistry, health or biological science with at least 12 semester hours of nuclear medicine courses. They must be registered Nuclear Medicine Technologists or certified by the Society of Nuclear Medicine. Starting salary ranges from $15,193 to $16,826 based on years of experience. Fringe benefits include regular pay increases, nine paid holidays, 13 days sick leave each year (with unlimited accrual), 13-26 days annual vacation, civil service retirement, low-cost life and health insurance. Must be a U.S. citizen; an Equal Opportunity Employer; for information contact: Juan J. Touya, M.D., Chief, Nuclear Medicine, Veterans Administration Medical Center, 2615 E. Clinton Avenue, Fresno, CA 93703; Phone: (209) 225-6100, ext. 237.

NUCLEAR MEDICINE TECHNOLOGIST Challenging position for registered technologist in progressive dept. Must have a working knowledge of nuclear imaging and radioimmunoassays. Good salary and superior benefits. Send resume or contact Director, Employee Relations, University Community Hospital, 3100 E. Fletcher Avenue. Tampa, FL 33612.

NUCLEAR MEDICINE TECHNOLOGIST Full-time positions available at Veterans Administration Medical Center, Martinez, CA which is located 35 miles northeast of San Francisco with easy access to rapid transportation. This Medical Center is a teaching hospital affiliated with University of California School of Medicine, Davis, CA. Apply or send application to Personnel Service, VA Medical Center, 150 Muir Rd., Martinez, CA 94553 or call (415) 228-6800, ext. 221. Equal Opportunity Employer.

NUCLEAR MEDICINE TECHNOLOGIST Opportunity for a registered or registry eligible technologist to join a recently expanding department which has a School of Nuclear Medicine. Equipment includes: Searle and Ohio Nuclear cameras; single pass whole body table; digital Gamma-2; cardiac computer; Recticlinea Scanner. 252-bed regional medical center, 125 miles south of St. Louis. A university city of 40,000. Contact: Sharon, Personnel Department, St. Francis Medical Center, 211 St. Francis Drive, Cape Girardeau, MO 63701, or call collect, (314) 651-6152. E.O.E.

NUCLEAR MEDICINE SUPERVISOR St. Luke's of Milwaukee, a 600-bed acute care hospital is looking for a supervisor in our large Nuclear Medicine department. We are involved in all phases of Cardiac Scanning. You will be responsible for the day to day operation of our department which includes the supervision of the technical and ancillary staff in this area. The ideal candidate will be a Registered Nuclear Medicine Technologist with at least 3-4 years of experience in the area. Prior supervisory background would be a definite asset. St. Luke's is the largest private hospital in the state of Wisconsin located in a residential area of Milwaukee. The city itself offers many opportunities both professionally and recreationally. For further information about the position please call Coleen Golomski collect at: (414) 647-6861. St. Luke's Hospital, 2900 W. Oklahoma Ave., Milwaukee, WI 53215. An Equal Opportunity Employer.

NUCLEAR MEDICINE TECHNOLOGIST 400-bed acute care facility on Florida's gulf coast seeks registered or registry-eligible Nuclear Medicine Technologist for our expanding Nuclear Medicine Department. Full range of imaging and radioimmunoassay procedures performed; equipment includes Raytheon LFOU and Technicare (Ohio) Portable Cameras, MDS computer system and fully automated RIA. Contact: Personnel Dept., Fort Myers Community Hospital, P.O. Box 7146, Fort Myers, FL 33901. (813) 939-8551.

NUCLEAR MEDICINE (2 YR)/NUCLEAR Radiology (1 yr) residencies in combined University Hospital-VA Hospital program. Training available in nuclear imaging therapy, and nuclear in-vitro procedures. Opportunities for clinical and laboratory research. W.N. Tauxe, Director, Division of Nuclear Medicine, University of Alabama Hospitals, Birmingham, AL 35223. An Equal Opportunity/Affirmative Action Employer.

NUCLEAR MEDICINE TECHNOLOGISTS Florida Medical Center a 400-bed acute care facility has positions available for registered or registry eligible technologists in its expanding and progressive Nuclear Medicine Department. The department contains six scintillation cameras, a MDS computer, RIA department, and radiopharmacy. Excellent starting salary and benefits. Inquire to Chief Technologist, Department of Nuclear Medicine, Florida Medical Center, 5000 West Oakland Park Blvd., Fort Lauderdale, FL 33313. (305) 735-6000.

REGISTERED NUCLEAR MEDICINE Technologist. Excellent opportunity for experienced technologist working in a Nuclear Cardiology setting. Midwest. Good growth potential. Benefits include medical, life insurance and profit sharing. Send confidential resume and salary requirements to: Box 200, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR MEDICINE TECHNOLOGIST Certified Nuclear Medicine Technologist to work in isotope imaging in 1200-bed university teaching hospital. Well equipped laboratory includes 5 stationary and 2 mobile cameras plus 3 computers. Active Nuclear Cardiology Program. Excellent fringe benefits with salary negotiable commensurate with experience. Send resume to: M.E. Flanagan, Department of Nuclear Medicine, Northwestern Memorial Hospital, 250 E. Superior, Chicago, IL 60611. An Equal Opportunity Employer m/f/h.

NUCLEAR MEDICINE RESIDENCY The Washington, D.C. Veterans Administration Medical Center is offering a 2 year A.M.A. approved program affiliated with George Washington University beginning July 1981. The center is a 700-bed general medical and surgical hospital. The program includes training in Radionuclide in-vivo and in-vitro procedures computer application as well as diagnostic ultrasound. At least 2 years of prior training in radiology, internal medicine or pathology is required. Equal Opportunity Employer. Contact: B.J. Sauerbrunn, M.D., Chief, Nuclear Medicine Service, VA Medical Center, 50 Irving St., N.W., Washington, D.C. 20422.

NUCLEAR MEDICINE TECHNOLOGIST —Registered or registry eligible—to join seven other technologists in a progressive Nuclear Medicine Department with four cameras, PDP-11 DEC computer for cardiovascular Nuclear Medicine studies. No radioimmunoassay. Send resume to: Personnel Department, Allegheny General Hospital, 320 East North Avenue, Pittsburgh, PA 15212.

NUCLEAR MEDICINE RESIDENCY University of Missouri-Columbia and Truman Veterans Hospital. Two year combined nuclear medicine program beginning July 1981 with openings for two qualified candidates. Broad basic science and clinical exposure including all in-vitro studies. Active staff with opportunity for independent and collaborative research. Contact: Richard A. Holmes, M.D., Chief Nuclear Medicine, University of Missouri Medical Center, Columbia, MO 65212. (314) 882-2541.

NUCLEAR MEDICINE TECHNOLOGIST We are seeking staff technologists for our 560-bed Medical Center in Central Illinois. Proficiency required in imaging instrumentation procedures and radiopharmaceutical preparation. No in-vitro experience required. The Department of Nuclear Medicine is equipped with the latest in stationary and mobile camera systems and computer capabilities. We offer excellent benefits and salary ($17,495 - $20,606) with additional compensation for overtime hours and emergency call coverage. Send resume in confidence to: Employment Manager, Methodist Medical Center of Illinois, 221 N.E. Glen Oak Ave., Peoria, IL 61636. (309) 672-5554. Equal Opportunity Employer.

NUCLEAR PHARMACIST. PHARMACON Nuclear, Inc. presently has positions open for radiopharmacists in the Southeastern United States. We offer excellent fringe benefits and salaries commensurate with experience. Send resume to Pharmacon Nuclear, Inc., 8119 N.W. 33 St., Miami, FL 33122 or call (305) 592-0720.

NUCLEAR MEDICINE TECHNOLOGIST Immediate, excellent opportunity for an experienced registered or registry eligible Technologist. Will work in large department of a 700-bed General Teaching Hospital which is affiliated with the Southwestern Medical School. The Department has 2 full-time Nuclear Physicians, a Physicist, 2 new GE Maxi-II's, 2 Standard Cameras and computer. Associated with research facilities in Radioassay and Pheumatology. Position should provide an interesting opportunity with a busy but not boring atmosphere for a dedicated Technologist. Excellent employee benefits and opportunities. Submit credentials to Mr. Warren Garfield, Director of Personnel, Presbyterian Hospital of Dallas, 8200 Walnut Hill Lane, Dallas, TX 75231.

NUCLEAR PHARMACIST—STAFF POsitions available immediately in centralized nuclear pharmacies located throughout the United States. Pharmacists with nuclear pharmacy experience preferred. Also good opportunities for management oriented applicants. Excellent fringe benefits programs. Salary commensurate with experience. Send resume and salary history to Personnel Department, Nuclear Pharmacy, Inc., P.O. Box 25141, Albuquerque, NM 87125, or call (505)292-5820. EOE.

THE HARRIS COUNTY HOSPITAL District, located in Houston, Texas, the most expansive city in the Southwest, has an immediate full-time position for a Registered Technologist in the Nuclear Medicine Department of Ben Taub General Hospital. The successful candidate must have one year of nuclear medicine experience and the ability to perform a variety of technical duties including diagnostics, therapeutics, imagings, radiobioassays, radiopharmaceuticals and quality control. Competitive salary and excellent benefits including free dental, life, and health insurance. For additional information, please contact the Personnel Department, Harris County Hospital District, 1502 Taub Loop, Houston, TX 77030. (713)791-7600. An Equal Opportunity Employer. M/F/H.

TECHNOLOGIST JOBS—STAFF, CHIEF, RIA, computer, etc. are available throughout the country—immediately and in the future. If you are concerned with the future, as well as the present and you are looking for a change, contact National Technologist Referral Service for confidential and immediate information. (212)274-0303, 509 Langley Ave., West Hempstead, NY 11522.

NUCLEAR MEDICINE TECHNOLOGIST. Registered or eligible. Are you interested in moving to Houston? Call collect today! (713)791-2237. Talk to Mrs. Smith about employment opportunities at St. Luke's Episcopal Hospital, Texas Children's Hospital and the Texas Heart Institute. We have a progressive lab with state-of-the-art instrumentation and perform a full spectrum of routine stress-cardiac and mobile procedures. Experience in nuclear cardiology and computer applications preferred. Send resume to Personnel Department, P.O. Box 20269, Houston, TX 77025. EOE/MF/Handicapped.

STAFF PHYSICIAN AND RESIDENCY position. Available at Walter Reed Army Medical Center, Washington, D.C. Applications are invited for residency and full time staff/faculty position in Nuclear Medicine. Walter Reed is a new 1280-bed teaching hospital with "world wide" referral and university affiliation. The Nuclear Medicine Service offers an outstanding experience in all aspects of Nuclear Medicine. The Service performs 12,000 clinical imaging procedures, 80,000 radioummunoassays, and 100 treatments each year. A new Nuclear-Cardiology laboratory is available with state-of-the-art exercise, camera and computer capabilities. Both clinical and animal research facilities are available. An active two year residency program (with two positions available each year) offers an extensive training experience leading to Nuclear Medicine board eligibility. Successful candidates for the staff position would join two other staff physicians, two radiopharmacists, physicist and large support team. Applications for residency will be considered for the training program beginning July 1982 and should be submitted by September 1981. The staff physician would receive an academically competitive salary with fringe benefits based on previous experience. Faculty appointment commensurate with experience is available with affiliated university. Residents qualify for a minimum salary of $29,000 and with specialty board eligibility $38,000 annually. Please contact Douglas Van Nostrand, M.D., Director of Nuclear Medicine Service, Walter Reed Army Medical Center, Nuclear Medicine Service, Washington, D.C. 20012, Telephone: (202) 576-1186.

FULL-TIME POSITION IMMEDIATELY available for experienced Nuclear Medicine Technologist in a 116-bed acute care hospital with active out-patient imaging services. Department equipped with two cameras, including brand new Technicare wide field of view camera and whole body table. Excellent opportunity for technologist who wishes to live in a beautiful east Florida coastal community 15 miles south of Daytona Beach, offering year-round sun-filled living. Competitive salary and liberal benefits. Contact Mr. Wayne Pearson at (904)427-3401 or write Fish Memeorial Hospital, 401 Palmetto Streeet, New Smyrna Beach, Florida 32069.

RADIOLOGIST—NUCLEAR MEDICINE Seeking a fifth diagnostic radiologist. Must have special competence in nuclear medicine, including cardiac, to head nuclear medicine section of a 55-physician multispecialty group practice with two large newly and fully equipped offices in surburban Detroit. Will participate also in general radiology. Immediate opening. Contact: Harold J. Daitch, M.D., Woodland Medical Group, 22341 W. Eight Mile Rd., Detroit, MI 48219. (313) 538-4700, ext. 266.

NUCLEAR MEDICINE TECHNOLOGIST Registered or registry eligible nuclear medicine technologist. This is a challenging and dynamic department and is equipped with an LEM, and LFOV, and ON 400 and three DEC Gamma II computers. This position will provide an interesting opportunity for a dedicated technologist. Contact Royal Davis or Dr. S. Treves, Division of Nuclear Medicine, Children's Hospital Medical Center, 300 Longwood Ave., Boston, MA 02115 or call (617) 735-7010. An affirmative Action/ Equal Opportunity Employer.

NUCLEAR MEDICINE TECHNOLOGIST Position available for registered or registry eligible technologist in a progressive 561-bed hospital. The Nuclear Medicine Department performs a full range of RIA and imaging procedures, including nuclear cardiology. The department has the latest in computer systems, a full-time Medical Physicist on staff, and an active continuing education program. We offer an excellent benefit package and competitive salary. For more information on joining one of Kansas City's largest health care teams, contact Charlotte Ament, Nuclear Medicine Department, Research Medical Center, 2316 East Meyer, Kansas City, MO 64132 or call (816) 276-4235.

NUCLEAR MEDICINE—DIAGNOSTIC Ultrasound Physician (ABNM) to join one full-time and one part-time physician in multi-hospital practice in a major Pacific Northwest City. Reply: Frederick N. Hegge, M.D., Department of Nuclear Medicine and Diagnostic Ultrasound, Emanuel Hospital, 2801 North Gantenbein Ave., Portland, OR 97227.

NUCLEAR MEDICINE TECHNOLOGIST Full time position for registered Nuclear Medicine Techologist in University Medical Center one-year old facility. Full range of in-vivo and in-vitro procedures. Five gamma cameras, including mobile with on-board computer and computer interfaced to stationary cameras. Base salary range: $15,626 per year. Good benefits. Contact Sara Jane Davis, CNMT, Supervisor, Division of Nuclear Medicine, University of Kansas Medical Center, 2015 W. 39th Street, Kansas City, MO 66103. Telephone, (913) 588-6843.

POSITIONS WANTED

NUCLEAR PHYSICIAN, CERTIFIED ABNM and Radiology, seeks relocation in Phila., N.J., N.Y.C., Washington, D.C. area. Medical school teaching hospital experience. Part-time position considered. Reply to Box 201, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR MEDICINE PHYSICIAN, ABNM, ABR, ABR (Nuclear Radiology), seeks position as director of nuclear medicine department, preferably Midwest hospital. Extensive background in developing nuclear medicine department, administration, imaging, RIA, computers and nuclear cardiology. Reply Box 202, Society of Nuclear Medicine, 475 Park Ave., So., New York, NY 10016.

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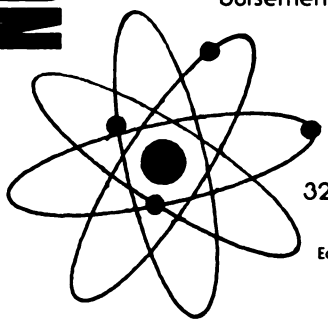
Develop your professional talents within the surroundings of the Windy City . . . Our teaching hospital is looking for a registered or registry eligible technologist to work in our growing nuclear medicine department. MacNeal Memorial Hospital is conveniently located close to both the Stevenson and Eisenhower expressways with the Burlington at our front door and we're only minutes away from the Loop.

We offer professional growth along with an excellent salary, and a liberal benefit program which includes 100% tuition reimbursement. Contact Personnel:



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Riverside Hospital, a 641-bed acute care facility, located in the beautiful and historic tidewater area of Virginia, currently has a full-time position available for a nuclear medicine technologist. This is an excellent opportunity to become an integral member of a progressive and growing department.

Qualified candidates must be registered or eligible by ARRT or NMTCB. Excellent salary and benefits, as well as relocation assistance offered. Resumes may be submitted to Michael D. Lulofs, Personnel Department, Riverside Hospital, 500 J. Clyde Morris Blvd., Newport News, VA 23601 or call collect (804)599-2025.

RIVERSIDE HOSPITAL

EOE M/F/H

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Two-year approved program offering broad clinical experience including tertiary care and community hospitals; oncology and pediatrics; ultrasound and CT; strong basic science teaching; radiation safety; central radiopharmacy and RIA; opportunity for research; an integrated program at State University of New York at Buffalo School of Medicine; available July 1, 1981.

Contact: M.A. Bender, M.D., Program Director, Dept. of Nuclear Medicine, Roswell Park Memorial Institute, 666 Elm Street, Buffalo, NY 14263; or M. Blau, Ph.D., Chairman, Dept. of Nuclear Medicine, SUNY/Buffalo, 3495 Bailey Avenue, Buffalo, NY 14215.

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Immediate full-time position available for a Registered or Certified Nuclear Medicine Technologist in a modern 358-bed general acute care hospital. Emphasis on Nuclear Imaging, Stress Thallium Myocardial Imaging and Graded Stress Cardiac Blood Pool Studies.

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The University of Nevada Las Vegas, College of Allied Health Professions, Department of Radiologic Technology is anticipating an opening for a faculty member to serve as the Nuclear Medicine Educational Coordinator.

Position will begin approximately August 24, 1981, and involves planning and administration of the Bachelor Degree Program of Nuclear Medicine. The position also requires teaching responsibilities. Qualifications include Doctorate preferred; registry in Nuclear Medicine awarded by the American Registry of Radiologic Technologists or Nuclear Medicine Technologist Certification Board (a second registry in Radiography preferred); a minimum of two years of clinical experience; and, two years of teaching at the collegiate level. Salary commensurate with qualifications. *Deadline for application is April, 1981.* Send Curriculum Vita to the Department of Radiologic Technology, University of Nevada, Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154. The University of Nevada Las Vegas is an Equal Opportunity/Affirmative Action Employer.

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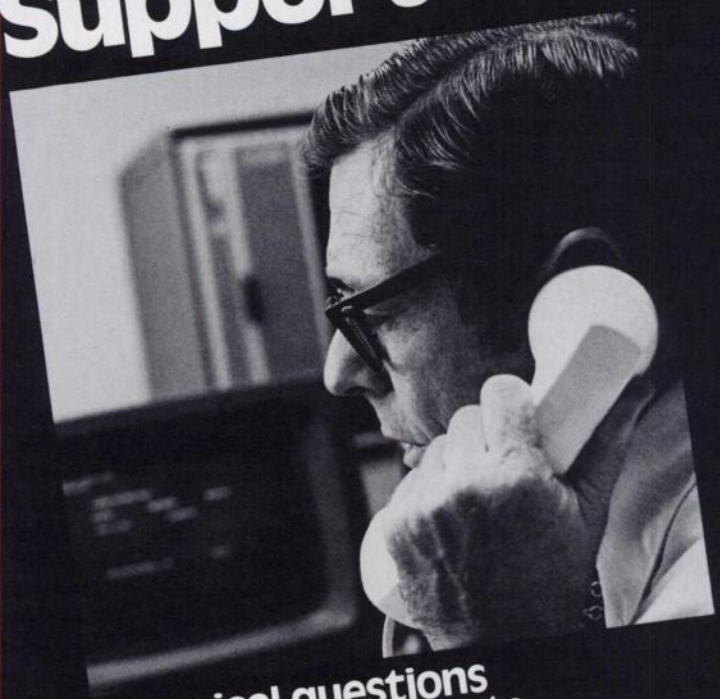

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• ECG Strip Chart Recorder	• Provides permanent record of patient ECG. Insures proper lead placement.
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• Trigger Pulse LED	• Monitors presence of output signals to the computer.
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MODEL	FEATURES	
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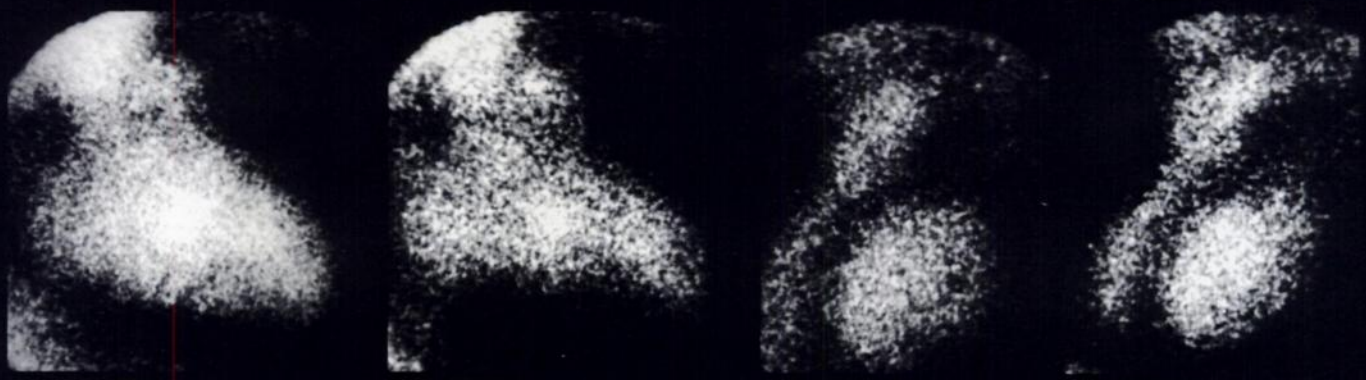
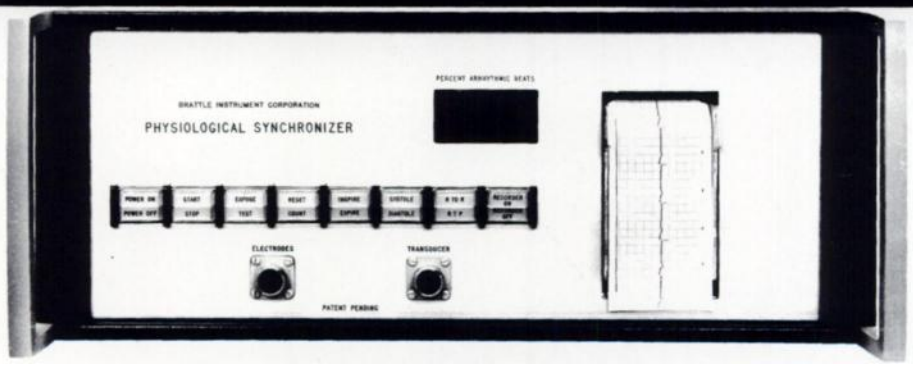


RAO, DIASTOLE | RAO, SYSTOLE | LAO, DIASTOLE | LAO, SYSTOLE

The RAO view shows akinesis of the lower antero-lateral wall and apex; and contraction of the inferior wall and high up the antero-lateral wall. The LAO view shows good contraction posteriorly and akinesis of the septal aspect of the chamber. Patient was injected IV with 20mCi of ^{99m}Tc-labelled Human Serum Albumin. The agent was prepared using the New England Nuclear Electrolysis Kit for labelling HSA. Write or call for a portfolio of Brattle-gated lung, liver and heart studies.



No knobs, no meters, no errors
The spartan panel above tells the second-best part of our story. If you want to photograph peak systole, press the SYSTOLE button. If, say, you want systole only at full expiration, press the EXPIRATION button as well. If only breathing is relevant, don't press the heart button.

The Brattle is connected to the patient and to your gamma (or x-ray or ultrasonic) camera. Whenever the patient is in the selected phase, both the scope and the scaler on your gamma camera are gated ON, and film is exposed. Otherwise, they are OFF.

Brattles lock onto patients—and stay locked on
It doesn't matter if the patient's heart rate and breathing depth change while he's under the collimator because we stay right with him. Brattles contain an ECG to track heart, a plethysmograph to track respiration, and a tiny computer to deduce systole and diastole times from the heart signal. And because it's all built in, your operator need not be a physiologist.

We don't cover our tracks—we print them
The panel lights flash whenever the patient reaches the selected phases; and pushing the RECORDER-ON button gets you an ECG tracing marked with breathing and camera-on times. You can verify function before, during and after exposure.

A single pair of axillary electrodes captures both heart and breath
It's easy. And we supply disposable, pre-filled electrodes.

Some Brattles have been in clinical use for over three years—in community and major hospitals
More than half of our instruments are in community hospitals and the list is growing rapidly. Upon request, we'll supply names of happy users in your area.

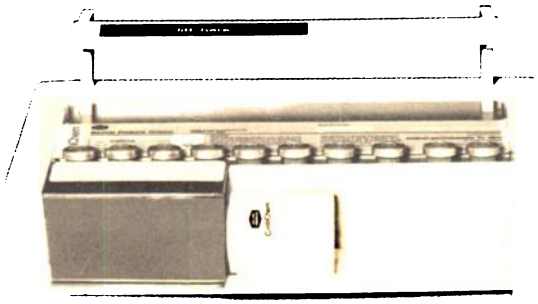
What's the next step? Get in touch
Ask your NEN man about Brattles and HSA Kits. He can show you a portfolio of clinical pictures and arrange to have one of our people give you a demo. Or write or call us direct. We'll send you brochures on this and other models, and will give you your own set of clinical pictures and a bibliography on gated scintigraphy. If you wish, we'll even make you a Brattle owner. (This is the best part of our story.)

Brattle Instrument Corporation

243 Vassar Street • Cambridge, Massachusetts 02139 • 617-661-0300

CintiChem®

Technetium Tc 99m Generators



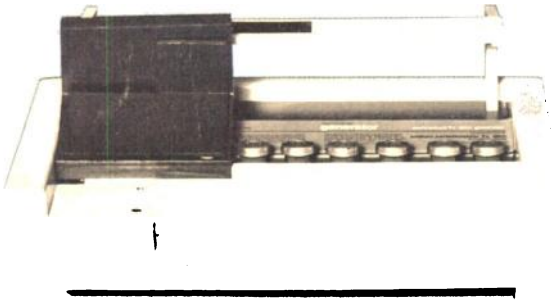
INCORPORATE THE FOLLOWING ADVANTAGES:

ONLY UNION CARBIDE CINTICHEM® Technetium 99m Generators are produced *in total* at one domestic production site which:

- Possesses a ten million dollar* commitment to Nuclear Medicine through its own Nuclear Reactor for the production of high specific activity Fission Product Mo 99,
- manufactures and purifies by a patented process high specific activity Fission Product Mo 99,
- loads Fission Product Mo 99 onto columns,
- assembles the Generators,
- performs quality control procedures including an elution check on each Generator,
- ships Generators directly to the user

This provides you with a reliable product supply and a uniformly high quality product.

Elution Transfer Point Shielded Hood Maximizes Radiation Protection During the Elution Process Itself



Shielded Elution Transfer Point

*Estimated 1980 construction value.

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