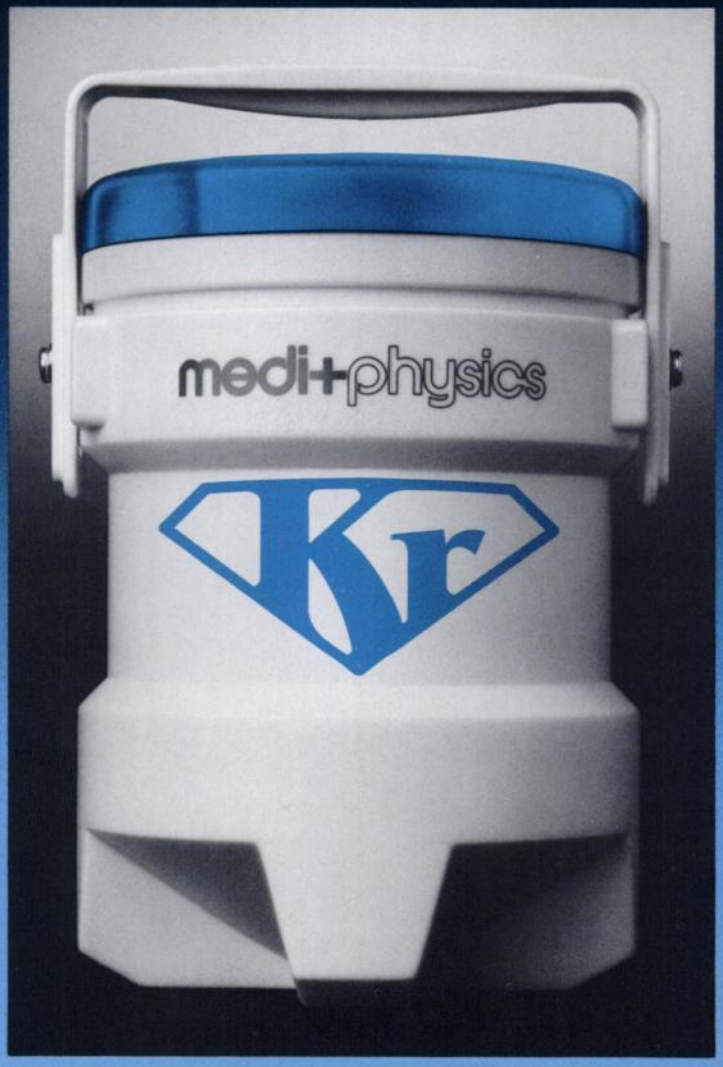
medi+physics™

# Announces An Ideal Radioisotope For The Study of Pulmonary Ventilation

- A half-life of 13 seconds and decay by Isomeric Transition means low radiation exposure to patients and staff.
- The monoenergetic gamma emission of 191 keV is well suited for the gamma camera.
- No special radioactive gas collection or disposal system required.
- Completely portable system allows studies in ICU, CCU, and Post-Surgical departments with portable camera.




**MPI Krypton Kr 81m Gas Generator**
Krypton Kr 81m

- Studies can be conducted on comatose, uncooperative, or mechanically vented patients.
- Distribution of radioactive gas is mainly to the lungs.
- Elaborate delivery system is not required.
- The only radioisotope that can be administered ON and OFF as needed.
- Easy to license when compared to Xenon Xe 133 gas.

# The Pulmonary Profile

## THE CONCEPT

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

## THE PURPOSE

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

## THE RESULT

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

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

medi+physics™

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

**MPI KRYPTON Kr 81m GAS GENERATOR**
**KRYPTON Kr 81m**

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

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

CONTRAINDICATIONS: None known.

WARNINGS: None known.

PRECAUTIONS:

General

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

Carcinogenesis, Mutagenesis, Impairment of Fertility

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

Pregnancy-Category C

Animal reproduction studies have not been conducted with Krypton Kr 81m gas. It is also not known whether Krypton Kr 81m gas can cause fetal harm when administered to a pregnant woman, or can affect reproduction capacity. Krypton Kr 81m gas should be given to a pregnant woman only if clearly needed.

Nursing Mothers

It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when Krypton Kr 81m gas is administered to a nursing woman.
Ideally, examinations using radiopharmaceuticals, especially those elective in nature, in women of childbearing capability, should be performed during the first few (approximately ten) days following the onset of menses.

Pediatric Use

Safety and effectiveness in children have not been established.

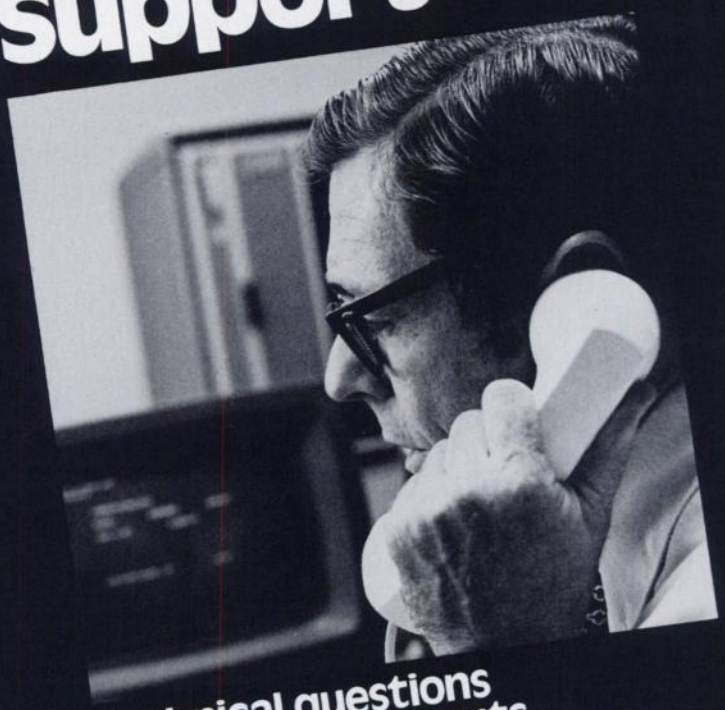
Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the safe use and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

ADVERSE REACTIONS: None known.

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

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

# Technical Support



## Technical questions answered by experts. Just give us a toll-free call.

Mallinckrodt gives you an open line to our comprehensive technical support system . . . a system designed to meet all your technical needs.

If you have a question about test procedures, applications or need technical assistance on any of our radiopharmaceuticals, we're here to help. If you encounter any problems, no matter how minor, we want to make things right . . . right away. Need information on the U.S. Nuclear Regulatory Commission or other State or Federal agencies? Call us for that too.

Whatever technical support you need, Mallinckrodt is just a toll-free call away.

**800-325-8181,** Your Technical Support Number
(In Missouri, 314-895-2405 collect)
**For ordering information, call: 800-325-3688**
(In Missouri, 314-344-3880 collect)

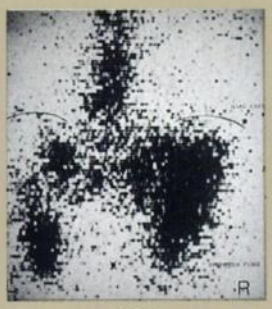
# THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

Yesterday Today Tomorrow



1970

1980

## Brought to you in part by NEN

For the past decade, nuclear medicine has enjoyed a continuing stream of new radiopharmaceuticals, new isotopes, new diagnostic procedures — and new patients. Many of these new diagnostic procedures resulted directly or indirectly from the investments in product research and development, testing, production, and promotion by a single company: New England Nuclear.

We supported investigators with grants to develop their ideas into agents suitable for animal and human testing... we invested in the production facilities to manufacture sufficient quantities of radiopharmaceuticals and isotopes to perform the studies necessary to bring new products to you.

And then, we underwrote an effort unique in nuclear medicine — we began spending hundreds of thousands of dollars each year to inform primary-care physicians and specialists why they should send their patients to nuclear departments for these new studies.

Such investments in new product development and physician education are common among traditional pharmaceutical companies producing proprietary products that can be patented. However, all NEN's investments were made on products for which no exclusivity of patent protection was available. Some of NEN's investments were not successful. A few were, however — and they profoundly changed nuclear medicine.

Of course, NEN could have waited for other companies to develop new procedures and products... to carry the risk and investment of pioneering trial and error. We could have waited until someone else created a demand for new isotopes, and then capitalized on their efforts.

Instead, we built *four* of our own cyclotrons, and are currently building a multimillion-dollar linear accelerator — further evidence of NEN's unique commitment to research and development innovation in isotope and radiopharmaceutical production.

If NEN had not been so committed to advancing nuclear diagnostics, perhaps bone scans might still be done with strontium... and techniques such as tumor, abscess, and myocardial perfusion imaging might still be subjects for academic — not clinical — consideration.

NEN has maintained a high level of customer acceptance of its isotopes and radiopharmaceuticals, thanks to physicians and technologists who understand that when they trust their business to NEN they are sharing our investment in future nuclear diagnostics... in the profession's future ability to diagnose diseases for which medicine has no agents today ...and in the effort to communicate the benefits of nuclear diagnostics to the medical community.

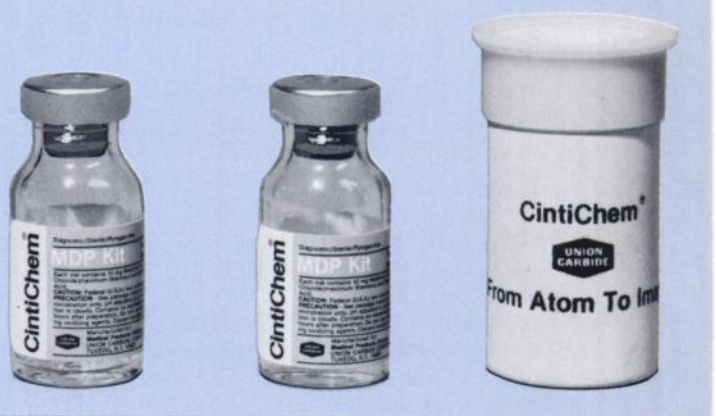
We're committed to you. We're NEN New England Nuclear®

# THE STABLE SOLUTION TO YOUR BONE IMAGING NEEDS

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

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

From: DIFFERENCES BETWEEN Tc-99m-MDP STABILIZED AND UNSTABILIZED. K.T. Study, K.A. Reed, and D.L. Laven. University of New Mexico, Albuquerque, NM; reprinted with author's permission from J.N.M.T., Vol. 8, No. 2, p. 127. Study based on biodistribution in Swiss-Webster mice.




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

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

**CintiChem® MDP KIT**

## Technetium Tc 99m Medronate Kit

**BRIEF SUMMARY OF PRESCRIBING INFORMATION**

**indications and usage**

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

**contraindications**

None known.

**warnings**

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

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

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

**precautions**

**general**

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

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

This preparation contains no bacteriostatic preservative.

Technetium Tc 99m Medronate should be formulated within six (6) hours prior to clinical use.

**pregnancy category C**

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

**nursing mothers**

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

**pediatric use**

Safety and effectiveness in children have not been established .

**adverse reactions**

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

**how supplied**

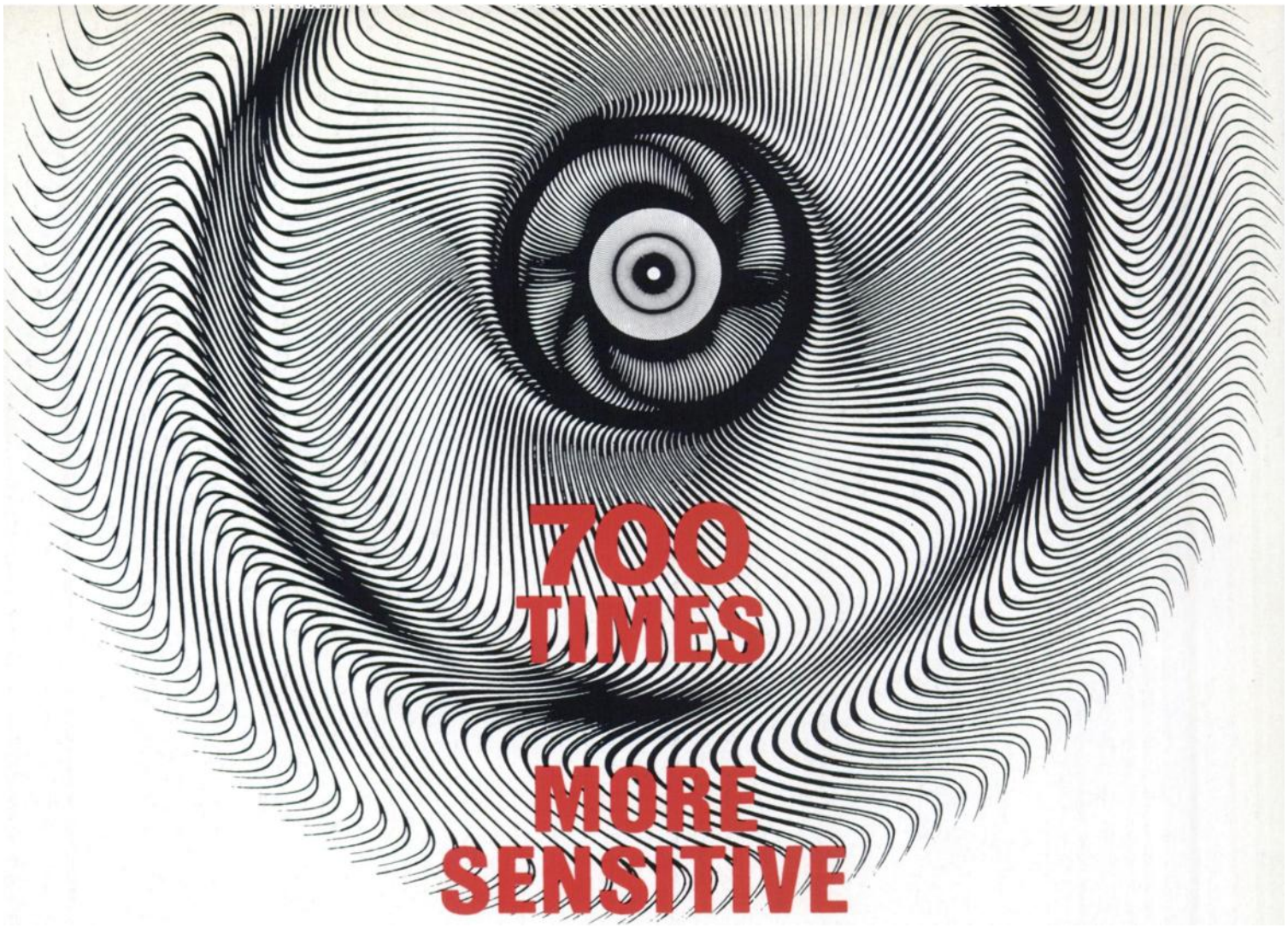
Union Carbide's Technetium Tc 99m Medronate Kit is supplied as a sterile, pyrogen-free kit containing 5 vials.

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

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

UNION CARBIDE **FROM ATOM TO IMAGE**

Manufactured For:
Union Carbide Corporation • Medical Products Division •
Nuclear Products • P.O. Box 324 • Tuxedo, New York 10987




# $^{125}$I METHOTREXATE RADIOIMMUNOASSAY KIT

Our $^{125}$I Methotrexate Radioimmunoassay Kit provides a rapid, simple method with an unexcelled level of sensitivity and specificity.

Here is a comparison chart that speaks for itself.

Select the proven DBI $^{125}$I MTX-RIA kit to monitor the circulating methotrexate levels in serum, plasma, cerebral spinal fluid or urine.

Also available:

- $^{125}$I Doxorubicin-RIA Kit
- $^{125}$I Digoxin-Stat-RIA Kit
- $^{125}$I Folate Kit
- $^{125}$I $T_4$-One Step-RIA Kit
- $^{125}$I $T_3$-Uptake Kit

Call or write for our low priced introductory kit.

| | DBI RADIOIMMUNOASSAY | IMMUNOENZYME ASSAY |
|---|---|---|
| STAT INCUBATION: | 15 minutes at 37°C | 1 minute |
| SENSITIVITY: | 0.0004 μM (700 times more sensitive) | 0.3 μM |
| EXOGENOUS INTERFERENCE: | None | Lypemic Icterus Hemolysis |
| STANDARDS SUPPLIED: | 7 | 6 |
| PRICE: | *57½ cents per tube | $1.86 per tube |

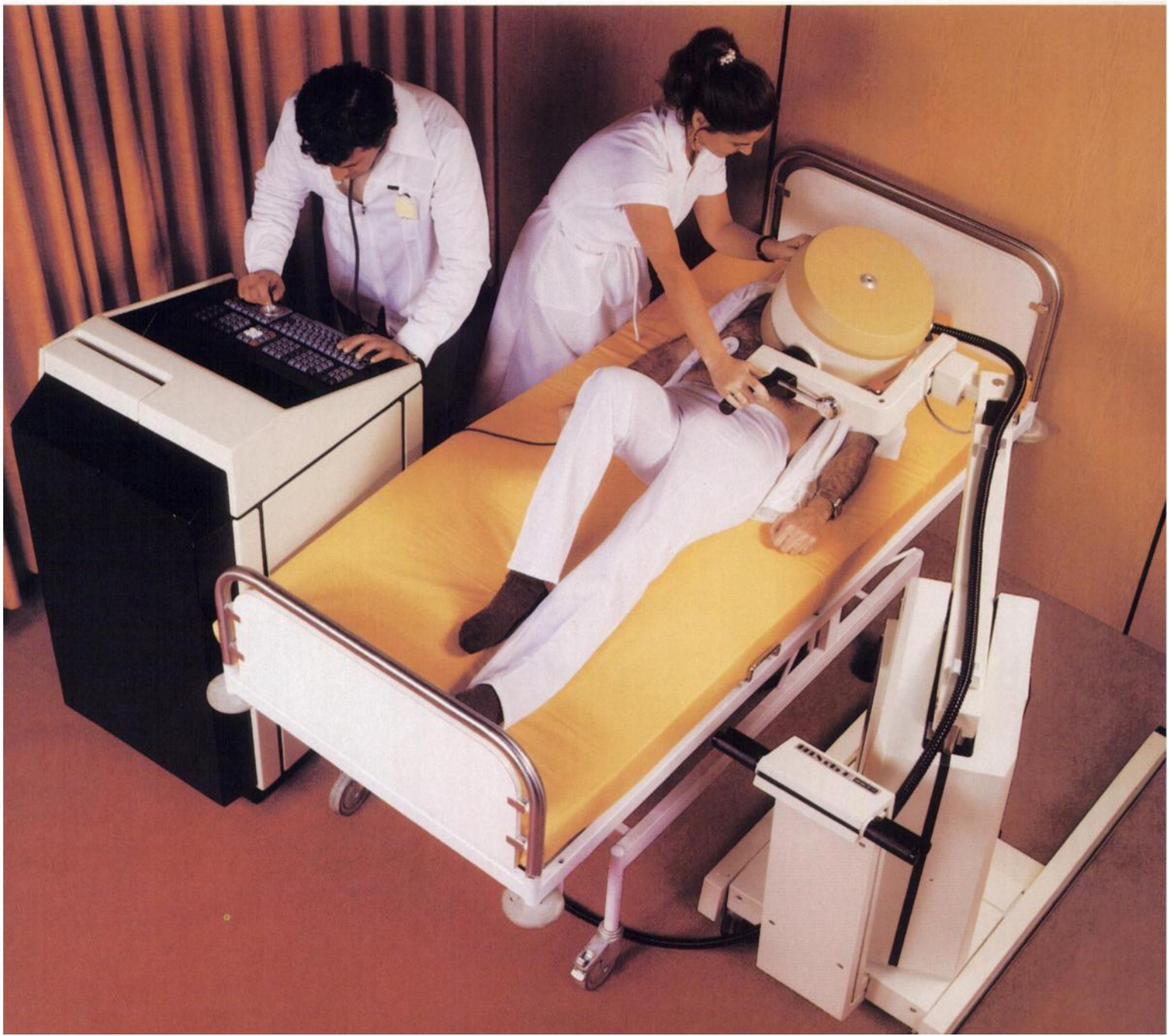
*In units of 200

**DBI Diagnostic Biochemistry Inc.**

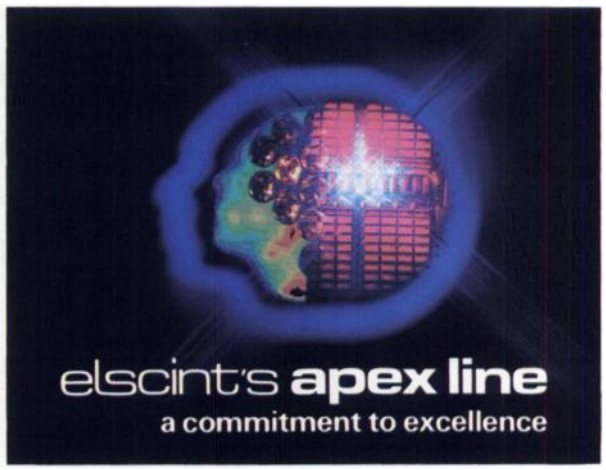
10457-H Roselle Street, San Diego, CA 92121
Tel. (714) 452-0950

# multicrystal count rates with single-crystal image quality

**Another unique feature of the Apex Line**



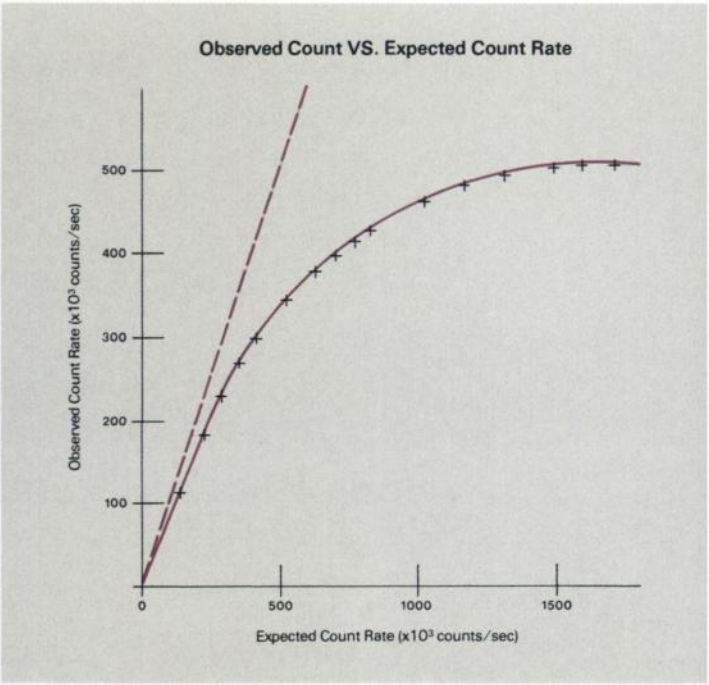
In the practice of modern Nuclear Medicine, physicians have learned that a camera's major diagnostic advantage is often negated by a parallel disadvantage.
High count rate is one such case.
Until Apex, high count rates were achievable only with multicrystal cameras—at the expense of image quality. Only Elscint's Apex Line provides count rates as high as 500,000 CPS and resolutions as fine as 1.8mm bars (Apex 215M).




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

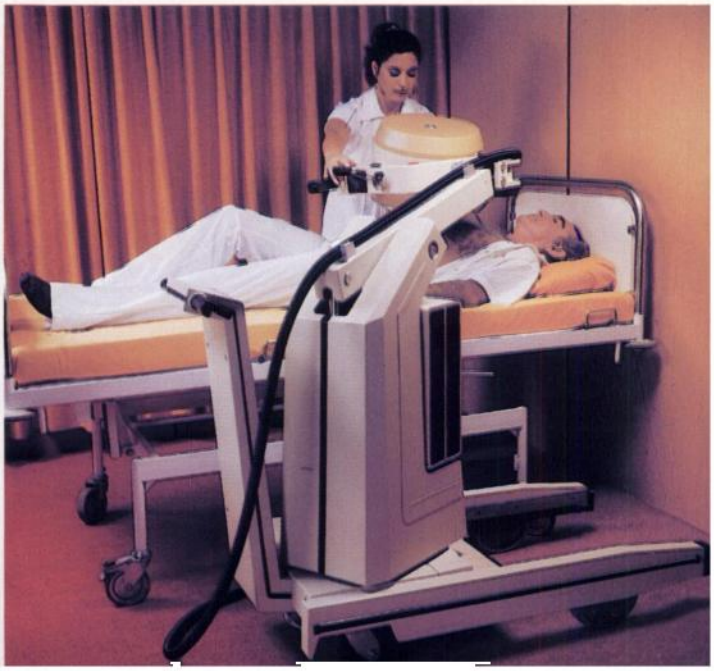
## High Count Rates—The Clinical Need

As Nuclear Medicine techniques become more sophisticated, they require higher count rates. Cardiac first-pass studies, for example, can only be effectively accomplished with count rates exceeding the limitations of most present day gamma cameras. Apex systems, however, do perform these studies—with remarkable image clarity.




## Some Impressive Apex Qualities

The remarkable *Count Rate* performance of the Apex Line is supported by a high *Dynamic Frame Rate* of 64 FPS for 64×64 pixels, and a *Multigated Frame Rate* of 64 frames per heart cycle for $64^2$ matrix.



# Pick a n

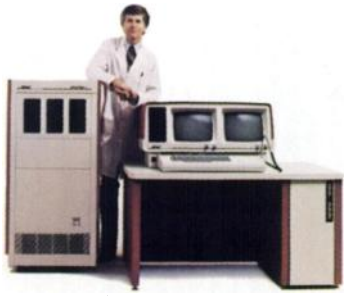
Any of these four ADAC nuclear medicine systems will deliver useful clinical information faster and more accurately than ever before possible.

And one has exactly the capacity your clinic or hospital needs today.

That's the one to buy.

Later, as you expand, your ADAC expands with you.

ADAC System I.



**It processes and acquires.**

It has a Diagnostic Acquisition/Processing Console, a Computer Section, and a Winchester disc drive.

It can easily be expanded to a System II.

ADAC System II.

**It processes one study while acquiring or processing another.**

It's a System I—plus a Remote Acquisition/Processing Terminal, a second Computer Section, and a second Winchester.

It can easily be expanded to a System III.

# umber.

ADAC System III.

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

ADAC System IV.

**It has a three-location option.**
With two Consoles and an expanded Computer Section, you can process and acquire in two places at once.

Add an optional Remote Terminal and you can process and acquire studies at three locations.

For more information on ADAC Systems I, II, III, & IV, write or call collect. ADAC Laboratories, 255 San Geronimo Way, Sunnyvale, California 94086. (408) 736-1101.

ADAC
Nuclear Medicine Computers

# FIRST AGAIN.

Being first can be habit forming. We were first with the 2-mm resolution mobile gamma camera. We were first with 12-inch (30 mm) FOV resolution good enough for cardiology. We were first with instant on-line ejection fraction. We were first with energy calibration. Question: Who's first with small field of view resolution in large field of view cameras? Picker. Again.

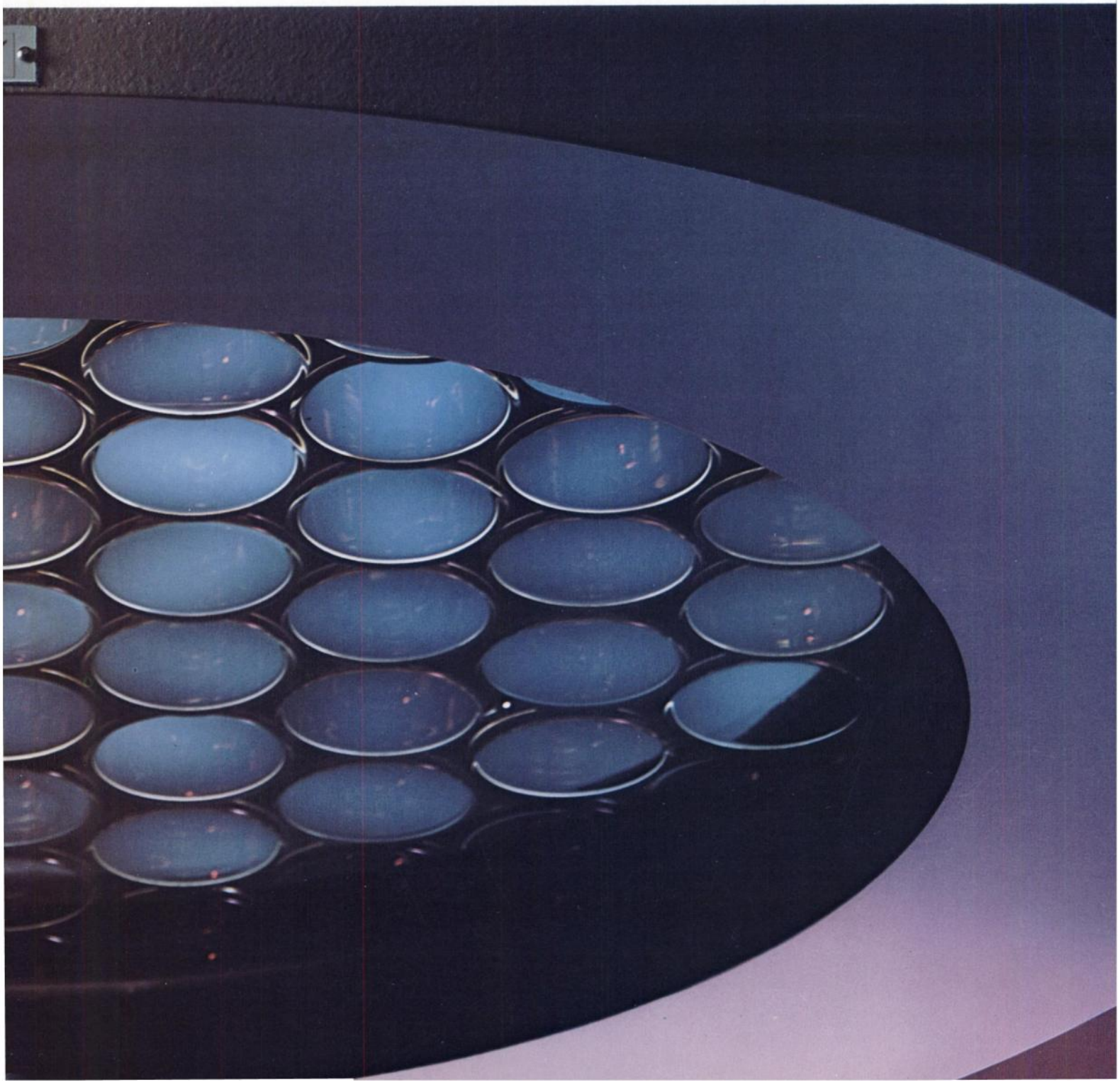
It took 61 photomultiplier tubes and an ingenious optimization of crystal design to improve resolution 25%. INTRODUCING THE DYNA™CAMERA 4/15/61 CLINICAL SYSTEM—

- Intrinsic resolution and linearity so good, myocardial tomography is now a practical reality.
- Improved clarity in small-lesion detection.
- Better reading of low-contrast liver, lung, and renal studies.
- Over 30,000 clinical imaging hours in nuclear medicine departments.

DynaCamera 4/15/61: 61-tube resolution in a compact, newly designed chassis. It's not only first, but it's good enough to remain first. There's more you should know. Write: Picker Corporation, 12 Clintonville Rd., Northford, CT 06472, or Picker International, 595 Miner Rd., Highland Hts., OH 44143.

THE IMAGE OF VALUE.

PICKER®



# A² Image Processing Systems

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Every A² System offers total capability. Whether you select a single terminal system, mobile or stationary, or a multiple terminal system, you can perform all existing acquisition processing and display protocols with the same ease of operation and superior image quality.

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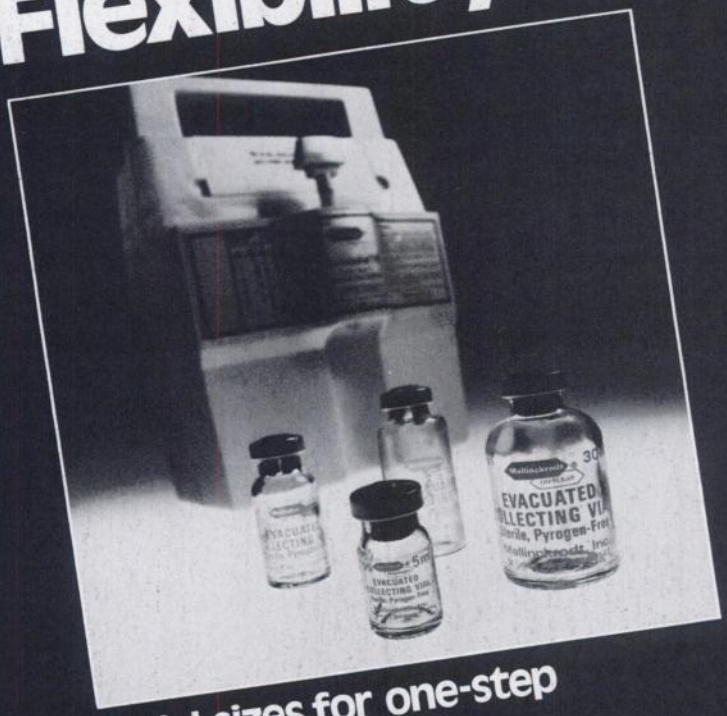
# Elution Flexibility




## 4 vial sizes for one-step elution & dilution.

With a Mallinckrodt generator, you can elute 5, 10, 20 or 30 ml volumes with no time-consuming dilutions. And you don't have to load saline vials, so there's less exposure time.

When generator activity is high, simply use a larger vial. By use of the proper size vial, the internal saline reservoir automatically provides the proper volume for the concentration you need. Saves preparation time, minimizes handling and reduces contamination risk. And eluting flexibility is part of every package, because all the vial sizes you need are available at no extra charge. Just let us know the sizes you need.

Find out more about the generator that gives you a choice of elution volumes with no extra steps. 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**
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# THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

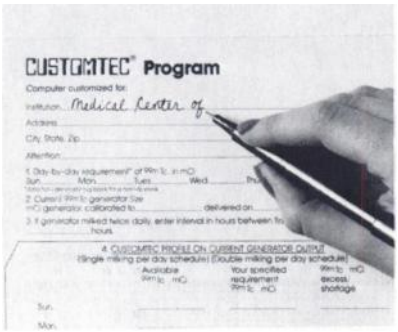
Ever since the first Squibb radiopharmaceutical was delivered over two decades ago, we have known that good products accompanied by good service result in customer satisfaction. We are proud of our record of professional service to nuclear medicine technologists and physicians and of our efforts to help fulfill their unique needs. Our current programs continue this tradition.

## Squibb Health Physics Service

Specially trained Technical Associates aid laboratory personnel with a pre-inspection of the laboratory to help ensure compliance with radiation safety regulations.

## Customtec®

Exclusive computer service that custom-tailors generator size and delivery schedule to a laboratory's daily technetium Tc 99m requirements.




## Technical Associates

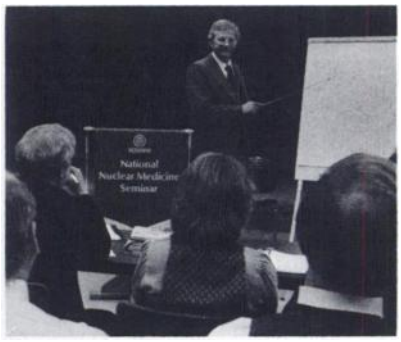
They have had extensive training and experience in nuclear medicine, radiopharmaceuticals, RIA and instrumentation. They can aid in license procurement and renewal, laboratory design and expansion, technologist training, trouble-shooting and instrument calibration.

## Squibb National Nuclear Medicine Management Seminars

Two-and-a-half-day program in management training and development. Designed for chief technologists, supervisors and persons who hold positions of equivalent or greater responsibility.

## Squibb National Nuclear Medicine Seminars

Educational course for technologists. Two days on *in vivo* procedures and two days on *in vitro* procedures. Approved for continuing education credits.




## Technologist Education Plan

A lead recovery program in which Squibb puts funds into a customer's education account each time spent Minitec® (Technetium Tc 99m) Generators are returned.


Your Squibb Representative will be happy to give you more information about these programs and other Squibb services. Technical assistance can be obtained from Technical Customer Service, 609-921-4100.

Medotopes®

SQUIBB®


# Back to Basics!

## The Assayer 1 by Radx

The never ending struggle for product popularity often leads a manufacturer to add gadgets. It's called "one-upmanship." We sometimes lose sight of what YOU, the user, wants.

By customer demand, Radx has gone "Back to Basics" and developed the Assayer 1, a simple dosecalibrator, a reliable dosecalibrator, an economical dosecalibrator.

The return to basics does not require a return to the 1960's technology. The Assayer 1 is microprocessor controlled, totally solid state, with a method of isotope selection way ahead of its time (an optical scanner) which is so precise, reproducible, and reliable that it will soon be copied.

It is not a gadget, it calibrates doses accurately, with precision and unprecedented reliability. It's the Assayer 1—$2950.

Call today for the last dosecalibrator you'll ever own.

RADX

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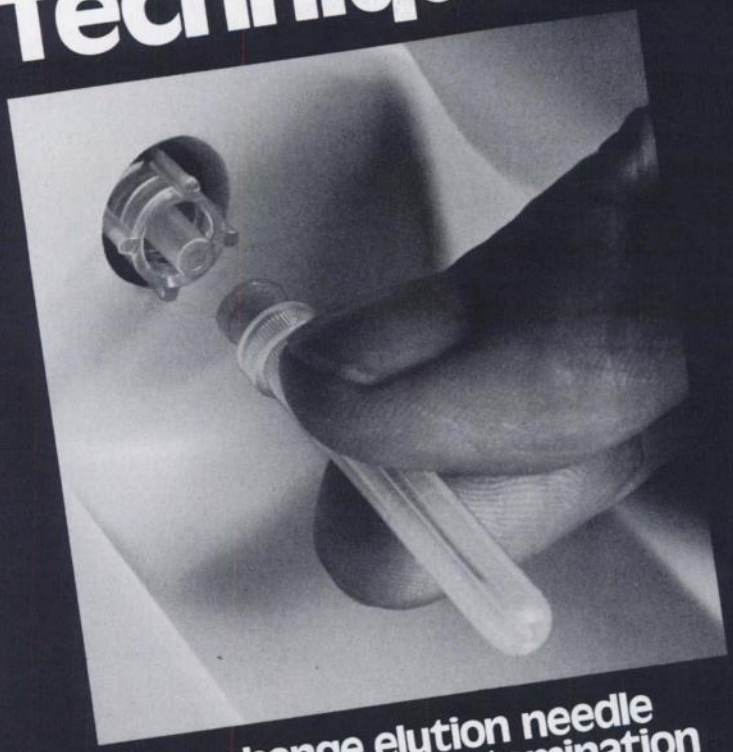
# Sterile Technique



## Quick-change elution needle reduces risk of contamination for greater patient safety.

A fresh needle every time you elute helps insure sterility. Mallinckrodt generators have a unique, quick-change system that makes it easy.

Each generator comes with 6 sterile-packed, pyrogen-free needles. After eluting, just remove the old needle and insert the new, leaving the protective cap in place. That way, your generator is always ready to supply sterile eluate. And if a needle is damaged, you can change it in seconds... no waiting for a whole new needle assembly to be delivered and installed, no disruption of your schedule.

For more information, call your Mallinckrodt representative or this toll-free number:

**800-325-3688** (In Missouri, 314-344-3880 collect)

**For technical assistance it's 800-325-8181**

(In Missouri, 314-895-2405 collect)

# THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

# 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.

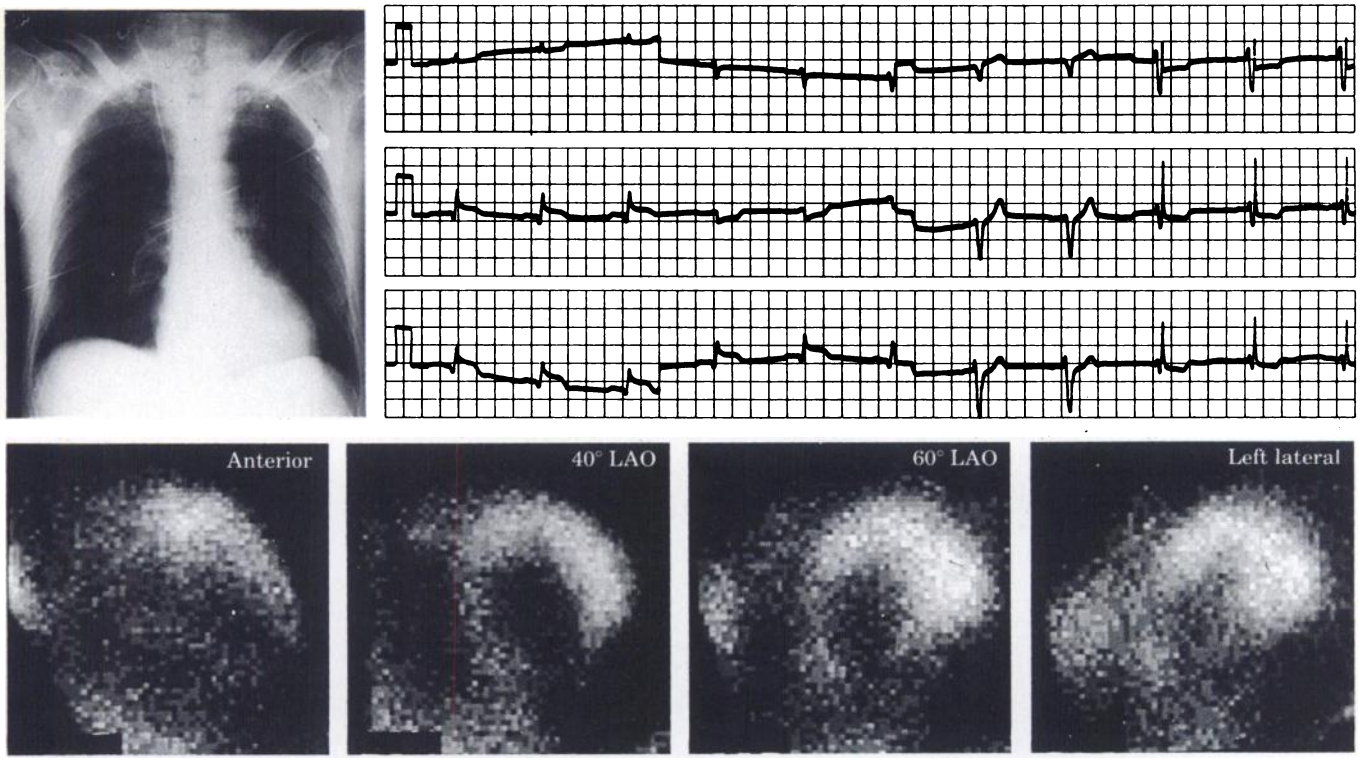
The thallium images—in the anterior, 40° LAO, and 60° LAO views—were interpreted both subjectively and by a computer-assisted quantitative technique.[2] For each interpretive approach, scores for all views were summed to give a total "defect score"—the lower the score, the smaller the area of thallium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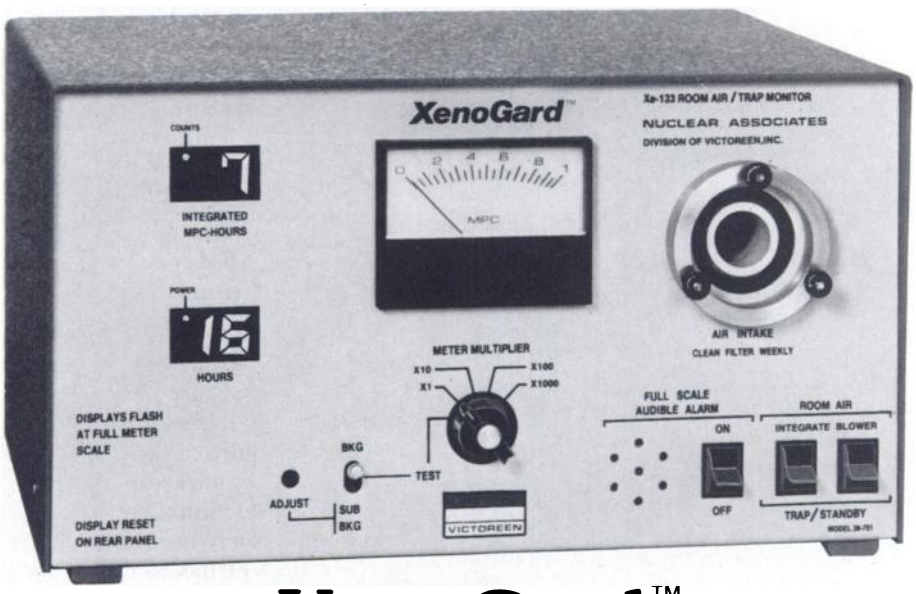


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†*10 CFR, Part 20, Sec. 20.103 and Appendix B, Table 1.*


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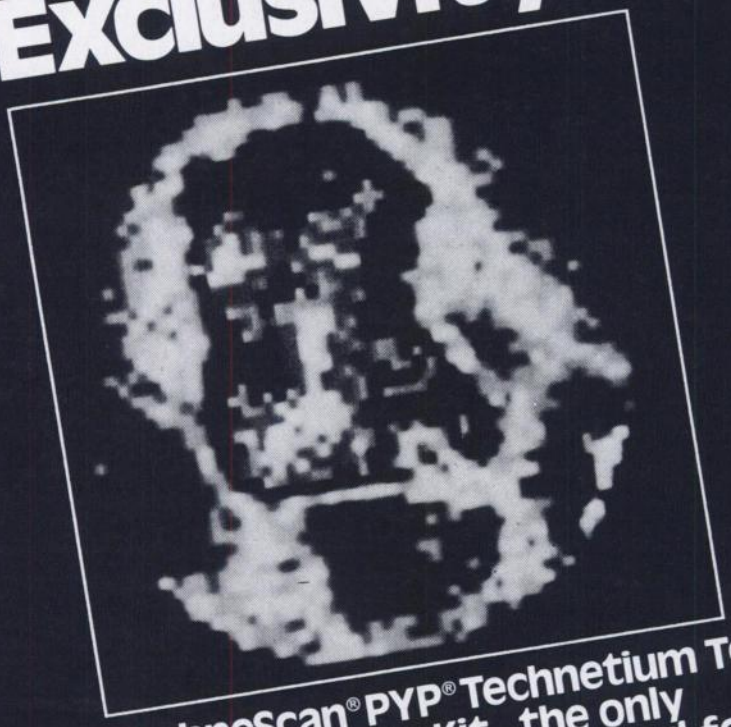

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*See brief summary on following page.*

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# 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.

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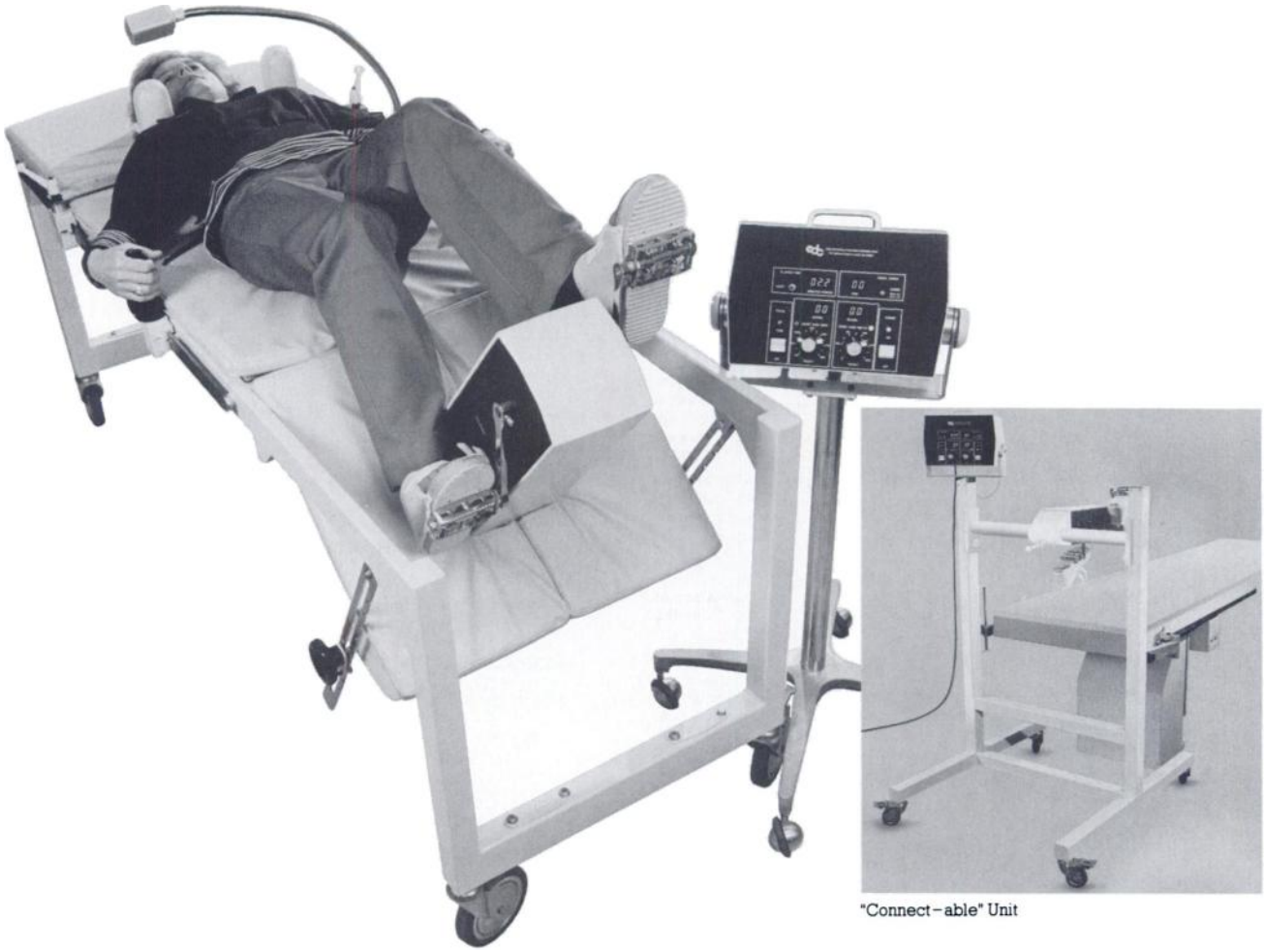

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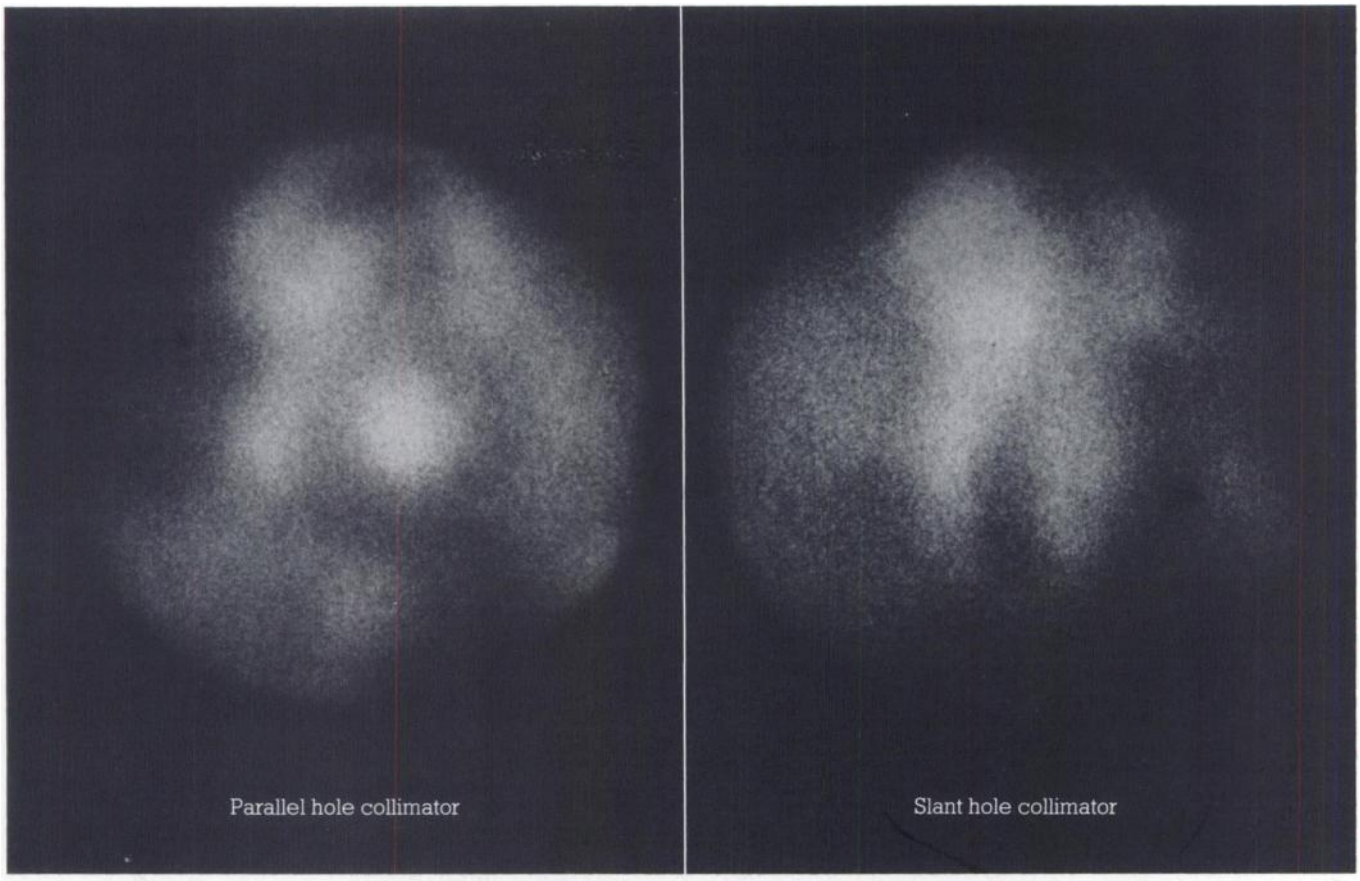


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*PARKER, J.A. et al: Radionuclide left ventriculography with the slant hole collimator. J Nucl Med 18:848-851, 1977.

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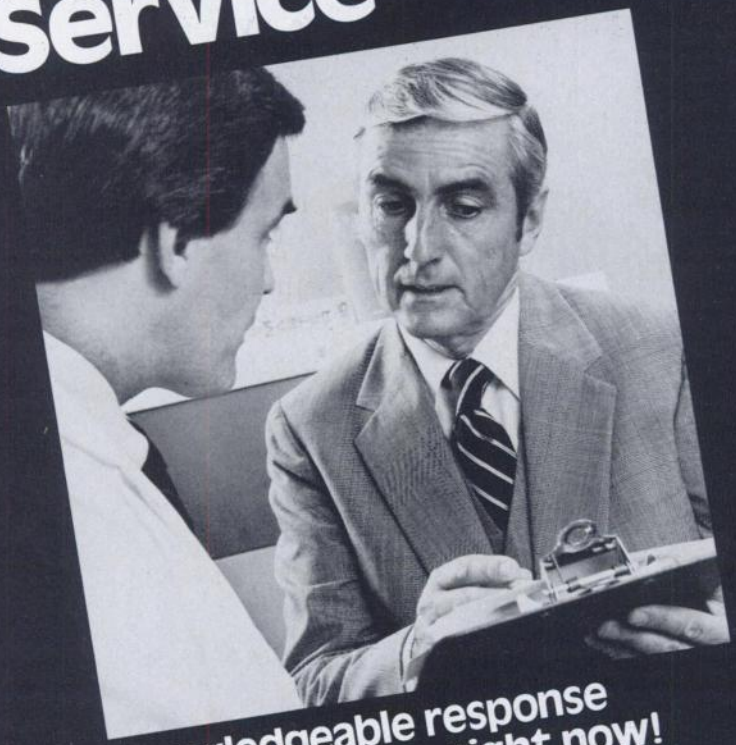

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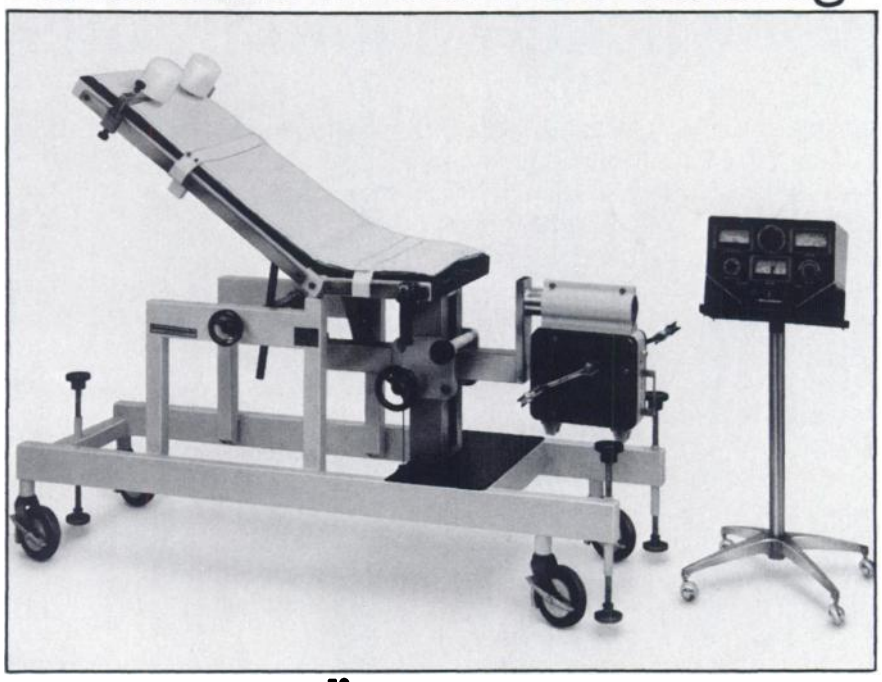

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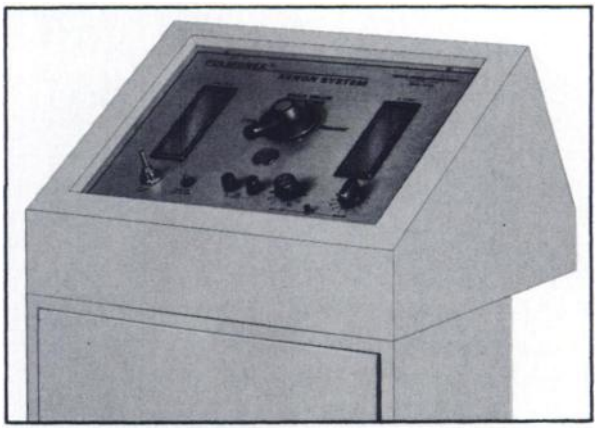

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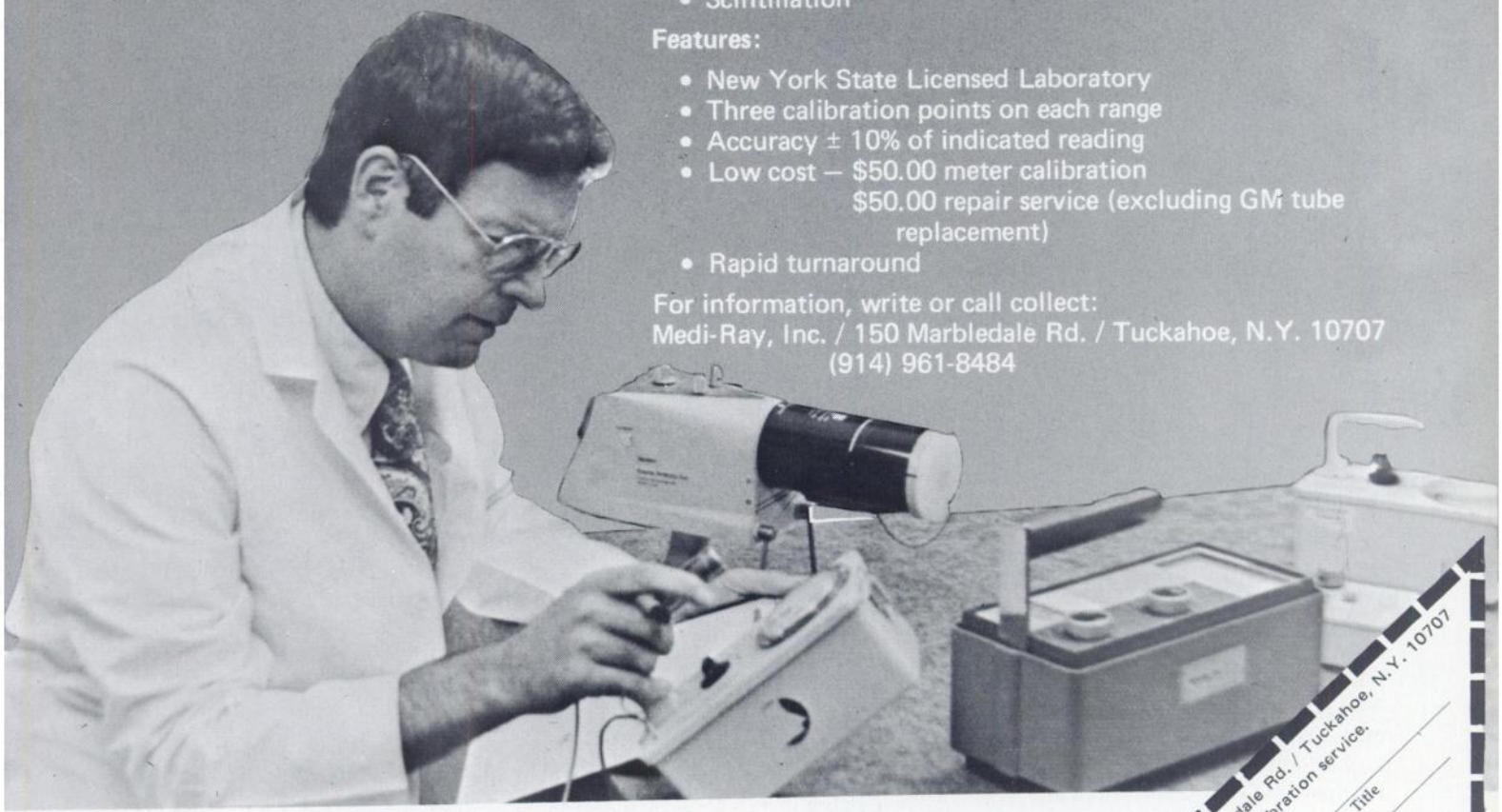

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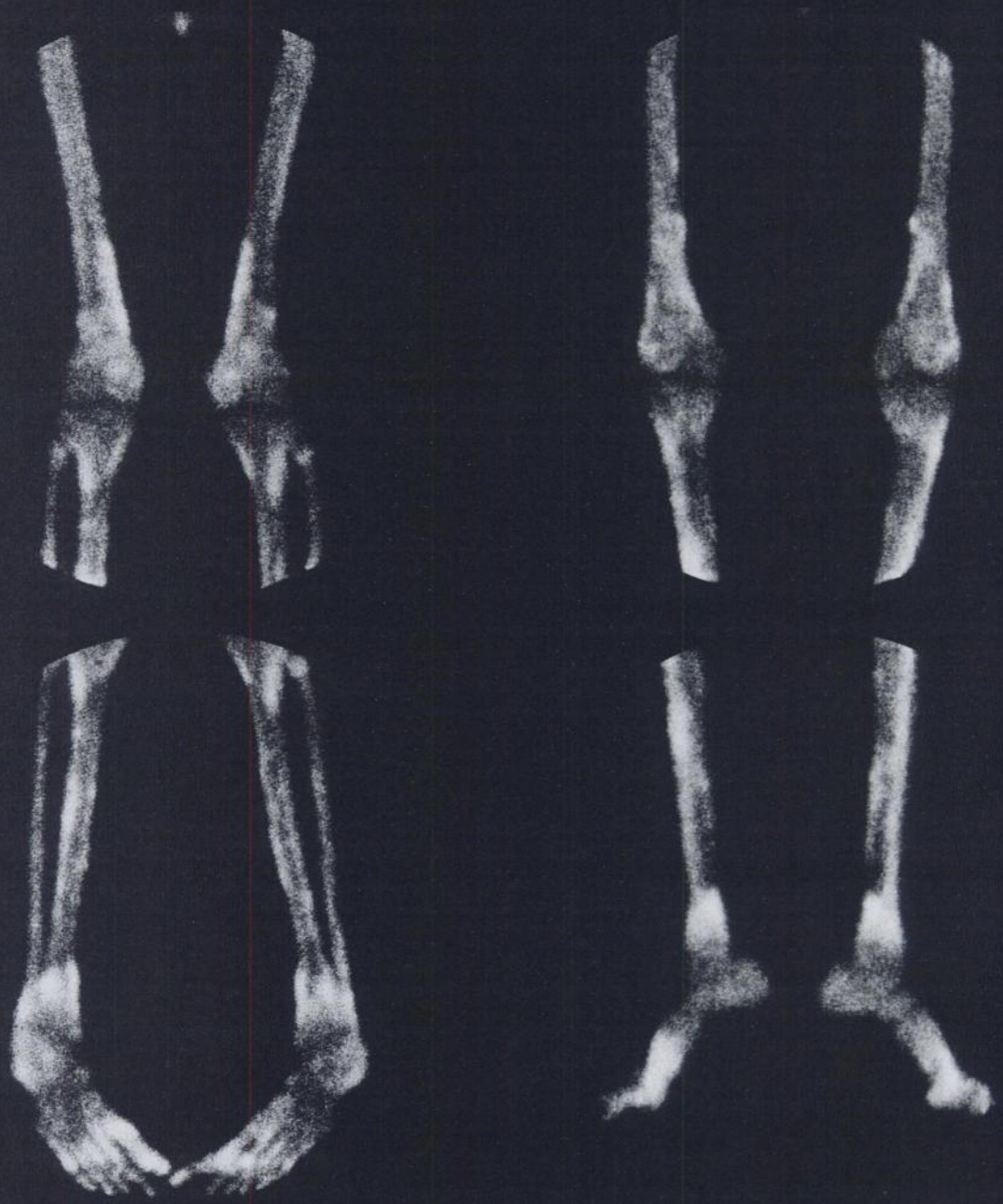
# Bone



**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 following page for brief prescribing information.

# 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)**

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# Gallium Citrate Ga67

**INDICATIONS AND USAGES:** Gallium Citrate Ga-67 may be useful in demonstrating the presence and extent of the following malignancies: Hodgkins disease, lymphomas and bronchogenic carcinoma. Positive Ga-67 uptake in the absence of prior symptoms warrants follow-up as an indication of a potential disease state.

Gallium Citrate Ga 67 may be useful as an aid in detecting some acute inflammatory lesions.

**CONTRAINDICATIONS:** None known.

**WARNINGS:** Gallium Citrate Ga 67 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 radiopharmaceutical drug products, especially those elective in nature of a woman of childbearing capability should be performed during the first few (approximately ten) days following the onset of menses.

**PRECAUTIONS:** A thorough knowledge of the normal distribution of intravenously administered Gallium Citrate Ga 67 is essential in order to accurately interpret pathologic studies.

The findings of an abnormal gallium concentration usually implies the existence of underlying pathology, but further diagnostic studies should be done to distinguish benign from malignant lesions. Gallium Citrate Ga 67 is intended for use as an adjunct in the diagnosis of certain neoplasms. Certain pathologic conditions may yield up to 40% false negative gallium studies. Therefore a negative study cannot be definitively interpreted as ruling out the presence of disease.

Lymphocytic lymphoma frequently does not accumulate Gallium Ga 67 sufficiently for unequivocal imaging; and the use of gallium with this histologic type of lymphoma is not recommended at this time.

Gallium Citrate Ga 67, 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.

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. Gallium Citrate Ga 67 should be used in pregnant women only when clearly needed.

Gallium Citrate Ga 67 has been found to accumulate in breast milk and should not be used in nursing mothers.

Safety and effectiveness in children have not been established.

Gallium Ga 67 localization cannot differentiate between tumor and acute inflammation; and other diagnostic studies must be added to define the underlying pathology.

The expiration date of the drug is seven days after the date of calibration.

**ADVERSE REACTIONS:** Severe itching, erythema and rash were observed in one patient of 300 studied.

**DOSAGE AND ADMINISTRATION:** The recommended adult (70kg) dose of Gallium Citrate Ga 67 is 2-5mCi. Gallium Citrate Ga 67 is intended for intravenous administration only.

Approximately 10% of the administered dose is excreted in the feces during the first week after injection. Daily laxatives and/or enemas are recommended from the day of injection until the final images are obtained in order to cleanse the bowel of radioactive material and minimize the possibility of false positive studies.

Studies indicate the optimal tumor to background concentration of ratios are often obtained about 48 hours post-injection. However, considerable biological variability may occur in individuals, and acceptable images may be obtained as early as 6 hours and as late as 120 hours after injection.

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

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 government agencies authorized to license the use of radionuclides.

**HOW SUPPLIED:** Gallium Citrate Ga 67 is supplied sterile and non-pyrogenic for intravenous use. Each ml contains 2mCi of Gallium Ga 67 on the calibration date, as a complex formed from 9ng gallium chloride Ga 67, 2mg of sodium citrate, 6.8mg sodium chloride, and 0.9% benzyl alcohol w/v as preservative. The pH is adjusted to between 4.5-7.5 with hydrochloric acid and/or sodium hydroxide solution.

Vials are available from 3mCi to 18mCi in increments of 3mCi on calibration date.

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

**Catalog Number NRP-121** December 1979

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# Tumor

**Diagnosis:** plasmacytoma

**Imaging information:** *Instrument:* Cleon 760 Whole Body Imager *Dose:* 5 mCi Gallium Citrate Ga 67
*Scan time:* 48 hours postinjection *Speed:* 5 cm/min

# Gallium Citrate Ga67

NEN New England Nuclear

Please see preceding page for brief prescribing information.

# Generator


# Technetium Tc 99m Generator

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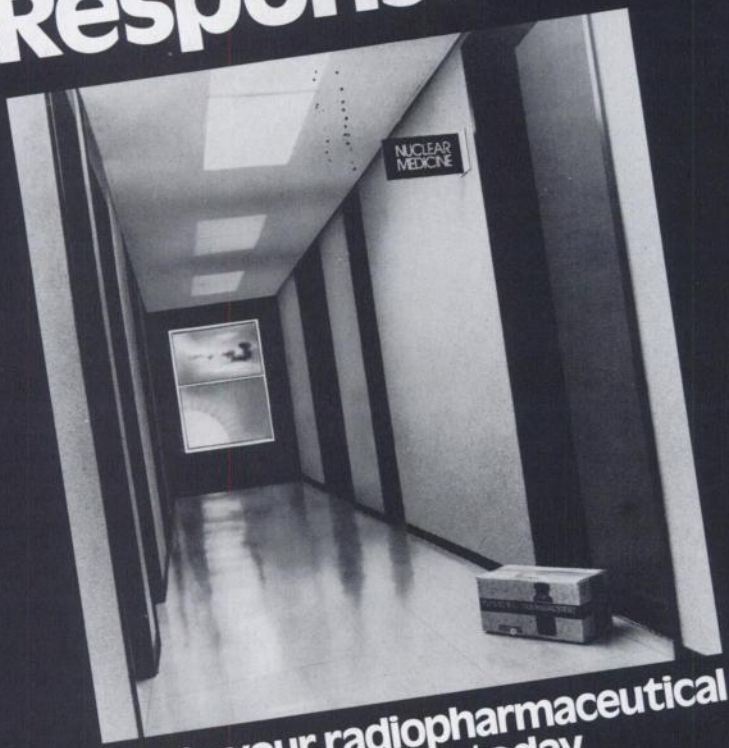
# Quick Response

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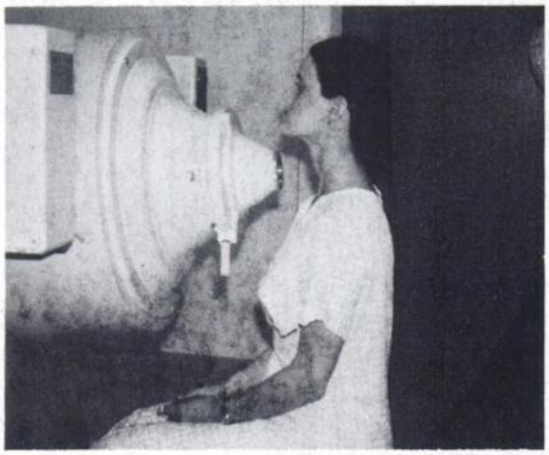

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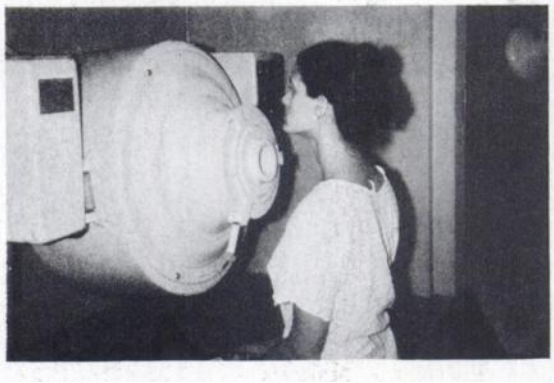

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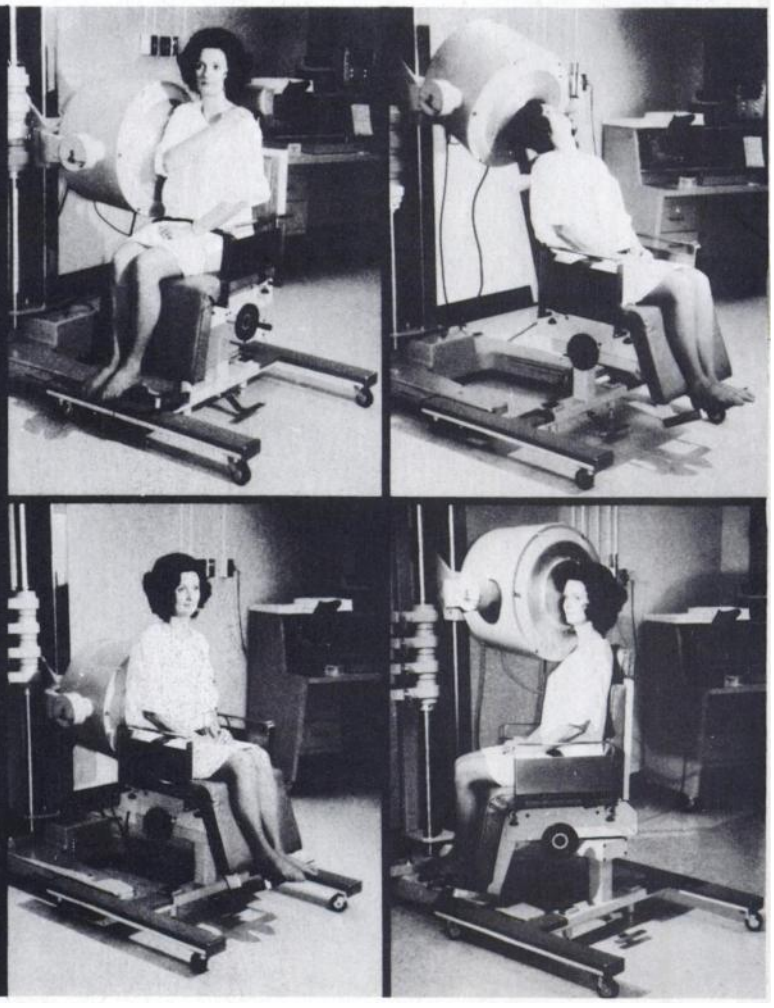

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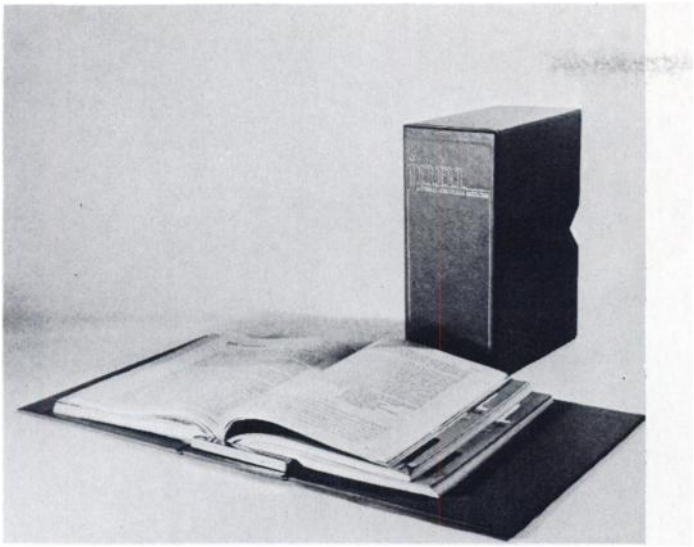

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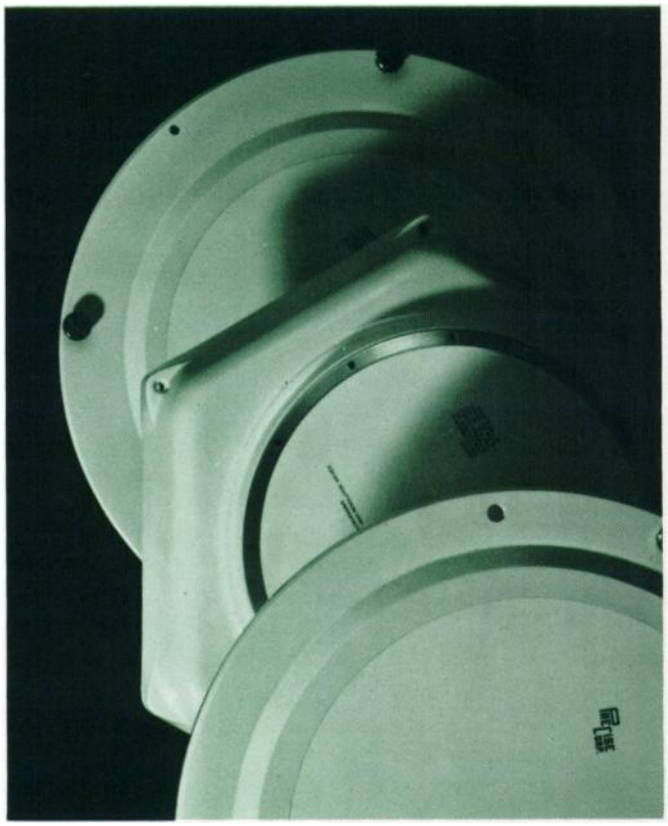

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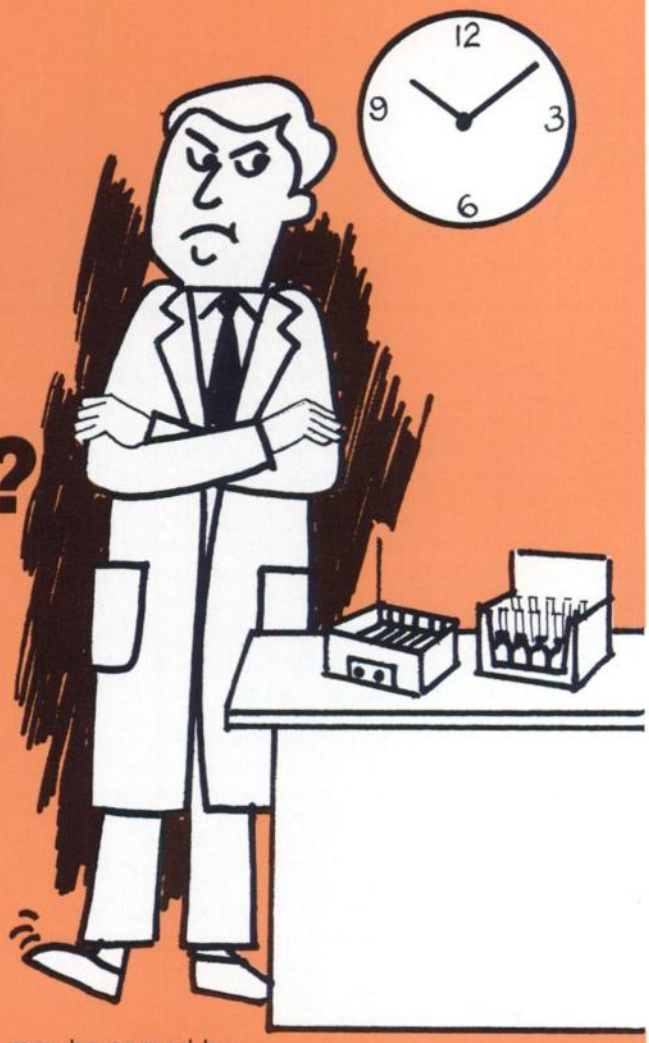


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*See Opposite Page For Summary Of Prescribing Information*

TECHNETIUM 99m

# TSC

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# TECHNETIUM Tc 99m SULFUR COLLOID INJECTION

**DIAGNOSTIC—FOR INTRAVENOUS USE**

**Brief summary of prescribing information.**
**See package insert for full disclosure.**

## description

Each kit contains sufficient material to prepare (5) five formulations. Each formulation consists of a reaction vial containing 0.5 ml 1.0 N hydrochloric acid, and two syringes, one containing a 1.1 ml aqueous solution of 1.9 mg sodium thiosulfate anhydrous and the other containing 5.3 mg gelatin in 2.1 of an aqueous buffer solution containing 177 mg sodium acetate. All components are sterile and pyrogen-free. When a solution of sterile and pyrogen-free Sodium Pertechnetate Tc 99m in isotonic saline is mixed with these components, following the instructions provided with the kit, Technetium Tc 99m Sulfur Colloid Injection is formed. The product so derived is intended for intravenous injection. The precise structure of Technetium Tc 99m Sulfur Colloid Injection is not known at this time.

## clinical pharmacology

Following intravenous administration, Technetium Tc 99m Sulfur Colloid Injection is rapidly cleared by the reticuloendothelial system from the blood with a nominal clearance half-life of approximately 2½ minutes. Uptake of the radioactive colloid by organs of the reticuloendothelial system is dependent upon both their relative blood flow rates and the functional capacity of the phagocytic cells. In the average patient 80 to 90% of the injected colloidal particles are phagocytized by the Kupffer cells of the liver, 5 to 10% by the spleen and the balance by the bone marrow.

## indications and usage

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

## contraindications

None known.

## warnings

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

## adverse reactions

Hypersensitivity reactions, including anaphylaxis, have been reported in patients receiving sulfur colloid preparations.

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

## dosage and administration

The suggested intravenous dose range used in the average patient (70 kg) is 1 to 8 millicuries of Technetium Tc 99m Sulfur Colloid Injection.

When orally administered, the Technetium Tc 99m Sulfur Colloid Injection is not absorbed from the G.I. tract.

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 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.

### radiation dosimetry

The estimated absorbed radiation doses [2] to an average patient (70 kg), or to patients with diffuse parenchymal liver disease from an intravenous injection of a maximum dose of eight millicuries of Technetium Tc 99m Sulfur Colloid Injection are shown in Table IV.

**table IV.** radiation doses

| | absorbed radiation doses (rads) 8 millicuries Tc 99m | | |
|---|---|---|---|
| tissue | normal liver | diffuse parenchymal disease | |
| | | early-intermediate | intermediate advanced |
| Liver | 2.7 | 1.7 | 1.3 |
| Spleen | 1.7 | 2.2 | 3.4 |
| Bone Marrow | 0.22 | 0.36 | 0.63 |
| Testes | 0.0088 | 0.017 | 0.026 |
| Ovaries | 0.045 | 0.065 | 0.096 |
| Whole-body | 0.15 | 0.15 | 0.14 |

[2] Modified from: Summary of Current Radiation Dose Estimates to Humans with Various Liver Conditions from $^{99m}$Tc-Sulfur Colloid. MIRD Dose Estimate Report No. 3, *J. Nucl., Med.*, 16, No. 1, 108A-B (1975).

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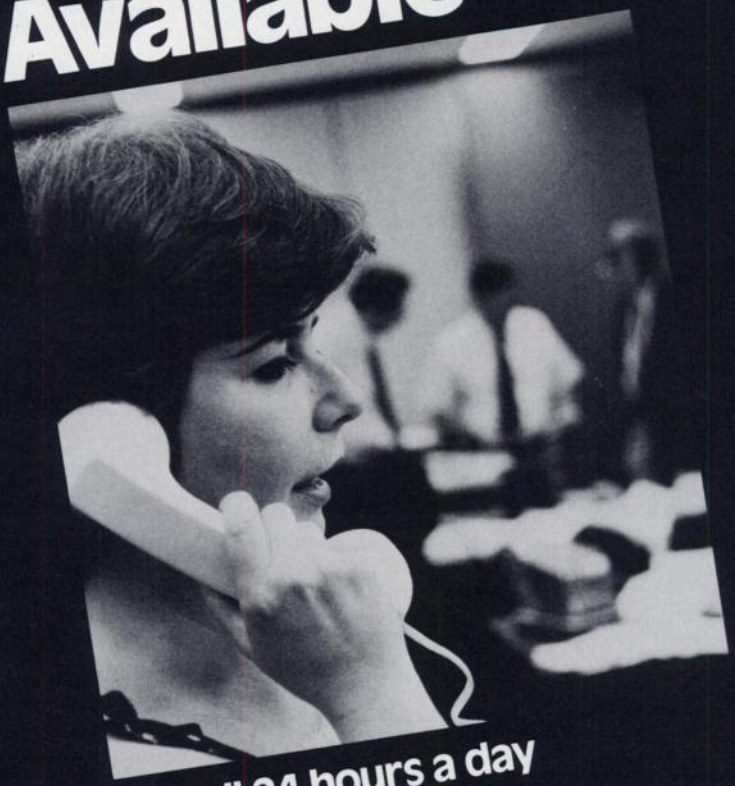

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# GENERATOR
## TECHNETIUM Tc 99m GENERATOR
## FOR THE PRODUCTION OF SODIUM PERTECHNETATE Tc 99m

**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 accumulate 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 calibration | mR/hr 2" | mR/hr 12" | mCi 99Mo | days from calibration | mR/hr 2" | mR/hr 12" | mCi 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.

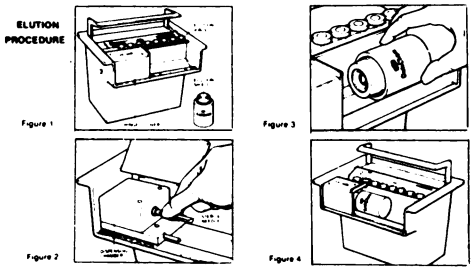
Union Carbide Generators are sterile and pyrogen-free at the time of shipment. Aseptic technique must be observed during the use of the generator to maintain a sterile and pyrogen-free system. Gloves should be worn during all elution procedures.

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 $\mu$ amp reading.
3. Transfer the Technetium Tc 99m sample from the shield to the chamber. Record the $\mu$ 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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A special glass column design incorporated in the high activity CINTICHEM® Technetium 99m Generators provides for high yields with as low as a 5 cc elution volume. Furthermore, the specially designed column reduces the potential Al + + + and Mo 99 content in the eluate.

### VERSATILITY

High activity CINTICHEM® Technetium 99m Generators can reduce the time required to perform quality control because in each single elution levels of activity are provided that would require eluting several lower activity Generators, and quality controlling each eluate.

### CONVENIENCE

High activity CINTICHEM® Technetium 99m Generators can dramatically reduce shielded shelf space requirements.

High activity CINTICHEM® Technetium 99m Generators can eliminate long term decay storage.

[1]Data on file at Union Carbide Corporation, Tuxedo, New York, and with the State of New York, Division of Safety and Health.

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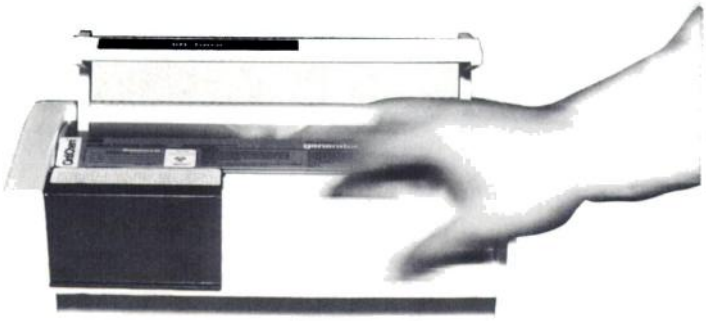

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- Only UNION CARBIDE CINTICHEM® Technetium 99m Generators are made at one domestic production site that possesses its own Nuclear Reactor for the production of Fission Product Mo 99, manufactures and purifies by a patented process high specific activity Mo99, loads it onto columns, assembles the Generators, performs quality control, and ships them directly to the user. This provides you with a reliable product supply and a uniformly high-quality product.

- The UNION CARBIDE Fission Product Mo 99 used in CINTICHEM® Technetium 99m Generators provides Sodium Pertechnetate Tc 99m activity concentrations sufficient for bolus injections.

- CINTICHEM® Technetium 99m Generators come in 32 activity and day of calibration combinations, which can satisfy a wide range of activity needs.

- 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 same needle assembly is used for the life of the product.

- 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 high quality products

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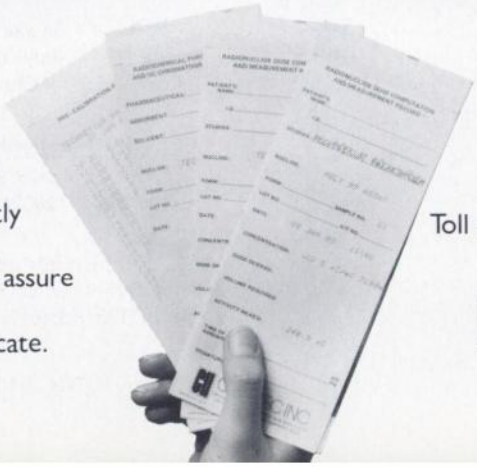

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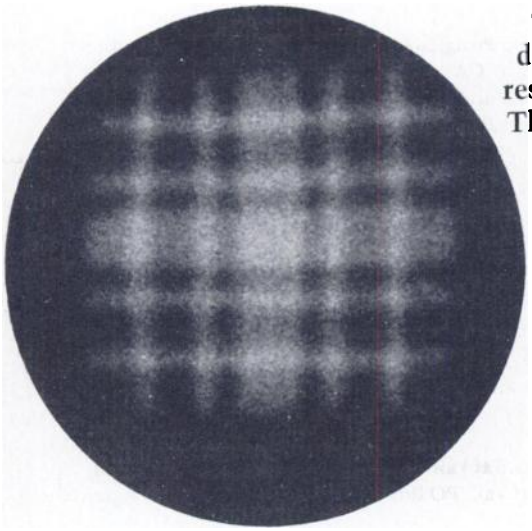

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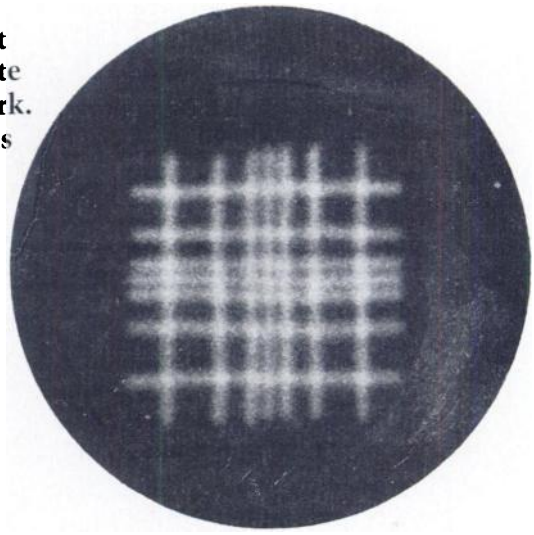

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NUC. MED. TECHNOLOGIST POSTIONS open immediately at the University of Texas Medical Branch in Galveston, Texas. UTMB is a 1200 bed teaching hospital system that performs the latest of procedures with modern equipment. We are a rapidly growing organization that offers opportunities for professional growth and advancement. Applicants should have formal training and be registry eligible. Salary commensurate with background, training and experience. Benefits include 15 days of paid vacation, paid sick leave, state pays most of Social Security Tax, no state income tax plus many others. Casual living in a semitropical climate. Send resume to William K. Otte, Jr., Assistant to the Chairman, Department of Radiology, P.O. Box 146, University of Texas Medical Branch, Galveston, Texas 77550. For more direct information call collect (713) 765-2009. UTMB is an affirmative action/equal opportunity employer.

NUCLEAR MEDICINE TECHNOLOGIST Immediate opening in our growing Nuclear Medicine Department for a registered Nuclear Medicine Technologist or registry eligible. Experience with computers and nuclear cardiology desirable. At our modern Midwest hospital we offer a competitive salary and comprehensive benefit package. For prompt consideration please contact Teresa Jenkins, Personnel, St. Mary's Medical Center, 3801 Spring St., Racine, WI 53405. (414) 636-4495.

NUCLEAR MEDICINE TECHNICIAN A large 575 bed teaching hospital, 10 miles south of Pittsburgh has an immediate opening for a Nuclear Medicine Technician (registered or eligible). Excellent salary and fringe benefit program. For interview contact: McKeesport Hospital, 1500 5th Avenue, McKeesport, PA 15132. Phone (412) 664-2415. An equal opportunity/affirmative action Employer.

NUCLEAR MEDICINE TECHNOLOGIST Immediate full-time opening for experienced technologist. Excellent opportunity with progressive mobile service company. Send resume to: Universal Nuclear, Inc., 6900 Knott Avenue, Suite F, Buena Park, CA 90621. Telephones: (714) 523-5431 or (213) 921-7931.

FELLOWSHIP PROGRAMS IN DIAGnostic Imaging. One (ABR) or two (ABNM) year approved programs offer pediatric and andult experience in all aspects of imaging including Ultrasound, CT, and .Cardiovascular Nuclear Medicine, and training in computers, radioassay and basic sciences. Facilities include state of the art instrumentation, centralized nuclear pharmacy and well equipped in vitro and animal laboratories for excellent research opportunities. Available July 1, 1981. Contact: K.M. Spicer, M.D., Ph.D., Director, Division of Diagnostic Imaging, Medical University of South Carolina, 171 Ashley Avenue, Charleston, S.C. 29403.

NUCLEAR PHYSICIAN-JULY 1981. Diagnostic Imaging ABNM, ABR program seeking recently trained nuclear medicine physician to assist one full-time and two part-time staff with educational and clinical responsibilities in Medical University setting. Excellent research opportunities and facilities available. Contact: K.M. Spicer, M.D., Ph.D., Director, Diagnostic Imaging, Medical University of South Carolina, 171 Ashley Avenue, Charleston, S.C. 29403.

FLORIDA-NUCLEAR MEDICINE TECHnologist. Immediate opening presently exists in our 714 bed non-profit, community hospital, located between Miami and Ft. Lauderdale. Individual must be registered or registry eligible. Hospital experience preferred. Excellent benefit program. Salary commensurate with experience and education. Send resume or call COLLECT (305) 987-2000 Ext. 5470 for Ann Cunniff, Employment Manager, Memorial Hospital, 3501 Johnson Street, Hollywood, FL. 33021. Equal Opprotunity Employer.

NUCLEAR RADIOLOGIST-NEEDED for expanding University afficiliated Radiologic group. Experience and/or board certification desired. Opportunity to share other imaging responsibilities. Excellent opportunity for a young aggressive person with primary interest in Nuclear Radiology. Northeast Ohio Region. Reply Box 1003, Society of Nuclear Medicine, 475 Park Ave. South, New York, NY 10016.

NUCLEAR MEDICINE TECHNOLOGIST. Full-time opening for a Registered Nuclear Medicine Technologist in a 715 bed critical-care hospital. Strong background in nuclear cardiology and computers preferred. For further information, contact Ann Dungan, Personnel Dept., St. Anthony Hospital Systems, 4231 W. 16th Ave., Denver CO 80204; Phone (303) 629-3700.

ASSISTANT PROFESSOR OF NUCLEAR Pharmacy/Health Physics at Purdue University. Responsibilities include research and teaching in both areas. Ph.D. in nuclear pharmacy or health physics required. Preference will be given to individuals with appropriate board certification in health physics or licensure in nuclear pharmacy. Application deadline November 1, 1980. Contact Paul L. Ziemer, Associate Head, Department of Bionucleonics, Purdue University, West Lafayette, IN 47909. An Equal OpportunityAffirmative Action Employer.

RADIOLOGICAL PHYSICIST: A PHYSIcist at the M.S. or B.S. level wishing to practice all aspects of applied radiological physics required for a professional consulting firm. Experience in radiation therapy treatment planning desired. Our activities include service in (1) Radiation Therapy Planning, (2) Nucler Medicine, (3) Diagnostic Radiology, and (4) Radiation Protection. Excellent salary and benefits. Submit resume to Box 1001, Society of Nuclear Medicine, 475 Park Avenue South, New York, NY 10016.

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 invivo and invitro 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 Services, VA Medical Center, 50 Irving St., N.W., Washington, D.C. 20422.

## POSITIONS WANTED

ABNM CERTIFIED INTERNIST WITH one year training in general diagnostic radiology seeks directorship of nuclear medicine section (private practice). Eight years experience as director of an active department of nuclear medicine and diagnostic ultrasound. Experienced in both clinical and research aspects of nuclear medicine imaging, including cardiovascular and computer applications, RIA, and B-mode ultrasound. All positions will be considered. For further information and C.V. reply Box 1000, Society of Nuclear Medicine, 475 Park Ave., So., New York, NY 10016.

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SEARLE LEM MOBILE CAMERA WITH new heavy-duty power unit and 1977 Ford 1 ton lift gate truck for transport. Camera has latest performance specs. Will sell separately. Make offer. K. Meier (415) 664-7400.




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Two full-time openings for Registered or Registry Eligible Nuclear Medicine Technologists. Both positions are in the Nuclear Medicine Department to do large varieties of studies. Baptist Medical Center is a 565 bed modern hospital located in the pleasant suburbs of Oklahoma City. Excellent salary and employee benefits await qualified applicants.

For information call (*collect*) Gene Stanford at (405) 949-3202 or send resume to:

**Baptist Medical Center**

**Employment Office**
**3300 NW Expressway**
**Oklahoma City, OK 73112**

## NUCLEAR PHYSICIAN
## CERTIFIED ABNM OR ABR

Faculty position available July 1981 in well equipped diagnostic imaging division with educational and clinical Nuclear Medicine responsibilities. Excellent research opportunities and facilities are available. Some Ultrasound and computer experience desired. Medical University complex is located in historic Charleston on the Atlantic Coast bordered by three rivers and barrier islands. Contact: **K.M. Spicer, M.D., Ph.D.,**

**Director, Division of Diagnostic Imaging**
**Medical University of South Carolina**
**171 Ashley Avenue**
**Charleston, SC 29403**

## FELLOWSHIP PROGRAMS IN DIAGNOSTIC IMAGING

One (AB Radiology) or two (AB Nuclear Medicine) year approved programs offer pediatric and adult experience in all aspects of imaging including Ultrasound, CT, and Cardiovascular Nuclear Medicine, and training in computers, Radioassay and basic sciences. Facilities include state of the art instrumentation, centralized Nuclear Pharmacy and well equipped In-Vitro and animal laboratories for excellent research opportunities.

**Available July 1, 1981**

**Contact: K.M. Spicer, M.D., Ph.D.,**
**Director, Division of Diagnostic Imaging,**
**Medical University of South Carolina**
**171 Ashley Avenue, Charleston, SC 29403**

## INSTRUCTOR

State University of New York at Upstate Medical Center is seeking candidates for a position as Instructor of Nuclear Medicine Technology. This is a full time position which carries a faculty appointment in the College of Health Related Professions.

Qualifications include graduation from AMA approved Nuclear Medicine Technology Program, certification by AART or NMTCB and some teaching experience. Baccalaureate Degree desirable, but not required. Some computer experience useful. Excellent starting salary plus an outstanding benefit program.

To apply please forward resume to:

**Charles E. Duxbury, R.T.**
**Assistant Administrator**
**Division of Nuclear Medicine**
**750 East Adams Street**
**Syracuse, New York 13210**

## CHIEF
## Nuclear Medicine Technologist

**JOHNSTON-WILLIS HOSPITAL**
**2908 Kensington Avenue**
**RICHMOND, VIRGINIA 23221**

Johnston-Willis Hospital located in historic Richmond, Virginia is seeking a Chief Nuclear Medicine Technologist to work in our new 292-bed acute care facility.

Reguired background includes experience in cardiac procedures, In-vivo procedures, quality control program, Shillings Testing, Blood Volume testing and supervision.

Equipment includes Siemens (Searle) and Ohio Nuclear LFOV Cameras and Siemens Scientiview and MDS Computer Systems.

Salary is commensurate with experience and excellent company benefits are offered.

If interested, please contact Bonnie Shoaf, Employment Coordinator, Johnston-Willis Hospital, 1401 Johnston-Willis Drive, Richmond, Virginia 23235.

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## RESIDENCY IN NUCLEAR MEDICINE

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.

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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.

## JNM CLASSIFIED PLACEMENT SERVICE SECTION

This section in the *Journal of Nuclear Medicine* contains "Positions Open", "Positions Wanted", and "For Sale" listing. Nondisplay "Positions Wanted" ads by members of the Society are billed at 60¢ per word for each insertion with no minimum rate. Nondisplay "Positions Wanted" ads by nonmembers and all nondisplay "Positions Open" and "For Sale" ads by members and nonmembers are charged at 85¢ per word. Display advertisements are accepted at $125 for ⅛ page, $185 for ¼ page, $295 for ½ page, and $510 for a full page. Closing date for each issue is the 1st of the month preceding publication. Agency commissions and cash discounts are allowed on display ads only. Box numbers are available for those who wish them.

All classified ads must be prepaid or accompanied by a purchase order. Send orders to:

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**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]

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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.

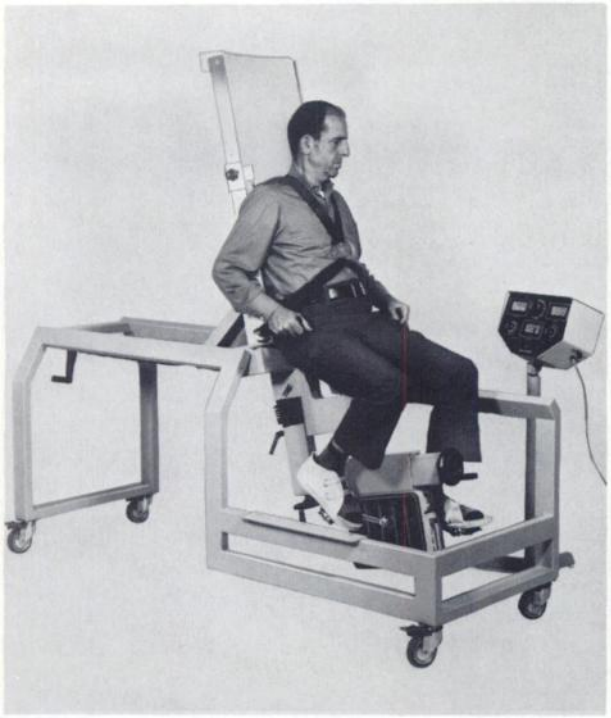
ADVERSE REACTIONS: There were nine adverse reactions reported in a series of 1,393 administrations. None of these were attributed to I 123. Five adverse reactions, consisting of gastric upset and vomiting, were attributed to a filler in the capsule. Two cases of headache and one case of nausea and weakness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

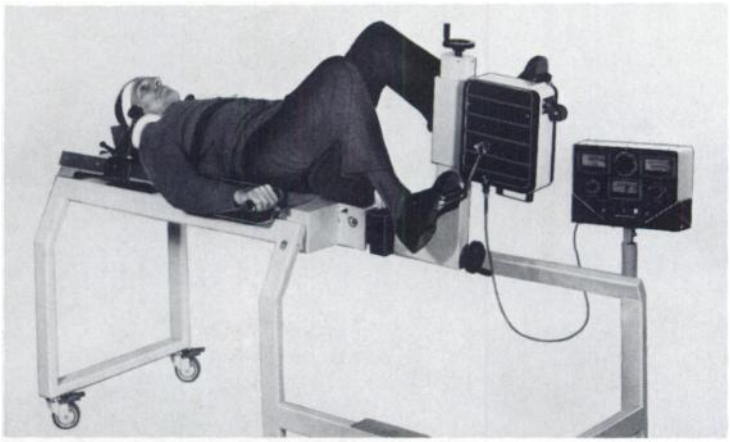
DOSAGE AND ADMINISTRATION: The recommended oral dose range for diagnostic studies of thyroid function in the average adult patient (70 kg) is from 100 to 400 microcuries. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration. Concentration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

# EXCEPTIONAL





*Left*: Erect stress test in progress. Note that pedal unit has been lowered to eliminate contact with patient's knees when camera head is positioned.

*Above*: Supine stress test in progress. Far side of table is unobstructed to easily accommodate a gamma camera. Adjustment wheels control vertical and horizontal travel of pedal unit for patients of all sizes.

# Cardiac Stress Table & Ergometer System

## Permits all patient positions, from supine through upright, *plus* standard imaging procedures

### VERSATILE • PRACTICAL • COST EFFECTIVE

Here is the most versatile stress imaging table available. It permits routine stress tests of patients in *any* position, from supine to upright. Whatever your nuclear cardiology requirements are, this exceptional system provides them quickly and easily...full gamma camera clearance, complete mobility, vibration-free rigidity, positive (but comfortable) patient restraint, easy-to-make positioning adjustments, unobstructed access to the patient and controls, choice of Collins or Quinton ergometers, and much more. The unit also doubles as a standard imaging table.

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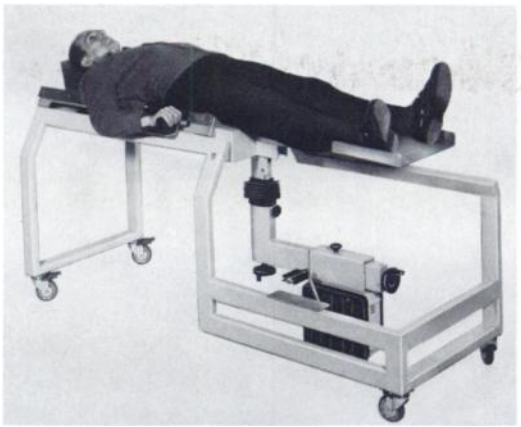

Patient positioned for standard imaging. Legs and feet are supported comfortably.

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Take it anywhere—and interface it with any gamma camera.

Newest of our Spectrum One nuclear medicine computers and cameras, the MCS-560 makes analysis of cardiology and nuclear medicine procedures easy.

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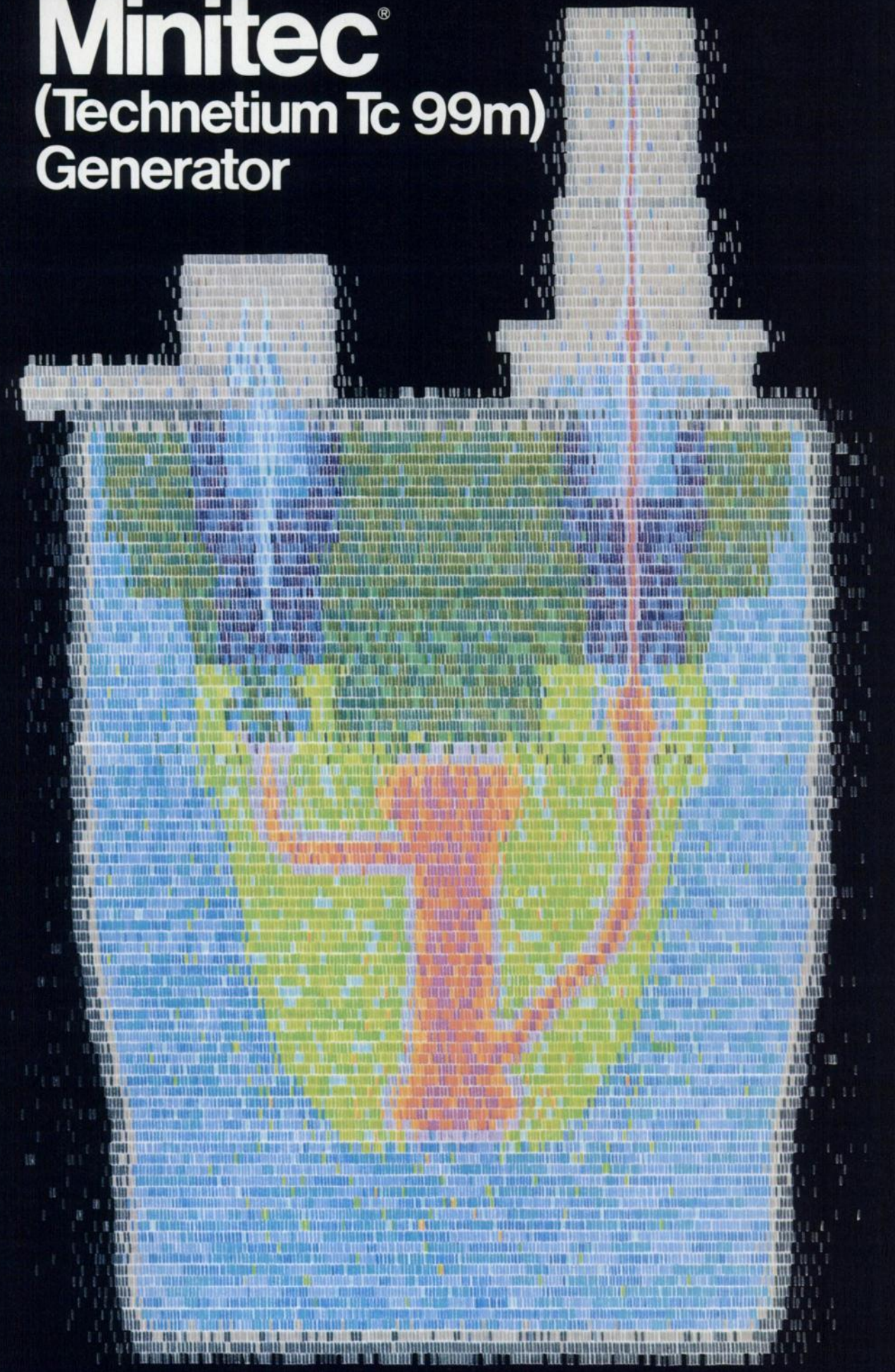

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—Unique construction (no exposed tubing) and thick shielding (1⅝" lead) provide high shielding-to-activity ratio.
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The 37 photomultiplier tubes and superior electronics in Toshiba's all new GCA-50A provide an exceptional intrinsic detector resolution of 1.8mm to yield a more functional diagnostic image.

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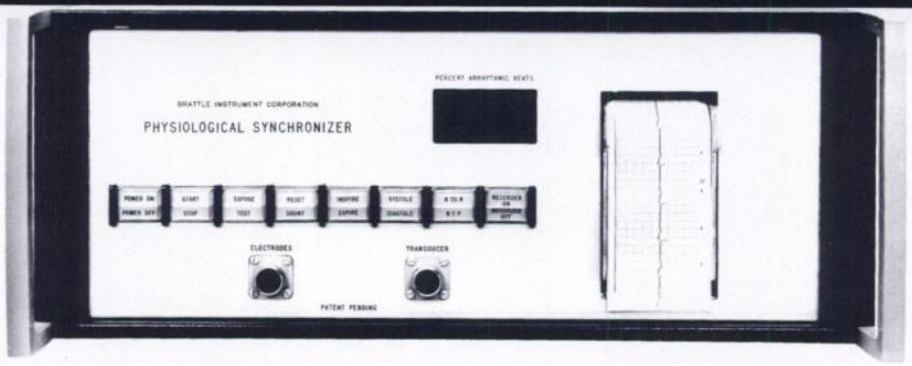


**No knobs, no meters, no errors**
The spartan panel above tells the second-best part of our story. If you want to photograph peak systole, press the SYSTOLE button. If, say, you want systole only at full expiration, press the EXPIRATION button as well. If only breathing is relevant, don't press the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

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