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 know 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.

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Toshiba's GCA-50A Low Energy Mobile Gammacamera with 1.8mm resolution.

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MEDICAL SYSTEMS

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.

In addition, the large 12.25" crystal diameter and high count rate of more than 200 kcps (40% window width) reduce scanning times and optimize the effective use of your unit.

Reliability is also exceptional. The GCA-50A design is based on the internationally proven performance of Toshiba's GCA-402. But now you have the flexibility of a totally mobile unit along with complete options like a cardiac synchronizer, 4- or 16-frame multi-image formatting, and computer capability.

So if you want to speed scanning time while improving your images and the overall effectiveness of the nuclear medicine group, contact your Toshiba representative now. Ask for full information on the GCA-50A Mobile Gammacamera.

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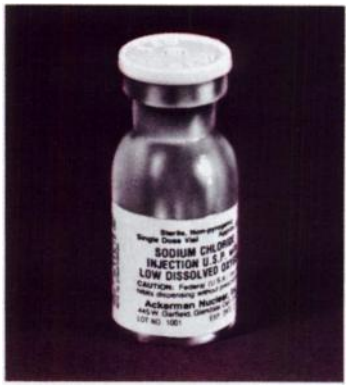
THE OBVIOUS SOLUTION

Low* Dissolved Oxygen Non-preservative normal saline U.S.P.

Designed with Nuclear Medicine in mind, Low Dissolved Oxygen, non-preservative, normal saline for routine use is now available from Ackerman Nuclear, Inc.



- ELUTION:
  Use for eluting Technetium-99m generators.
- DILUTION:
  Use for diluting high specific concentrations of Technetium-99m.

SODIUM CHLORIDE INJECTION U.S.P.
with LOW DISSOLVED OXYGEN
pH 4.5 to 7.0

DESCRIPTION:
SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN is a sterile isotonic solution of sodium chloride in water for injection. It contains no antimicrobial agent. It contains 0.9% sodium chloride and is packaged in single dose vials. The osmolarity is 300 mOsm/1, the dissolved oxygen content is less than 5 ppm.

INDICATIONS:
SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN is indicated for eluting, preparing and/or diluting pharmaceuticals that specify oxidants may cause adverse effects on the final product. SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN is also used as a fluid and electrolyte replenisher or as an irrigating solution.

WARNING:
Excessive amounts of sodium chloride by any route may cause hypopotassemia and acidosis. Excessive amounts by the parental route may precipitate congestive heart failure and acute pulmonary edema, especially in patients with cardiovasular disease, and in patients receiving corticosteroids or corticotropin drugs that may give rise to sodium retention. No antimicrobial agent has been added.

PRECAUTIONS:
Unused amounts should be discarded immediately following withdrawal of any portion of the contents.

HOW SUPPLIED:

Catalog No.	Product	Packaging
S-25	SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN	25/10 ml vials

Each 10 ml single dose vial contains approximately 6 ml. Each ml contains 9 mg sodium chloride providing 0.154 mEq each of sodium and chloride ions. Total osmolarity 300 mOsm/1; pH between 4.5 and 7.0. Dissolved oxygen content less than 5 ppm. Contains no preservatives.

ACKERMAN NUCLEAR, INC.
445 W. Garfield Avenue
Glendale, Calif. 91204

1/78

Decrease the amount of oxygen you add daily and reduce the effect of one more variable from your radiopharmacy. Use Low Dissolved Oxygen saline when preparing kits containing any stannous tin products.

*less than 5 ppm

For additional information call or write to:

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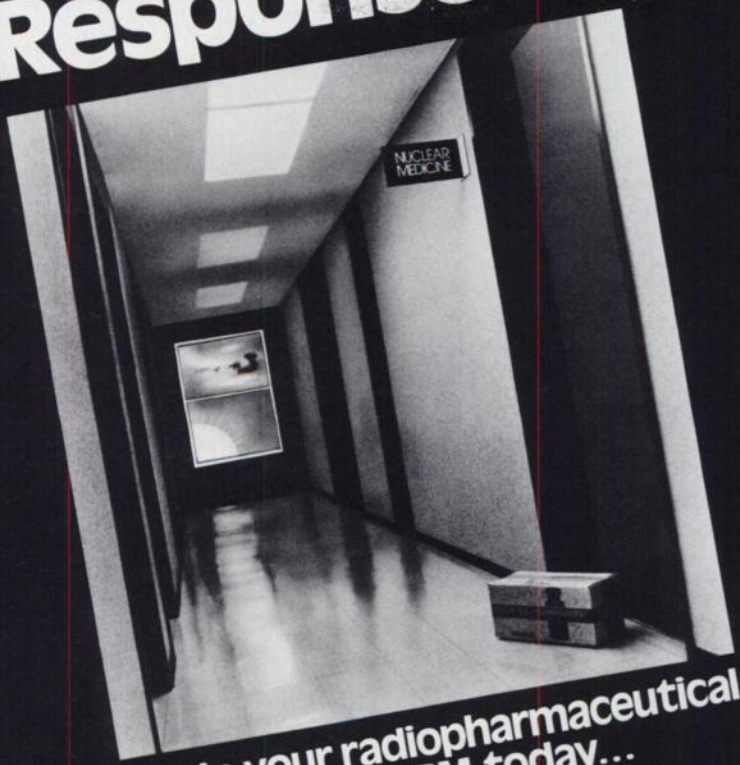
Pharmaceuticals for Nuclear Medicine
445 W. Garfield Ave.
Glendale, CA 91204, USA
(213) 240-8555

Quick Response



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

THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

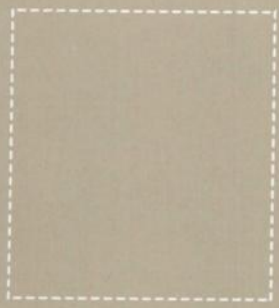
Yesterday

1970

Today

1980

Tomorrow



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.

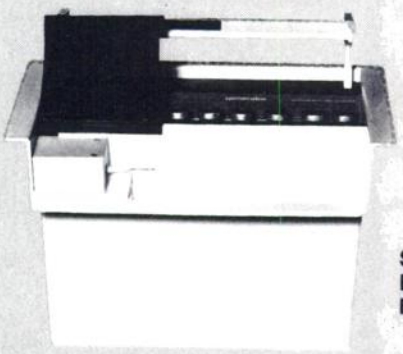
NEN has maintained a high level of customer acceptance of its isotopes and radiopharmaceuticals, thanks to physicians and technologists who understand that when they trust their business to NEN they are sharing our investment in future nuclear diagnostics... in the profession's future ability to diagnose 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®

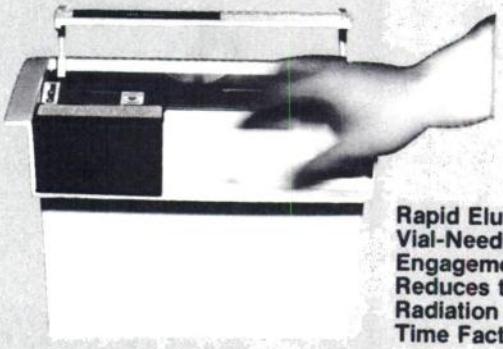
CintiChem®

Technetium 99m Generators

(Technetium Tc 99m Generators for the Production of Sodium Pertechnetate Tc 99m)



Shielded Elution Transfer Point



Rapid Elution Vial-Needle Engagement Reduces the Radiation Exposure Time Factor

"Automatic" Elution Vial-Needle Alignment Eliminates the Need for Direct Eye Exposure

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

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827-1A

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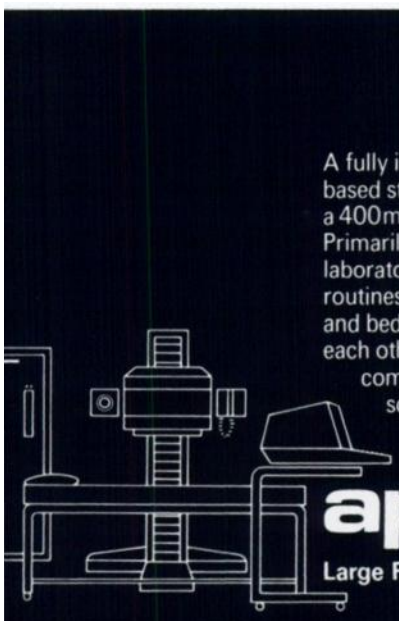
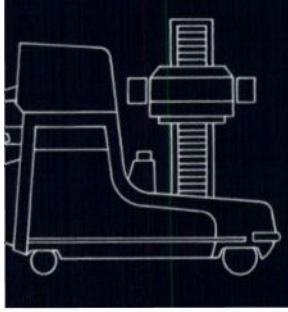


A fully integrated, microprocessor-based stationary system utilizing a 400mm front end of advanced design. Primarily used in the Nuclear Medicine laboratory for specialized diagnostic routines. The *Apex 415W,* with camera and bed tracked perpendicular to each other, provides fast and efficient computer-controlled whole body scanning.

apex 415

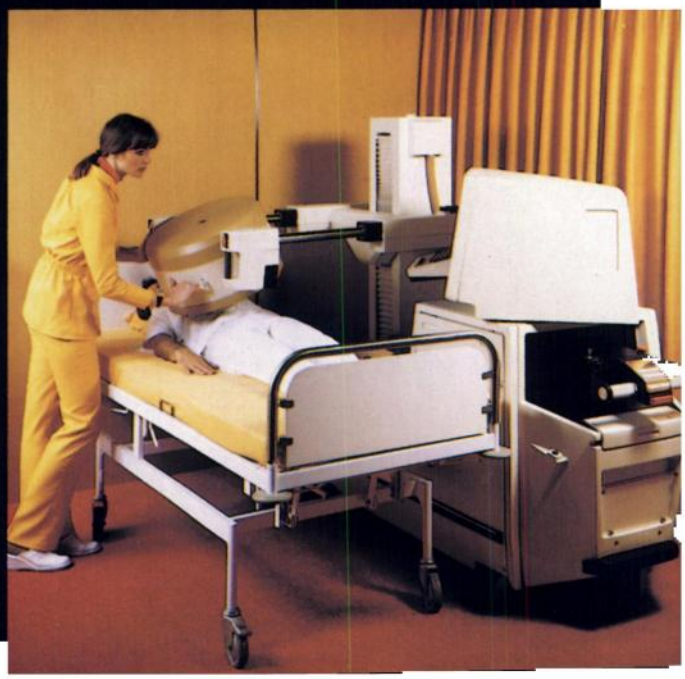
Large Field Digital Gamma Camera



An Apex 415 with all system components mounted on a self-contained motor-driven vehicle operating on internal rechargeable storage batteries. Its complete mobility enables the Apex 415M to serve several departments, and to be used in instances where the patient cannot be moved.

apex 415M

Large Field Mobile Gamma Camera



Nuclear Medicine has reached a peak with the Apex Line.
A revolution, not merely an evolution.
Apex is a family of computerized imagers where the digitally controlled detector communicates directly with an array of data acquisition and processing modules.
This is the new generation in Nuclear Medicine.

Apex Systems provide:

- Superb lesion detectability and image contrast.
- 2.5 mm bars resolution and ±2% maximum nonuniformity (Tc^{99m}, 20% window).
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- Count rates up to 500 KCPS.
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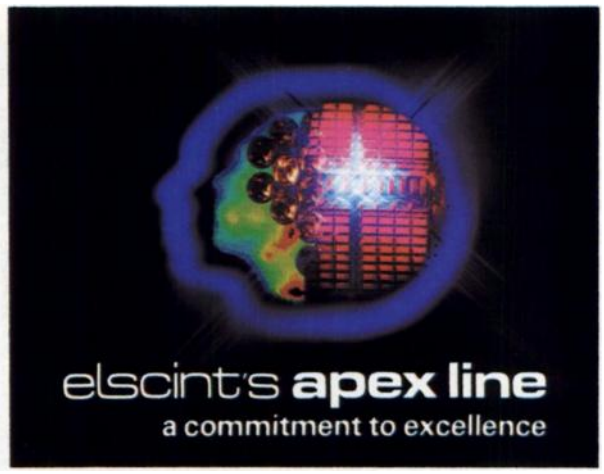
- Comprehensive set of clinical processing software.
- Huge 400 Kbyte memory expandable to 1.0 Mbyte, with full programming facilities.
- 15 Mbyte hard disk handles up to 50,000 patient registrations.

The Apex Line...another unprecedented idea whose time has come.



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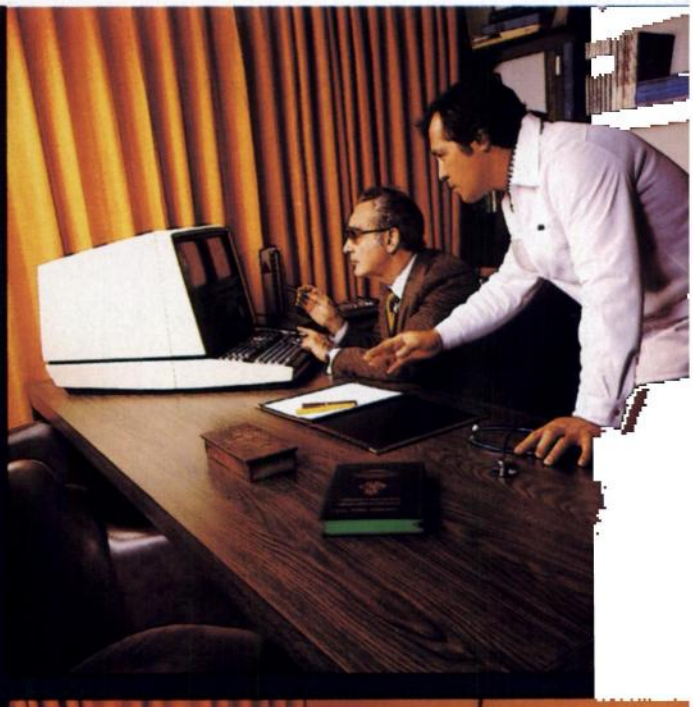
Hackensack, N.J. 07602, U.S.A.
Call Toll Free: 800-631-1694

A dedicated microprocessor-based Nuclear Medicine data system, embracing the most modern technological methods from concept to completion. Wholly modular construction facilitates growth or upgrading of the basic Apex 115, and permits the assembly of many specialized configurations.

apex 115

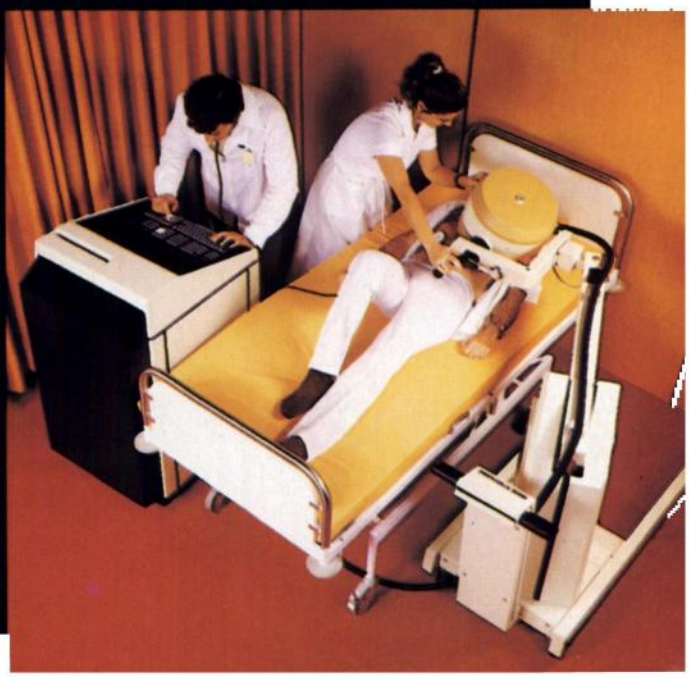
Digital Processor Family



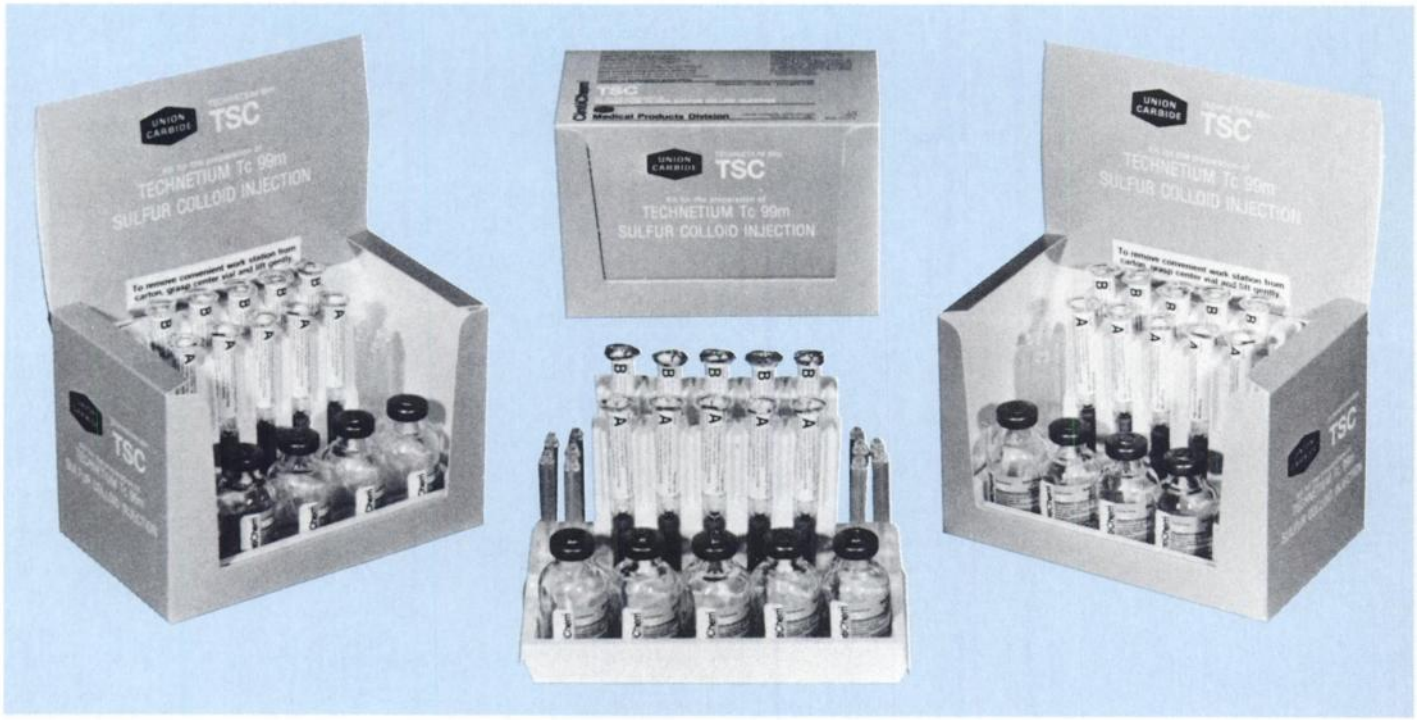
A self-contained digital camera system in mini-mobile form, especially developed for cardiac use. Its high degree of flexibility in use and its excellent maneuverability make it perfect for operation in the ICU, CCU, Cath Lab, Emergency Room, and Operating Suite.

apex 215M

Lightweight Mobile Gamma Camera



THE VERSATILE R.E.S. SYSTEM



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- **ONE 5-MINUTE BOIL.**
- **EASY TO USE SYRINGE SYSTEM.**
- **ONE YEAR SHELF LIFE.**
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- **EFFICIENT PACKAGE DESIGN REDUCES SHELF SPACE REQUIREMENTS.**

SOLUTION FOR IMAGING NEEDS

- Needs boiling only once for 5 minutes.
- Buffer is injected into the reaction vial immediately after removal from the boiling water bath. No waiting is required.
- Dose vial can be cooled at room temperature, or, for rapid preparation, can be rapidly cooled in a cold environment for sooner use.
- **CINTICHEM® TECHNETIUM 99m TSC** can provide a versatile solution for your imaging needs when **specifically requested** on your prescription if prepared doses are obtained from a radiopharmacy.
- Compared to competitive "convenience packaging", a **CintiChem®** Standing Order allows you to optimize your kit purchases and delivery schedule to meet your individual dosage needs; reduces your shelf space requirements; and continuously assures you of product with the longest expiration date available.

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IN N.Y.S. CALL 800-942-1986

indications and usage

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

contraindications

None known.

warnings

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

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

This radiopharmaceutical preparation should not be administered to children or to patients who are pregnant or during lactation 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

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

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

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

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

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

The preparation contains no bacteriostatic preservative.

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 Sulfur Colloid Injection 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.

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

adverse reactions

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

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

how supplied

The TECHNETIUM 99m SULFUR COLLOID KIT is supplied as a sterile pyrogen-free kit consisting of: five reaction vials, each containing 0.5 ml 1.0 N hydrochloric acid in water; five sterile syringes (labeled "A"), each containing 1.9 mg sodium thiosulfate anhydrous in 1.1 ml aqueous solution; five sterile syringes (labeled "B"), each containing 5.3 mg gelatin in 2.1 ml aqueous buffer solution containing 177 mg sodium acetate anhydrous

storage

Store finished drug at room temperature.

FOR FULL PREPARATION AND PRESCRIBING INFORMATION, SEE PACKAGE INSERT.

CintiChem®

TECHNETIUM 99m

TSC Kit For The Preparation Of Technetium Tc 99m Sulfur Colloid Injection

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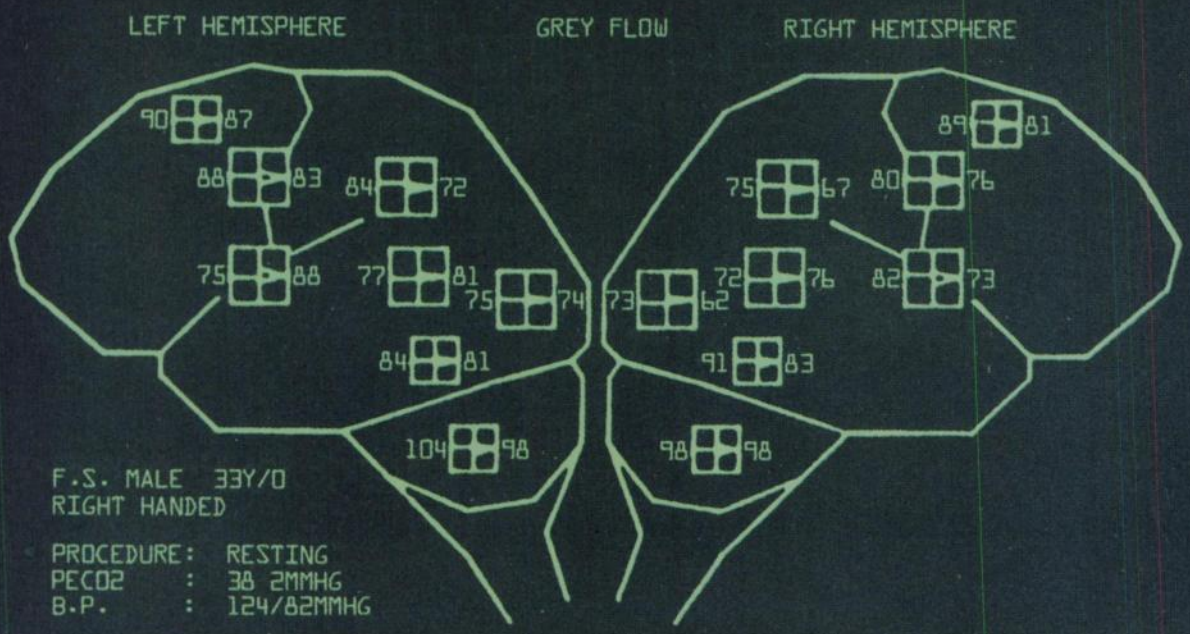
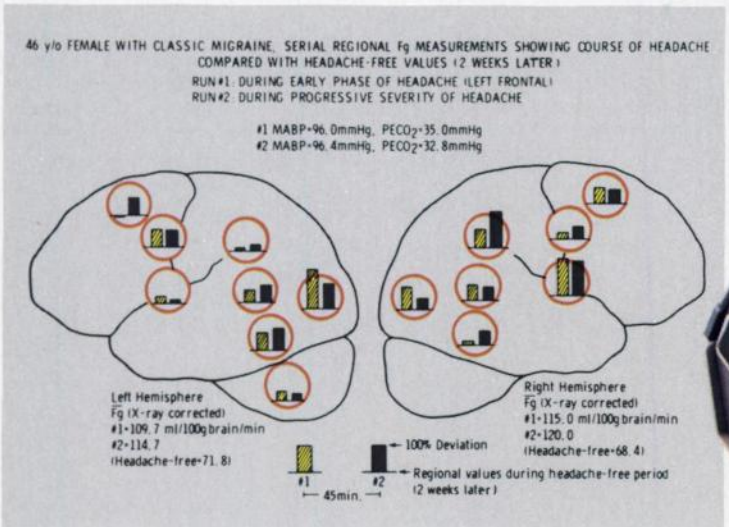
OUR NEW COMPARATIVE DISPLAY SYSTEM MAKES THE MOST EXPERIENCED, NON-TRAUMATIC rCBF ANALYZER EVEN BETTER.





This diagram represents a typical diagnosis of migraine headache as derived from a TASC-5 System analysis.

Reprinted from "Regional Cerebral Hemodynamics During Migraine and Cluster Headaches Measured by the ^{133}Xe Inhalation Method," published by Fumihiko Sakai, M.D. and John Sterling Meyer, M.D., published in HEADACHE, Volume 18, July 1978, Number 3, Lee Kudrow, M.D., Editor.

THE HARSHAW TASC-5 IS A COMPLETELY INTEGRATED, FULLY COMPUTERIZED SYSTEM FOR NON-INVASIVE rCBF ANALYSIS.

It has been proven under the most stringent demands of clinical applications. Using the inhalation method of ^{133}Xenon administration, Harshaw's TASC-5 System entirely eliminates patient danger and stress normally associated with invasive methods. In addition, three major improvements increase the TASC-5 System's accuracy, flexibility and ease of operation: a new software routine; a direct, onscreen comparative graphic presentation and instant hard copy capability with Harshaw's new hard copy attachment.

HARSHAW'S NEW INHALATION ANALYSIS ROUTINE – AN IMPROVEMENT IN EFFICIENCY AND ACCURACY.

Harshaw's new Scattered Radiation Artifact Routine, an updated version of our classic computer program based on the research of Dr. Walter Obrist, et al*, yields significantly increased information about flow grey.

* Walter D. Obrist, et al STROKE
Vol. 6, May June 1975, PP 245-256

HARSHAW'S HARD COPY ATTACHMENT – A PERMANENT RECORD, INSTANTLY AVAILABLE.

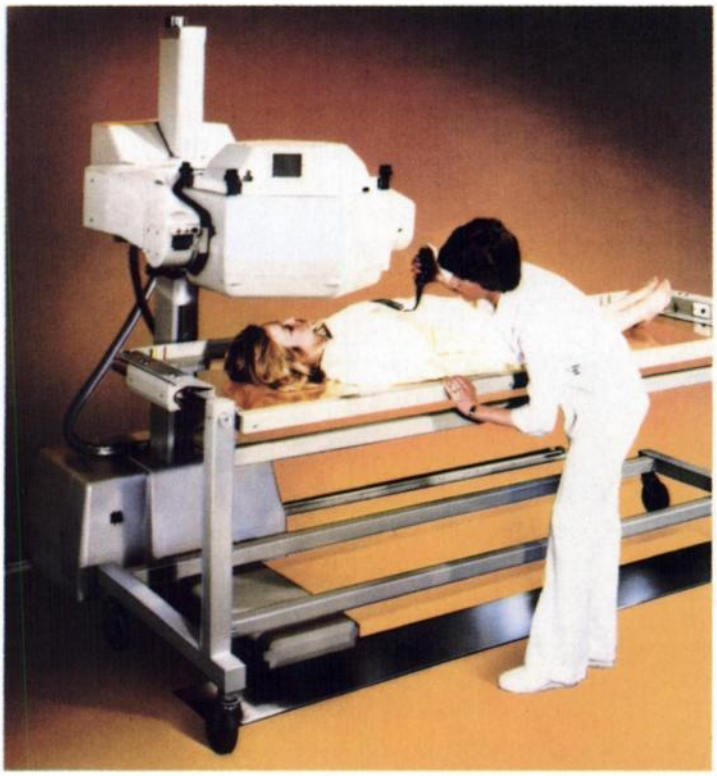
Fast, accurate analysis is made even easier by Harshaw's hard copy attachment. It provides an instant, silent, permanent record of the tabular or comparative graphic presentation on the terminal CRT, and eliminates the need for a teletypewriter or other impact printer. The result is a significant savings in analysis time, and the elimination of "translation" errors that can reduce accuracy.

TASC-5 – AN INCREASINGLY ACCEPTED CLINICAL TOOL.

Harshaw's TASC-5 System is the most advanced and experienced Regional Cerebral Blood Flow Analyzer available. And it is the commercial, non-invasive system used by more U.S. institutions presently performing rCBF studies than all other commercial systems combined. We'll be happy to demonstrate its capabilities for you.

Call or write us. We're The Harshaw Chemical Company, Crystal & Electronic Products, 6801 Cochran Road, Solon, Ohio 44139. (216) 248-7400.

HARSHAW



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Whole body imaging capability can be purchased as a complete system in any LFOV configuration, or added to your present Pho/Gamma® LFOV™ Camera.

The Pho/Gamma Whole Body Accessory combines the proven diagnostic capabilities of the Pho/Gamma LFOV Camera with a newly designed whole body accessory utilizing a moving detector concept to provide large-area, high-resolution images. Both whole body and single organ imaging, requiring an X Y table, can be performed with equal utility and ease. For procedures not requiring the table, the table itself may be easily rolled aside. The Whole Body Accessory features selectable speeds for optimized whole body imaging, operational simplicity, and rapid data acquisition for high patient throughput.

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- —ZLC™/37
- —LFOV™ Standard
- —LFOV™ Basic

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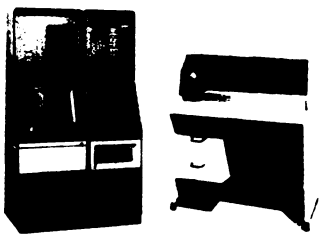

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Nuclear Medical Division
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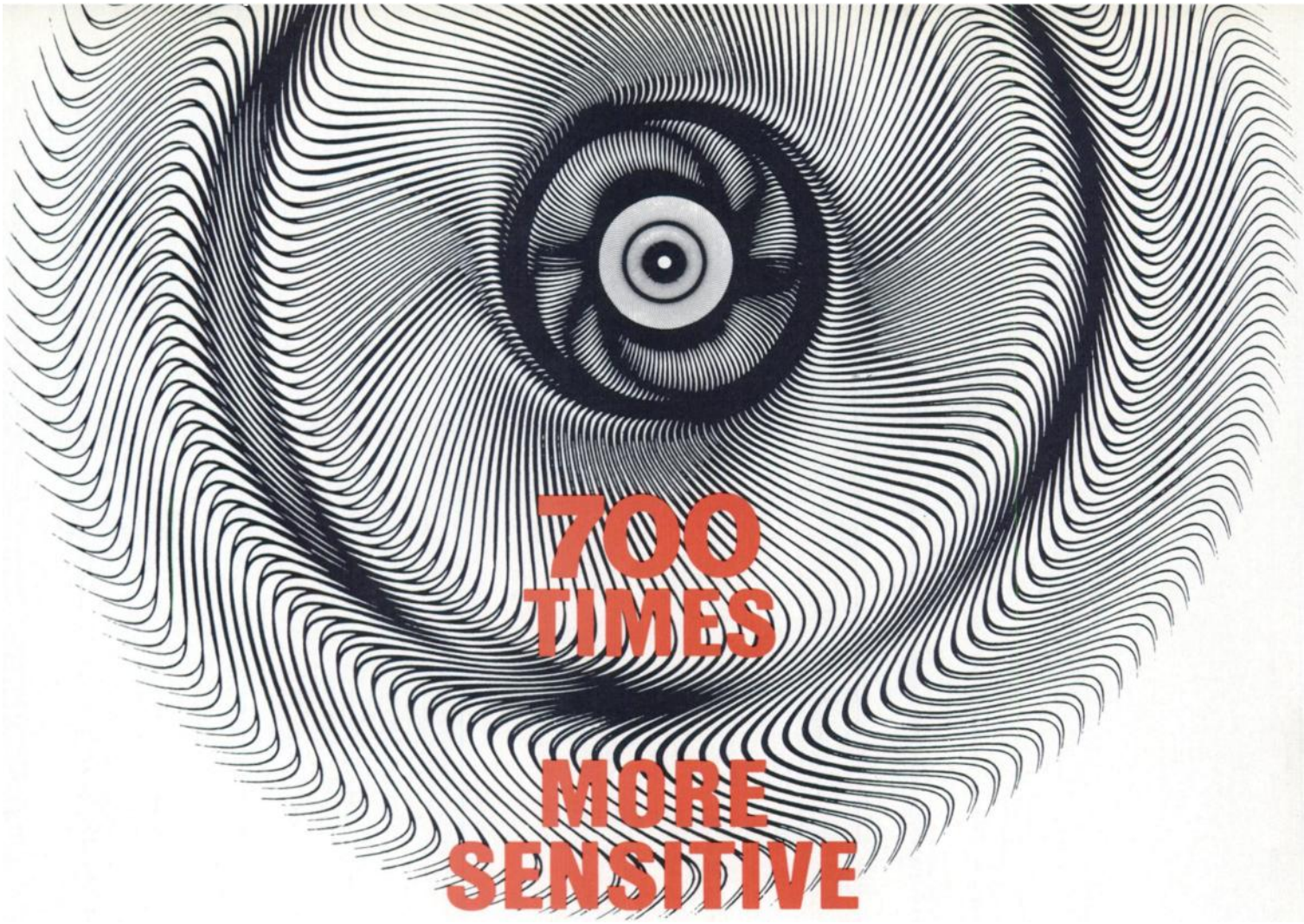

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Our ^{125}I Methotrexate Radioimmunoassay Kit provides a rapid, simple method with an unexcelled level of sensitivity and specificity.
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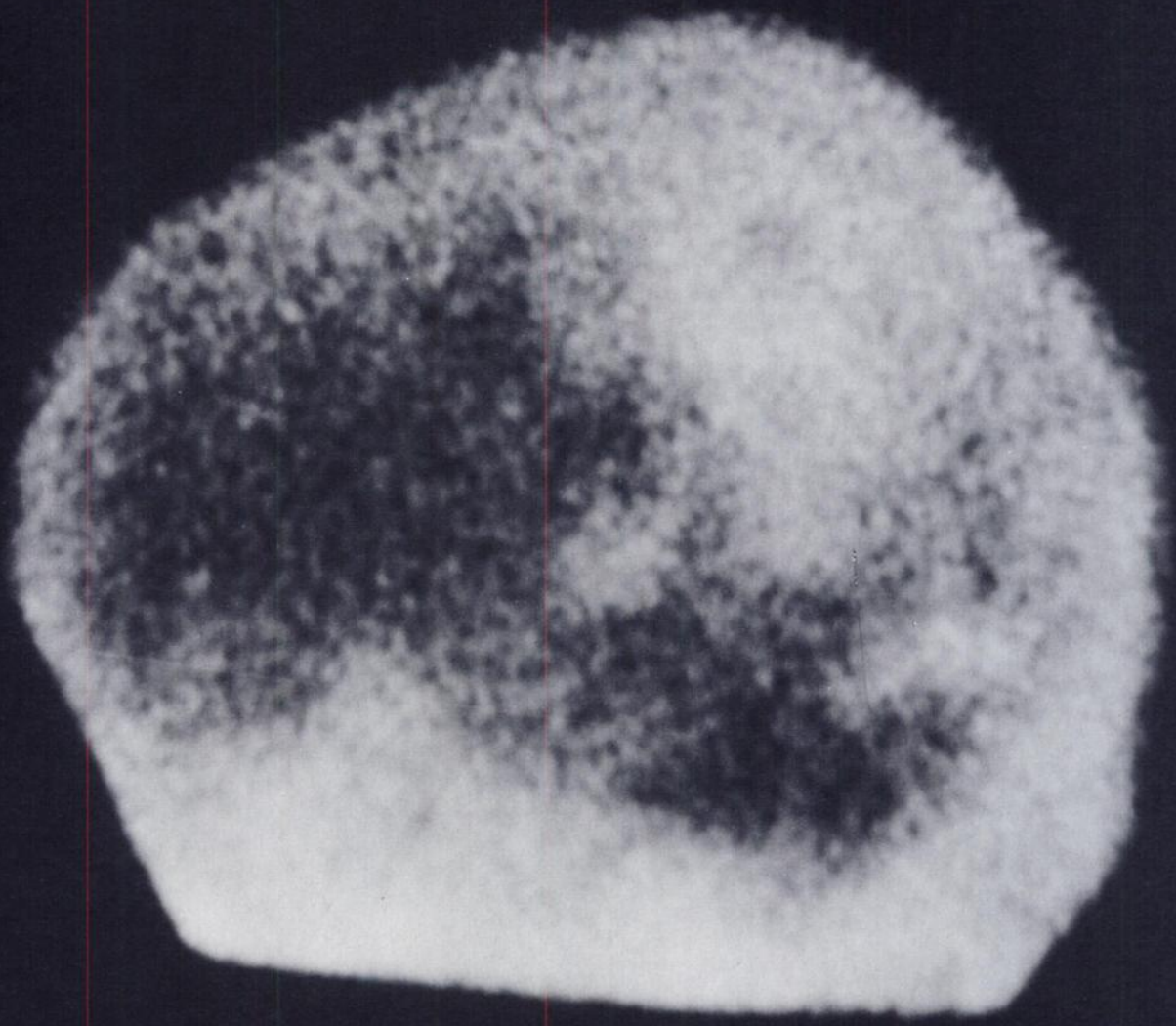
	DBI RADIOIMMUNOASSAY	IMMUNOENZYME ASSAY
STAT INCUBATION:	15 minutes at 37°C	1 minute
SENSITIVITY:	0.0004 μM (700 times more sensitive)	0.3 μM
EXOGENOUS INTERFERENCE:	None	Lypemic Icterus Hemolysis
STANDARDS SUPPLIED:	7	6
PRICE:	*57½ cents per tube	$1.86 per tube

*In units of 200

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

Brain



Diagnosis: arteriovenous malformation

Imaging information: *Instrument:* Ohio Nuclear Series 100 Gamma Camera *Dose:* 15 mCi GLUCOSCAN
Scan time: 90 minutes postinjection *Counts:* 400 K

GLUCOSCAN™

Technetium Tc 99m Gluceptate Sodium Kit

NEN New England Nuclear®

Please see following page for brief prescribing information.

GLUCOSCAN™

Technetium Tc 99m Gluceptate Sodium Kit

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

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

CONTRAINDICATIONS: None known.

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

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

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

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

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

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

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

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

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

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

Safety and effectiveness in children have not been established.

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

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

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

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

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

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

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

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

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

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

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

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

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

New England Nuclear®

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(In Mass. and International: 617-482-9595)

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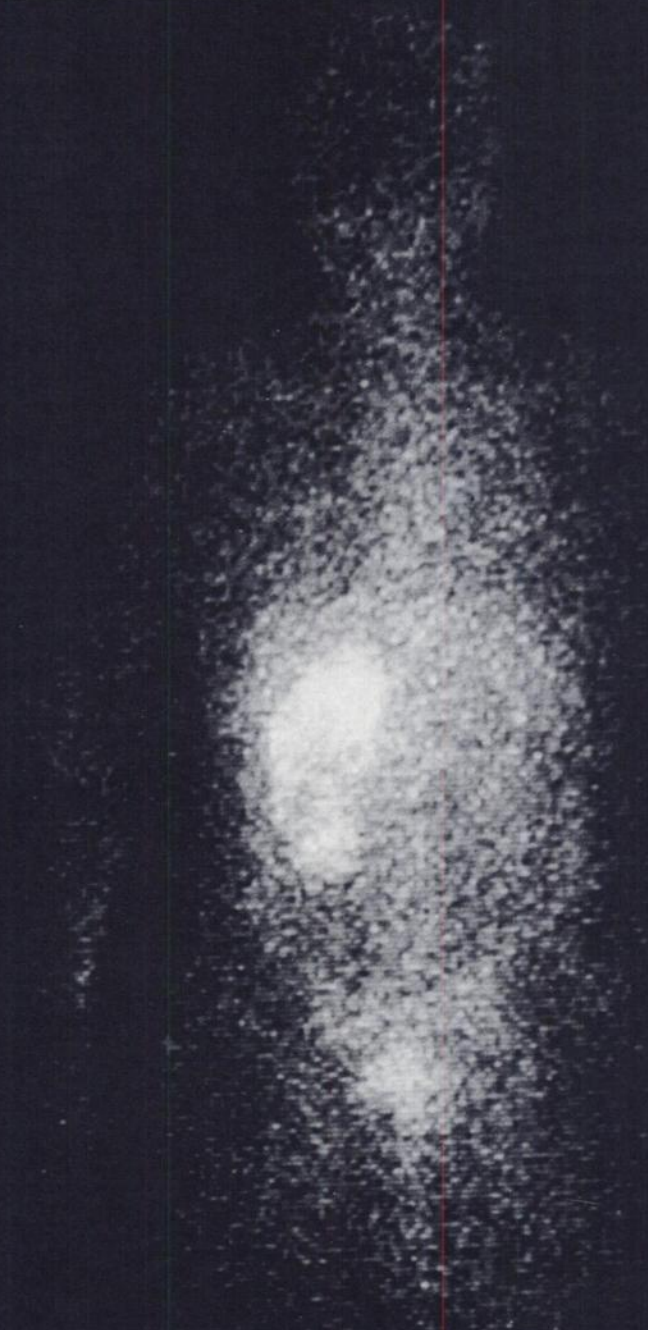
Europe: NEN Chemicals GmbH, D-6072 Dreieich, W. Germany, Postfach 401240 Tel: (06103) 85034 Order Entry: (06103) 81011

Abscess



Diagnosis: intranephric abscess

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 Ga 67

NEN New England Nuclear®

Please see preceding page for brief prescribing information.

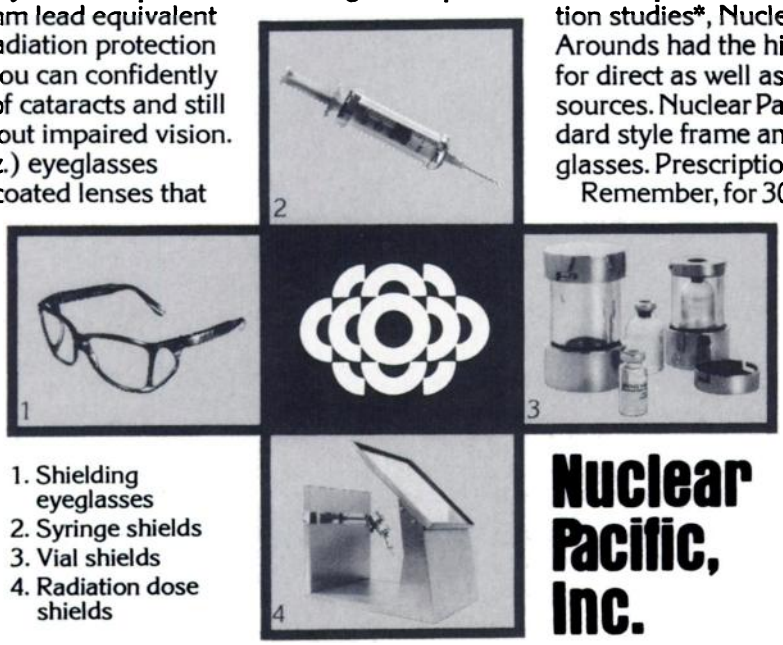
Keep your eyes safe from radiation...
comfortably and confidently.

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

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

Remember, for 30 years Nuclear Pacific has set the standard for visibility and protection in the radiation shielding industry.

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



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

Nuclear Pacific, Inc.

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

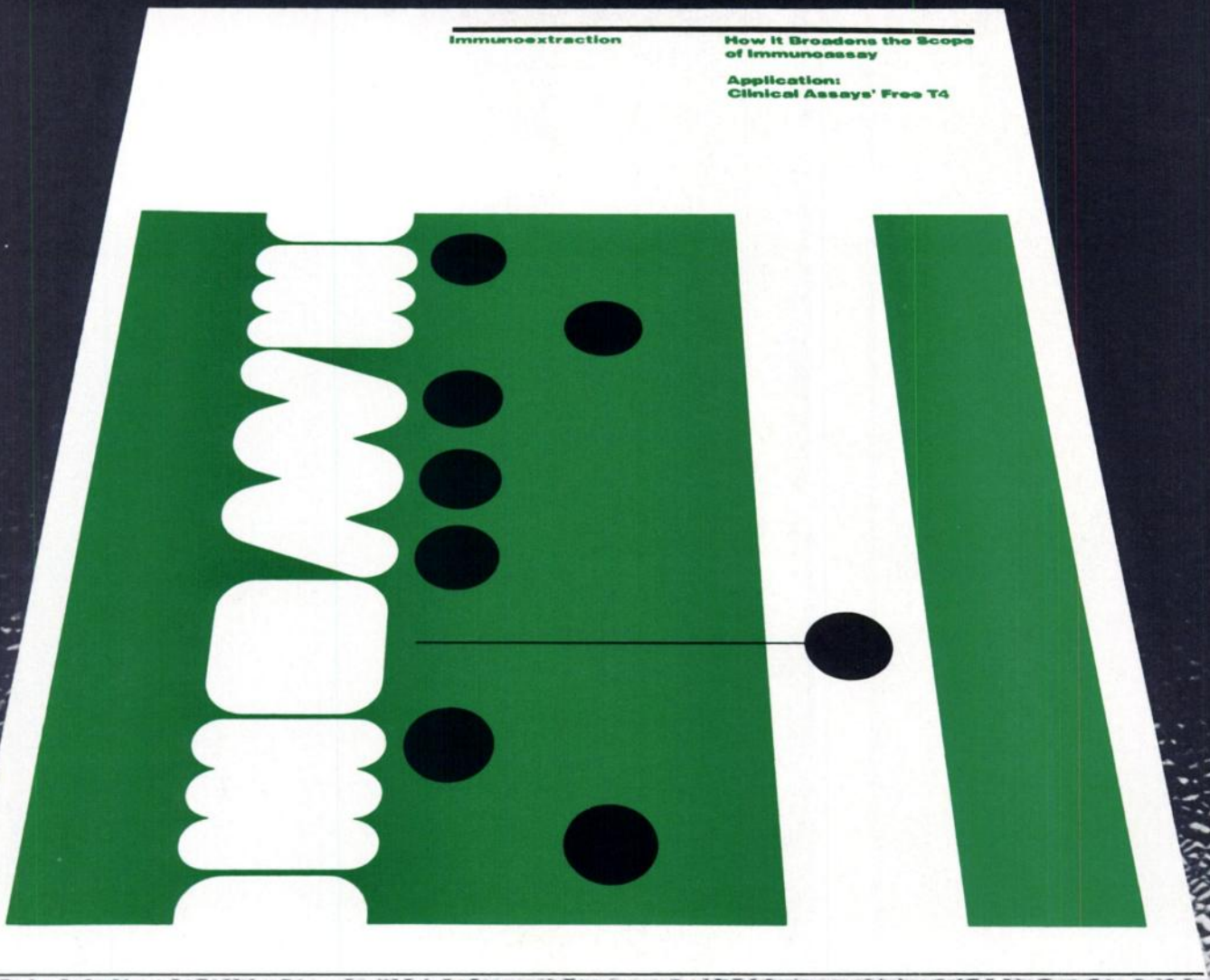
*Study available upon request.

Generator

Technetium Tc 99m Generator

NEN New England Nuclear®

OUR FREE T4 RIA



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Immunoextraction. It's what makes the free T4 option of our GammaCoat™ Total/Free T4 RIA Kit work.

Immunoextraction is the process we developed* to collect only free T4 for measurement. It does so by simulating in the test tube how the cells of the body remove free T4.

The result is a convenient one-tube assay that saves you from needless data manipulations or calculations. It reduces work and speeds throughput because there is only one set of tubes to count.

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Please send me your immunoextraction brochure, which explains how your free T4 assay works.

Name_____

Affiliation_____

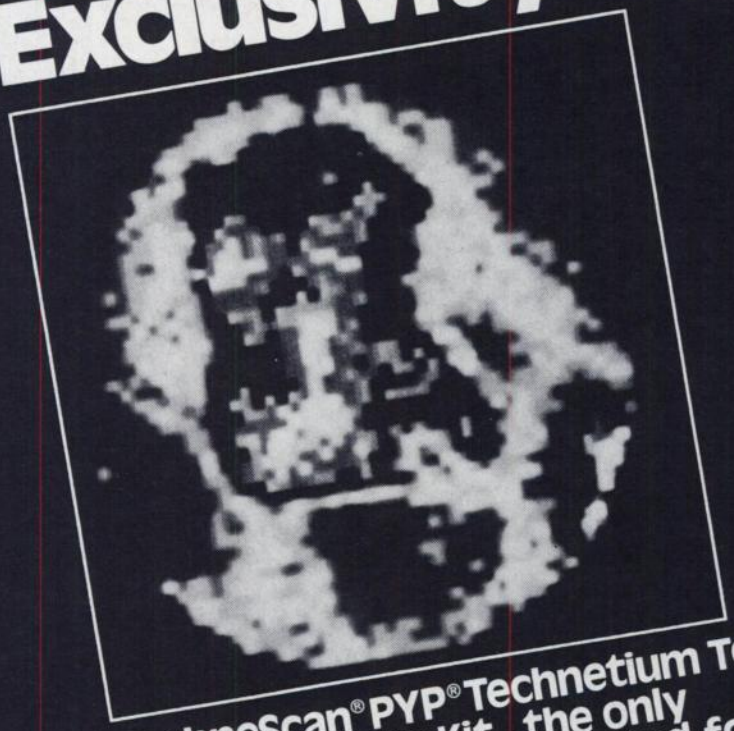
Address_____

City_____ State____ Zip_____

Phone_____

*patent pending

Diagnostic Exclusivity



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

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

Other indications in nuclear cardiology include use as an adjunct in the diagnosis of acute myocardial infarction.

For more information about TechneScan PYP—and all the other organ-imaging kits available from Mallinckrodt—just call your Mallinckrodt representative or this toll-free number:

800-325-3688 (In Missouri, 314-895-0880 collect)
For technical assistance, it's 800-325-8181

See brief summary on following page.

THE MALLINCKRODT COMMITMENT

Mallinckrodt® Diagnostics

to Nuclear Medicine

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

TechneScan® PYP®

Technetium Tc-99m Pyrophosphate Kit

BRIEF SUMMARY

CLINICAL PHARMACOLOGY

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

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

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

INDICATIONS AND USAGE

TechneScan PYP Tc 99m is a skeletal imaging agent used to demonstrate areas of altered osteogenesis, and a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction.

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

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

CONTRAINDICATIONS

None.

WARNINGS

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

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

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

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

The **TechneScan PYP Kit** must be maintained at refrigerator temperature until use.

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

Sodium pertechnetate Tc-99m solutions containing an oxidizing agent are not suitable for use with the **TechneScan PYP Kit**.

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

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

PRECAUTIONS

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

Bone Imaging

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

Cardiac Imaging

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

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

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

Blood Pool Imaging

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

ADVERSE REACTIONS

None.

HOW SUPPLIED

Catalog Number—*094* **TechneScan PYP Technetium Tc-99m Pyrophosphate Kit.**

Kit Contains:

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

Reaction Vial Contains:

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

5—Radioassay Information String Tags.

Mallinckrodt® Diagnostics

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

ISOTRON

INVENTORY CONTROL COMPUTER

This small desk top microprocessor computer provides complete inventory control and NRC record keeping functions for the nuclear medicine department.

It is user programmable – you program it to fit your requirements even down to the half-life of the radionuclide so the Isotron never becomes obsolete in the rapidly changing field of nuclear medicine.

The Isotron can keep track of up to 20 different radiopharmaceuticals simultaneously by both radionuclide and chemical form! Updates the quantity of radioactivity every minute to reflect radioactivity decay.

The Isotron performs patient dose/volume calculations.

The Isotron subtracts the administered dose from the decayed activity and provides a running total of remaining activity.

The Isotron performs future time calculations. If it is 8:00 A.M. and you want to draw up a dose for 1:00 P.M. the calculation is simply and rapidly performed.

An optional hard copy data printer is available with the Isotron, known as the Isocord, which provides three copies of all pertinent data for your record keeping.

The Isotron may be used with any manufacturers dosecalibrator.

The Cost? Very reasonable. When combined with the Isocord and our Assayer 1 Dosecalibrator the total price is less than competitive systems with 50% of the capabilities.

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Xenon Xe 133

(10 mCi vials)

MPI DTPA Kit

Technetium Tc 99m Pentetate Kit

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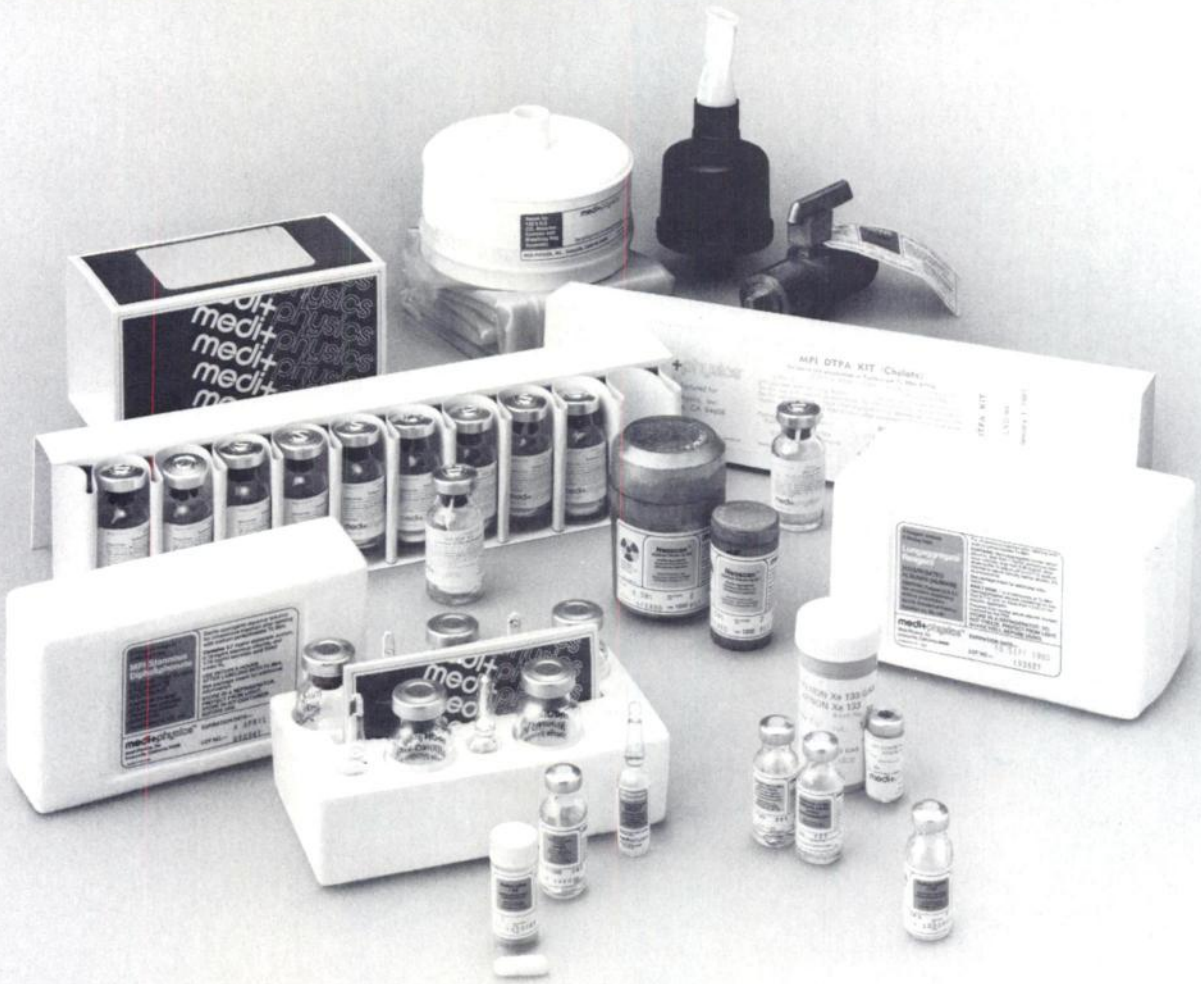

Sodium Iodide I 123
Capsules and Solution

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Lungaggregate™ Reagent
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Sodium Pertechnetate Tc 99m Solution

Neoscan®
Gallium Citrate Ga 67

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Xenon Xe 133
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Technetium Tc 99m Etidronate Kit

MPI MDP Kit
Technetium Tc 99m Medronate Kit

MPI Xenon Xe 133 Gas
Xenon Xe 133

Tc 99m Lungaggregate™
Technetium Tc 99m Albumin Aggregated

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MODEL	FEATURES
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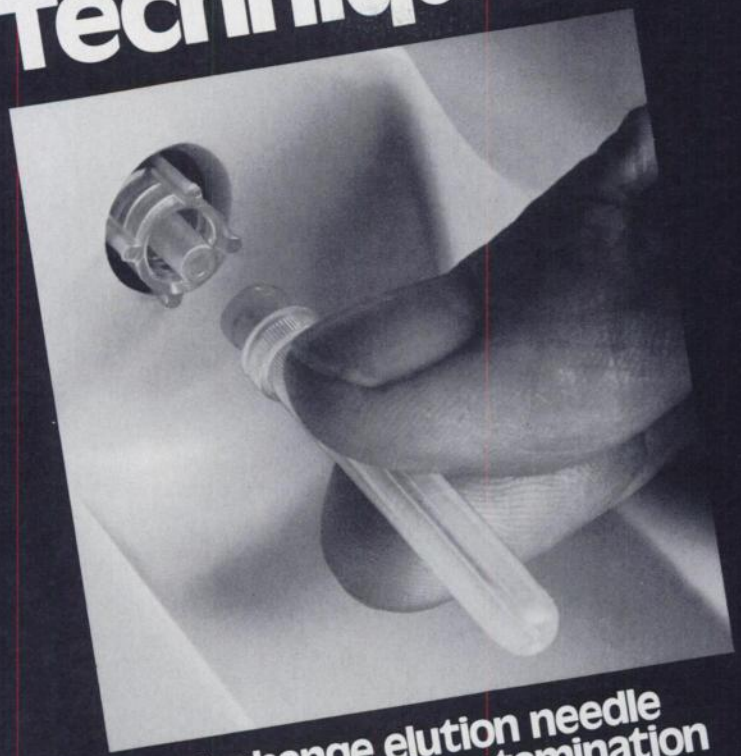
Sterile Technique



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, 314-895-0880 collect)
For technical assistance, it's 800-325-8181

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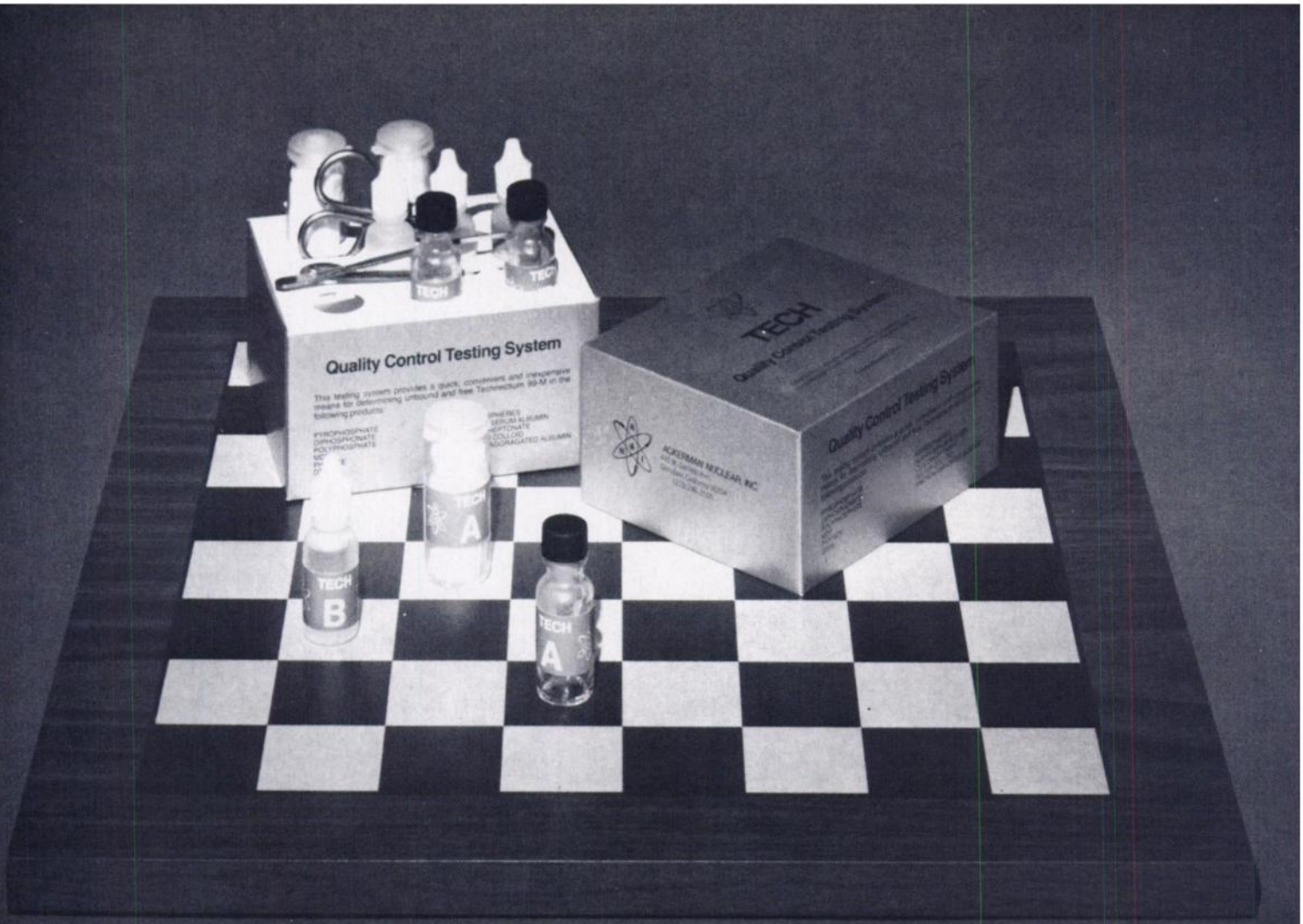

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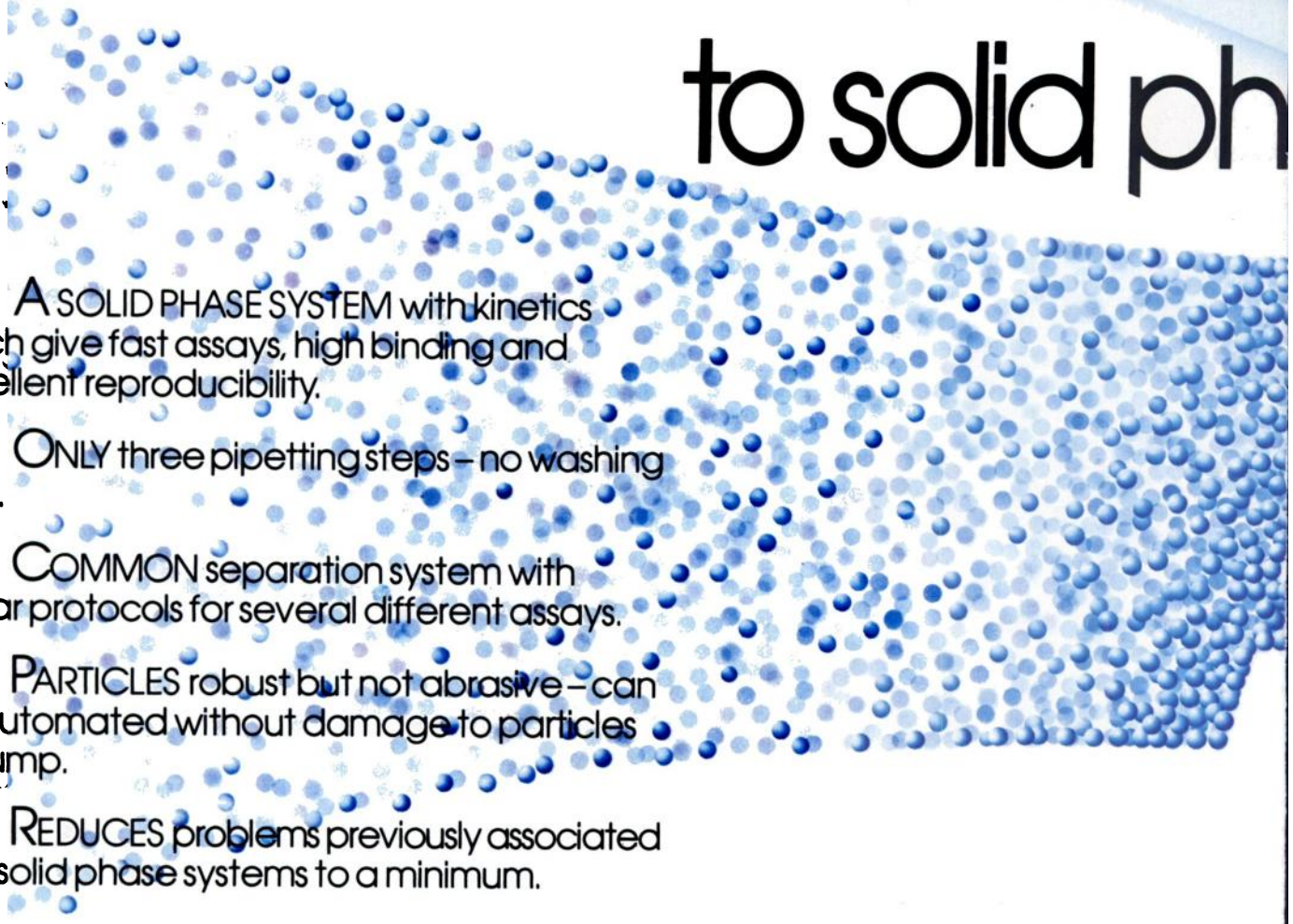

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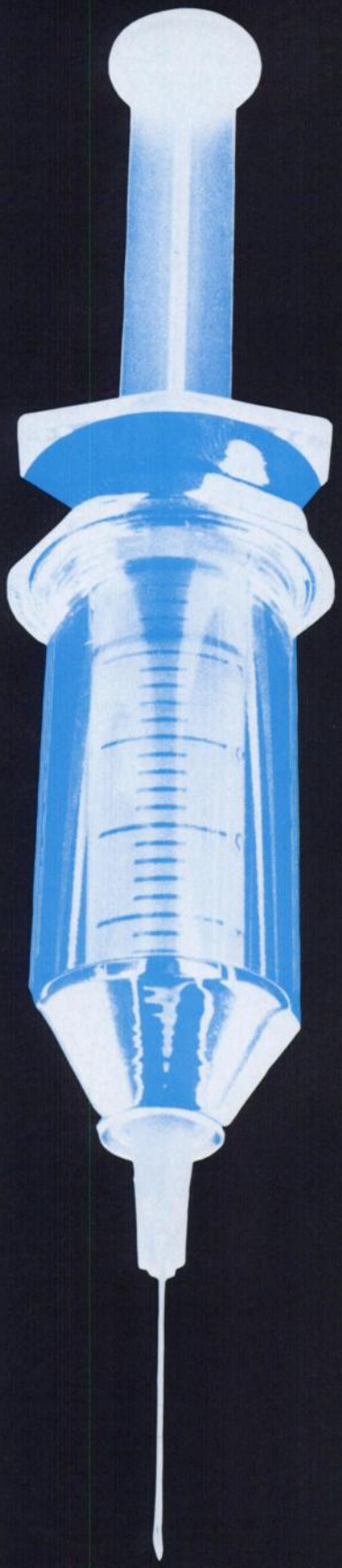

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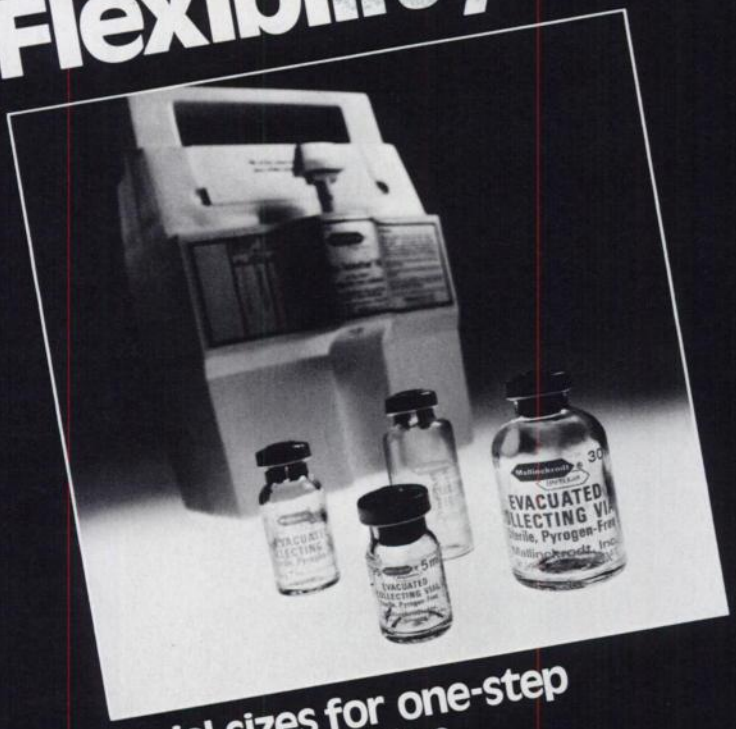

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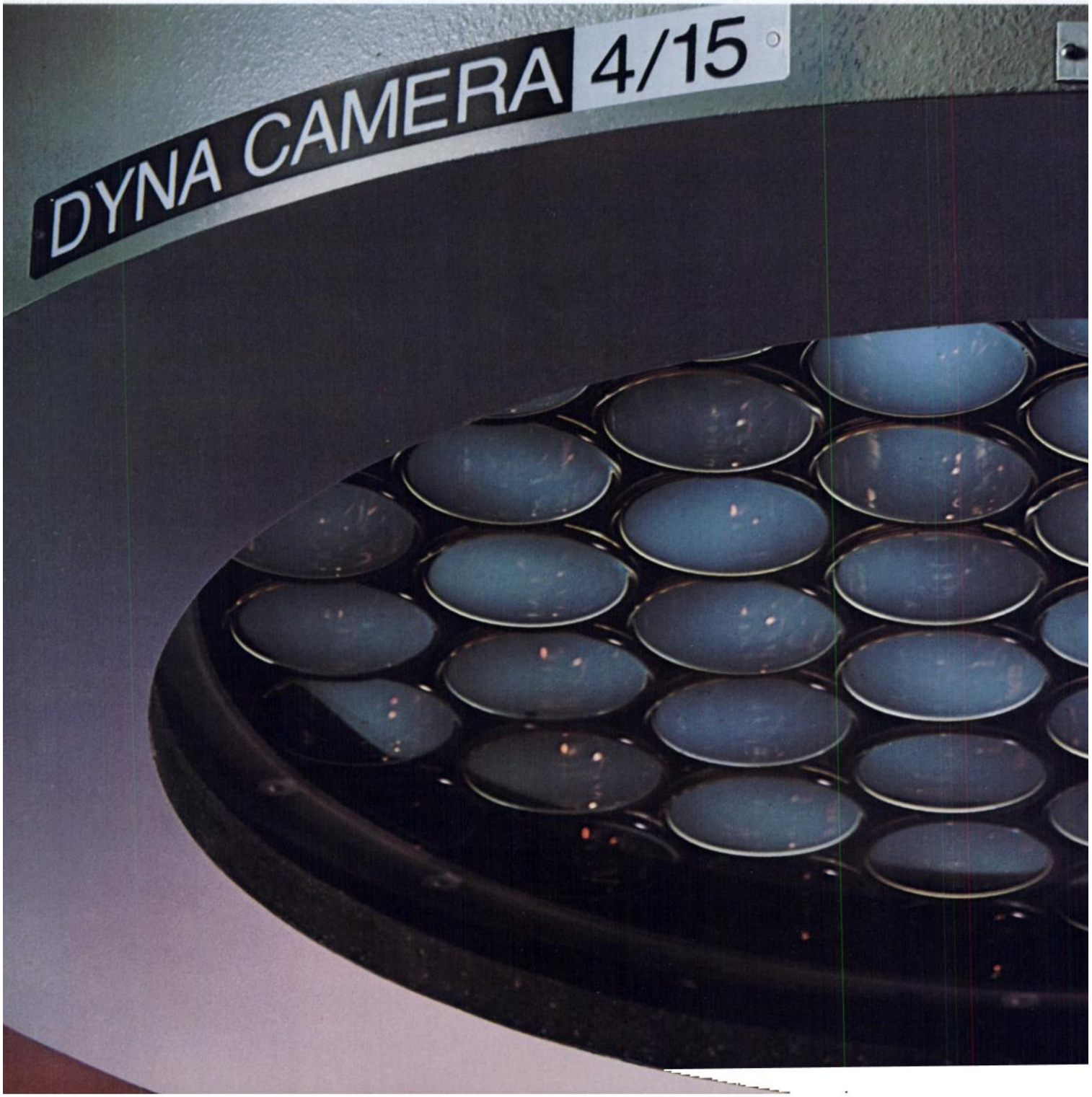

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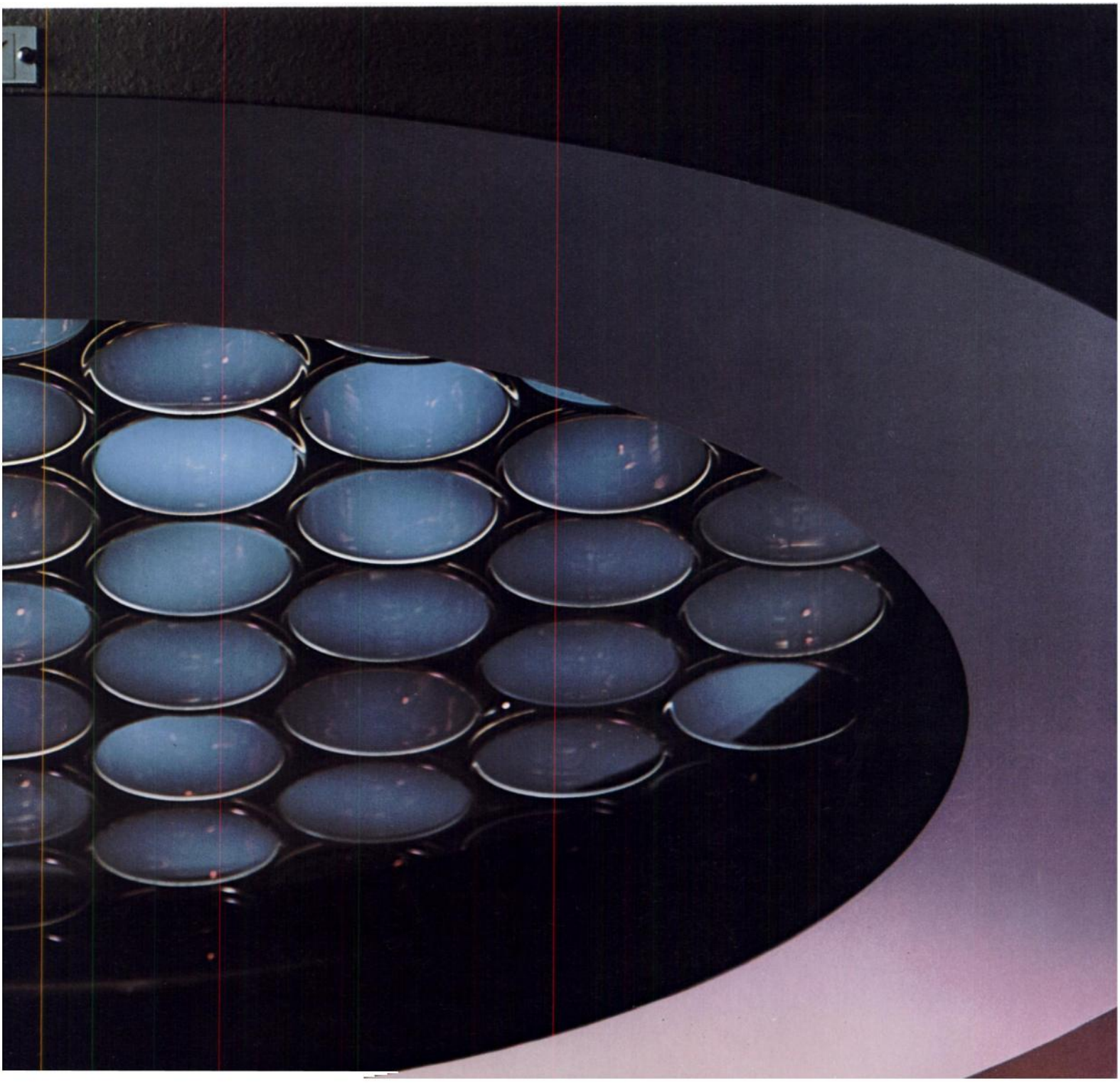

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*G. Subramanian, et al: Technetium-99m Methylene Diphosphonate — A superior agent for skeletal imaging. Comparison with other Technetium complexes. J. Nucl Med 16:744, 1975

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DIAGNOSTIC ISOTOPES
MDP KIT
TECHNETIUM Tc 99m MEDRONATE KIT

DIAGNOSTIC

DESCRIPTION

Each kit contains 10 vials, with each vial containing medronic acid, stannous chloride, and ascorbic acid. The 10 ml vial contains 10 mg of medronic acid, 0.17 mg (minimum) stannous chloride (maximum stannous and stannic chloride 0.29 mg), and 2 mg ascorbic acid. The contents of the vial are sterile, pyrogen-free, and lyophilized and sealed under nitrogen. The pH has been adjusted to 4-8 with hydrochloric acid and/or sodium hydroxide.

Administration is by intravenous injection for diagnostic use, after reconstitution with sodium pertechnetate Tc 99m Injection. The product as supplied is sterile and pyrogen-free.

The precise structure of stannous technetium-medronate complex is unknown at this time.

RADIATION DOSIMETRY

The effective half-life was assumed to be the physical half-life for all calculated values. About 50% of each dose of Technetium Tc 99m Medronate is retained in skeleton, and about 50% is excreted into the bladder. The estimated absorbed dose to an average patient (70 kg) from an intravenous injection of a maximum dose of 20 millicuries of Technetium Tc 99m Medronate are shown in Table IV.

Table IV

Absorbed Radiation Dose

Organ		(*rads/20 mCi*)
Total Body		0.13
Bone Total		0.70
Red Marrow		0.56
Kidneys		0.80
Liver		0.06
Bladder Wall	2 hr void	2.60
	4.8 hr void	6.20
Ovaries	2 hr void	0.24
	4.8 hr void	0.34
Testes	2 hr void	0.16
	4.8 hr void	0.22

Method of calculation: A Schema for Absorbed-Dose Calculations for Biologically Distributed Radionuclides, Supplement No. 1, MIRD Pamphlet No. 1, p. 7, 1968.

CLINICAL PHARMACOLOGY

Following intravenous administration of Technetium Tc 99m Medronate, skeletal uptake occurs as a function of blood flow to bone and bone efficiency in extracting the complex. Bone mineral crystals are generally considered to be hydroxyapatite, and the complex appears to have an affinity for the hydroxyapatite crystals in bone.

Clearance of the complex from blood is rapid following intravenous administration. Up to 50% of the injected dose is usually cleared by urinary excretion within the first 3-6 hours. Bone uptake is usually 40-50% within 3 hours following intravenous administration.

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.

DOSAGE AND ADMINISTRATION

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

Bone imaging: 10-20 mCi Technetium Tc 99m Medronate

Scanning post-injection is optimal at about 1-4 hours.

Slow administration of the drug over a period of 30 seconds is recommended.

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.

HOW SUPPLIED

Diagnostic Isotopes' Technetium Tc 99m Medronate Kit is supplied as a sterile, pyrogen-free kit containing 10 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.

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

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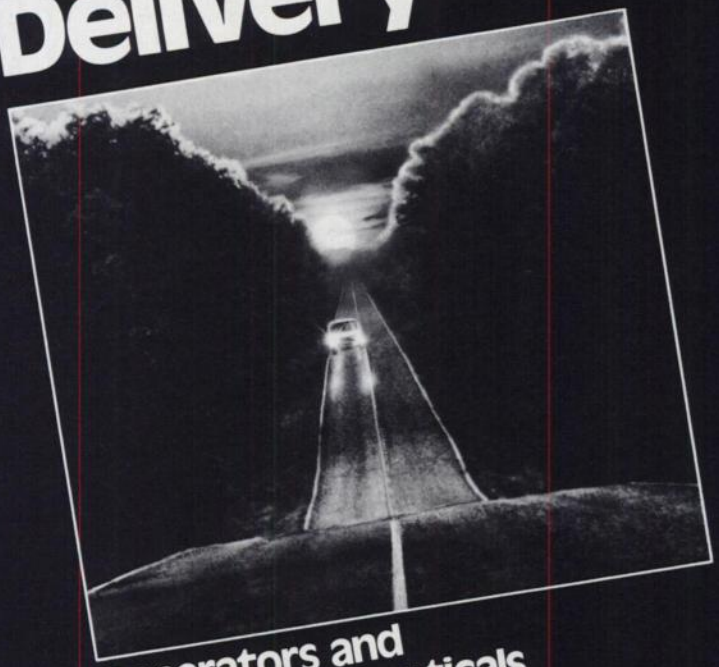

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*In a recent independent survey of 400 nuclear medicine departments. Data on file at Mallinckrodt.

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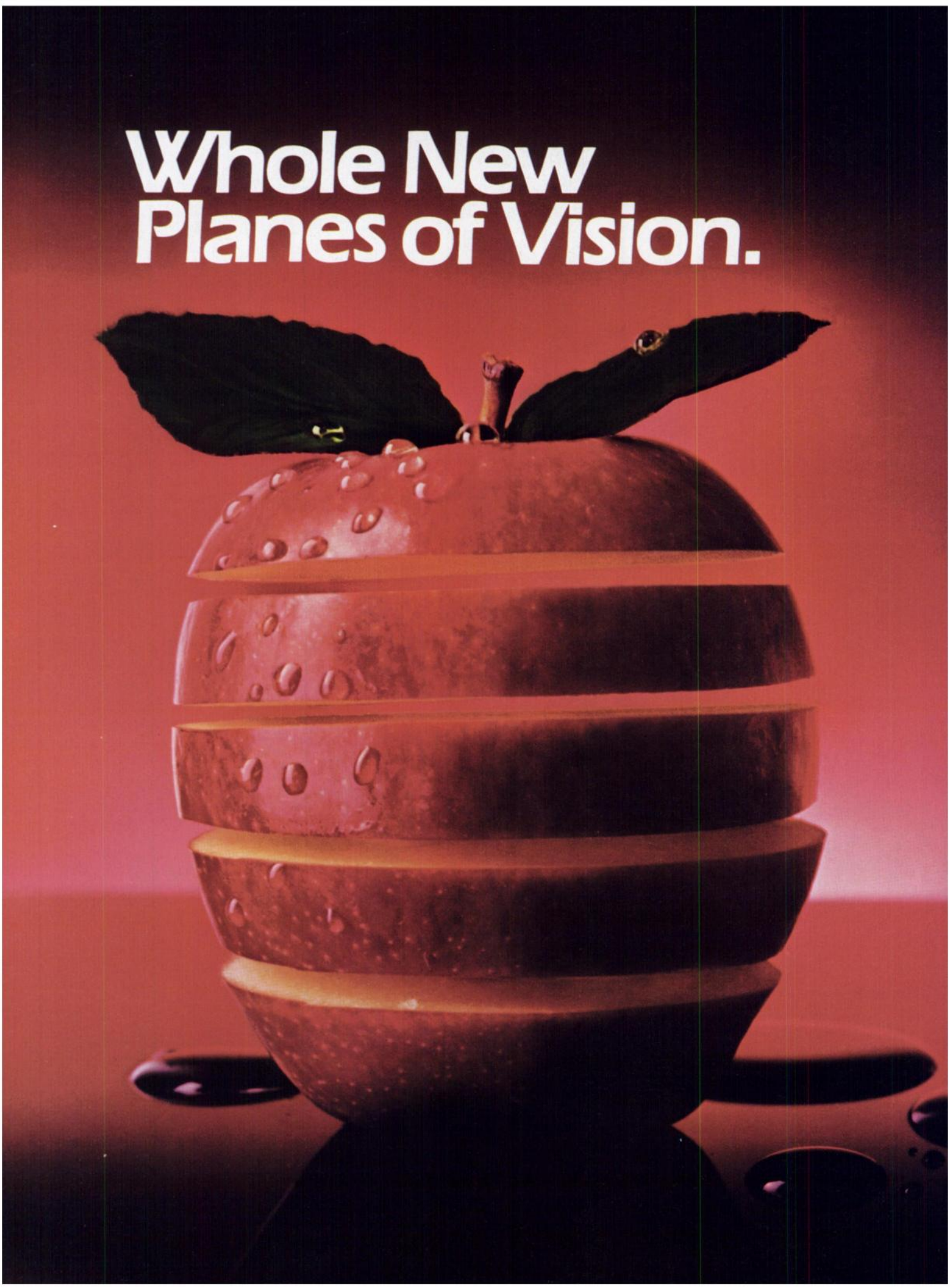

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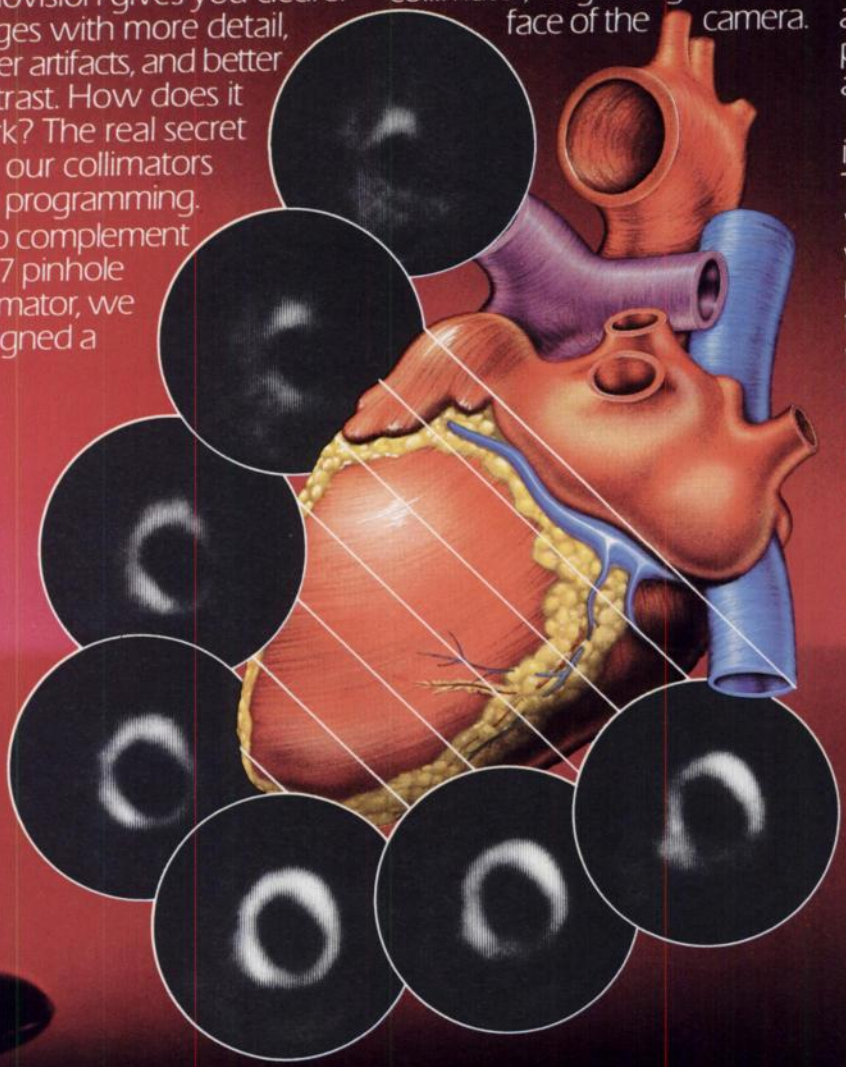

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GENERATOR

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	4.8mR/hr
30.5 cm	13000mR/hr	0.8mR/hr

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

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

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

*initial order only.

preparation

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

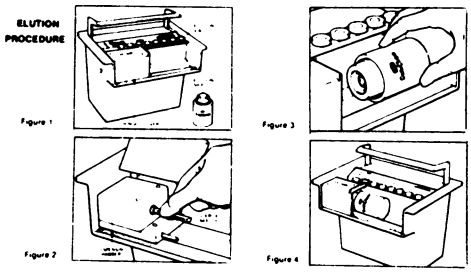
Union Carbide Generators are sterile and pyrogen-free at the time of shipment. Aseptic technique must be observed during the use of the generator to maintain a sterile and pyrogen-free system. Gloves should be worn during all elution procedures.

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

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

First Elution

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



storage

Store generator at room temperature (18-25 °C).

Caution: Avoid Freezing.

subsequent elutions

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

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

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

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

Technetium Tc 99m assay procedure

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

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

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

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

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

Molybdenum Mo 99 breakthrough test

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

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

disposal

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

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

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

New High Activity Union Carbide CintiChem®

Technetium 99m Generators

(Technetium Tc 99m Generators for the Production of Sodium Pertechnetate Tc 99m)

AVAILABLE EXCLUSIVELY FROM UNION CARBIDE

INCORPORATE THE FOLLOWING FEATURES:

COST EFFECTIVENESS

The use of a single high activity CINTICHEM® Technetium 99m Generator can significantly reduce your operating expenses by replacing from two to five lower activity Technetium 99m Generators.

CALIBRATIONS IN Mo 99

8,280 mCi to 16,600 mCi calibration sizes, in increments of approximately 830 mCi.

Tuesday and Thursday calibration days.

SAFETY

The depleted uranium internal shielding of the column possesses greater density and therefore superior shielding properties than the lead shielding used in lower activity generators.

The CINTICHEM® 8,280 mCi Technetium 99m Generator provides an approximate dosimetry of 9.7 mr/hr on the day of calibration, following elution, 18 inches from the surface, *without* a secondary external shield.[1]

The weight of a 16,600 mCi Generator is 45.5 pounds. All high activity generators are shipped in the D.O.T. Transport Index II classification.

QUALITY

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.

For full prescribing information, refer to preceeding page.

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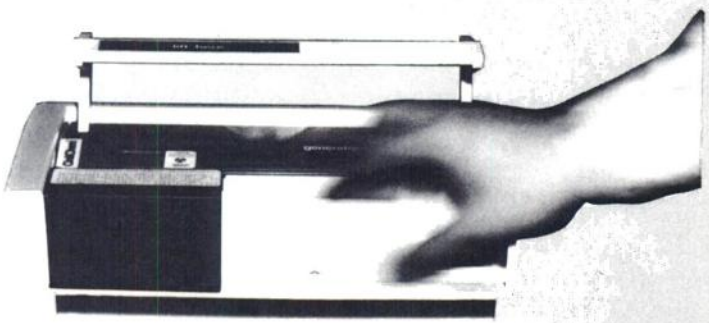
CintiChem®

Technetium 99m Generators

(Technetium Tc 99m Generators for the Production of Sodium Pertechnetate Tc 99m)

ARE DESIGNED TO MAXIMIZE RADIATION PROTECTION AND FOR EASY ELUTION



Rapid Elution Vial-Needle Engagement Reduces the Radiation Exposure Time Factor

INCORPORATE THE FOLLOWING ADVANTAGES:

- 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

For full prescribing information, refer to page opposite preceeding page.

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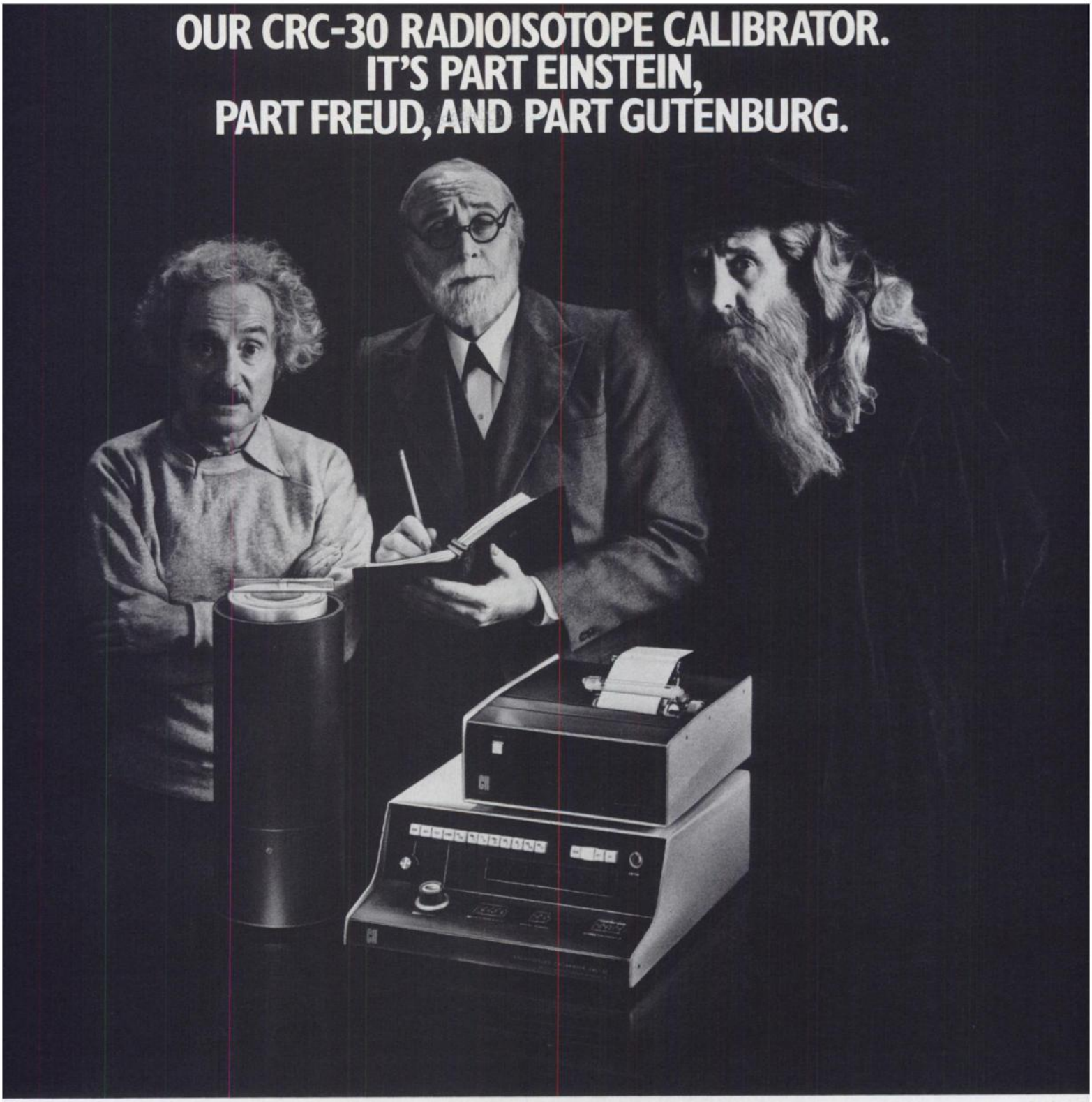
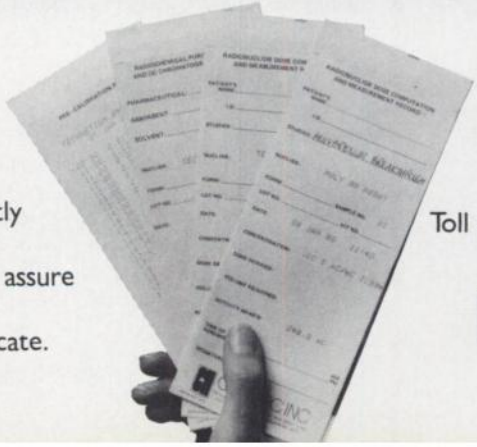


The CRC-30 calibrates and computes, analyzes radiochemical purity, and puts it all in print.

Computes radiopharmaceutical dose to assure that activity is exactly as prescribed.

Analyzes imaging preparations to assure radiochemical purity.

Prints permanent records in triplicate. Gives molybdenum assay printout.



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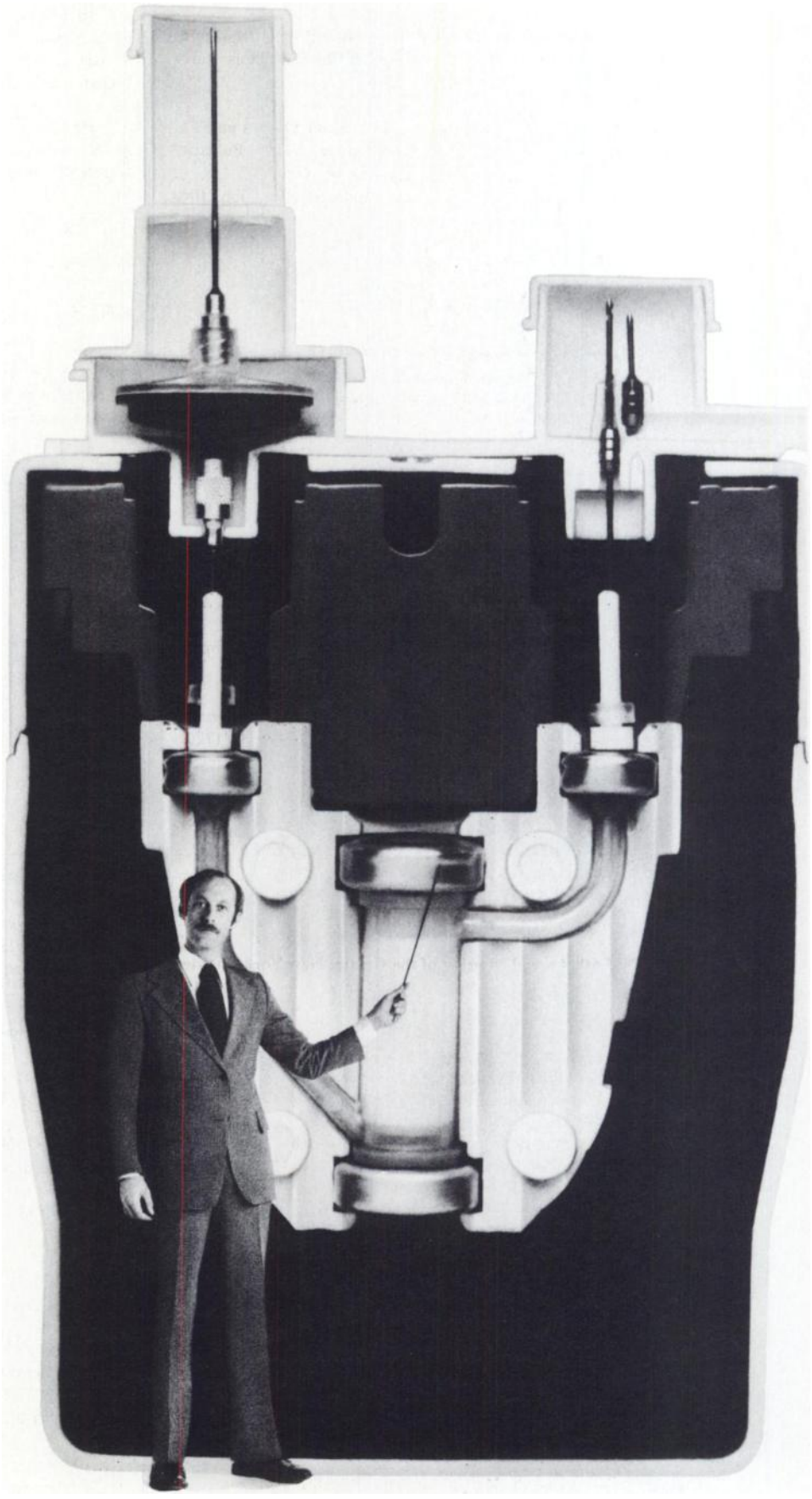

Minitec®
(Technetium Tc 99m)
Generator

Small in size and light in weight, but big in performance. That's Minitec. Designed for minimum amount of exposure to operator, its unique construction (no exposed tubing) and thick shielding (1⅝" lead) provide high shielding-to-activity ratio. Small-volume, high-concentration eluates give maximum flexibility for varying applications. Wide range of potencies and calibration dates fit the ^{99m}Tc needs of every lab.

Squibb Technical Associates

When you buy Minitec and Squibb radiopharmaceuticals, you get the back-up service of a Squibb Technical Associate. He's had extensive training in nuclear medicine, radiopharmaceuticals, RIA and instrumentation. Call him when a new tech needs instruction, a problem develops, you're planning to expand, or there's need for special information. You'll get the prompt, personal attention of an experienced specialist.

See next page for brief summary.

Medotopes®

SQUIBB®

MINITEC®
Technetium Tc 99m
GENERATOR

DESCRIPTION: Minitec (Technetium Tc 99m) Generator consists of a specially designed lead-shielded alumina column containing adsorbed fission-produced Mo 99. Tc 99m, the short-lived daughter of Mo 99, is obtained as sterile sodium pertechnetate Tc 99m by periodic elutions of the generator with an isotonic saline solution.

INDICATIONS AND USAGE: Sodium pertechnetate Tc 99m is indicated in ADULTS as an agent for brain imaging including cerebral radionuclide angiography, thyroid imaging, salivary gland imaging, placenta localization, and blood pool imaging including radionuclide angiography. (For use of sodium pertechnetate Tc 99m as a diagnostic radiopharmaceutical in CHILDREN, consult package insert.)

CONTRAINDICATIONS: None known.

WARNINGS: Radiopharmaceuticals should not be administered to patients who are pregnant or to nursing mothers unless the expected benefit to be gained outweighs the potential hazards.

Since sodium pertechnetate Tc 99m is excreted in human milk during lactation, formula-feedings should be substituted for breast-feedings.

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.

Radiation risks associated with the use of sodium pertechnetate Tc 99m are greater in children than in adults and, in general, the younger the child the greater the risk owing to greater absorbed radiation doses and longer life expectancy. These greater risks should be taken firmly into account in all benefit-risk assessments involving children.

IMPORTANT: Since material obtained from the generator may be intended for intravenous administration, aseptic technique must be strictly observed in all handling. Only the eluent provided should be used to elute the generator. Do not administer material eluted from the generator if there is any evidence of foreign matter.

PRECAUTIONS: In the use of any radioactive material, care should be taken to insure minimum radiation exposure to the patient and occupational workers consistent with proper patient management. At the time of administration the solution should be crystal clear.

ADVERSE REACTIONS: No adverse reactions specifically attributable to the use of sodium pertechnetate Tc 99m have been reported.

For full prescribing information, consult package insert.

HOW SUPPLIED: Minitec (Technetium Tc 99m) Generator is available in potencies of 220, 440, 880, 1330, 1770, or 2220 millicuries Mo 99 at calibration time. The generator is supplied with vials of sterile, nonpyrogenic eluent; a sterile needle adapter assembly and evacuated sterile collecting vials. Other accessories including lead shields, reference standard solutions, and a whole vial assay kit are available on request for use with the Minitec (Technetium Tc 99m) Generator.

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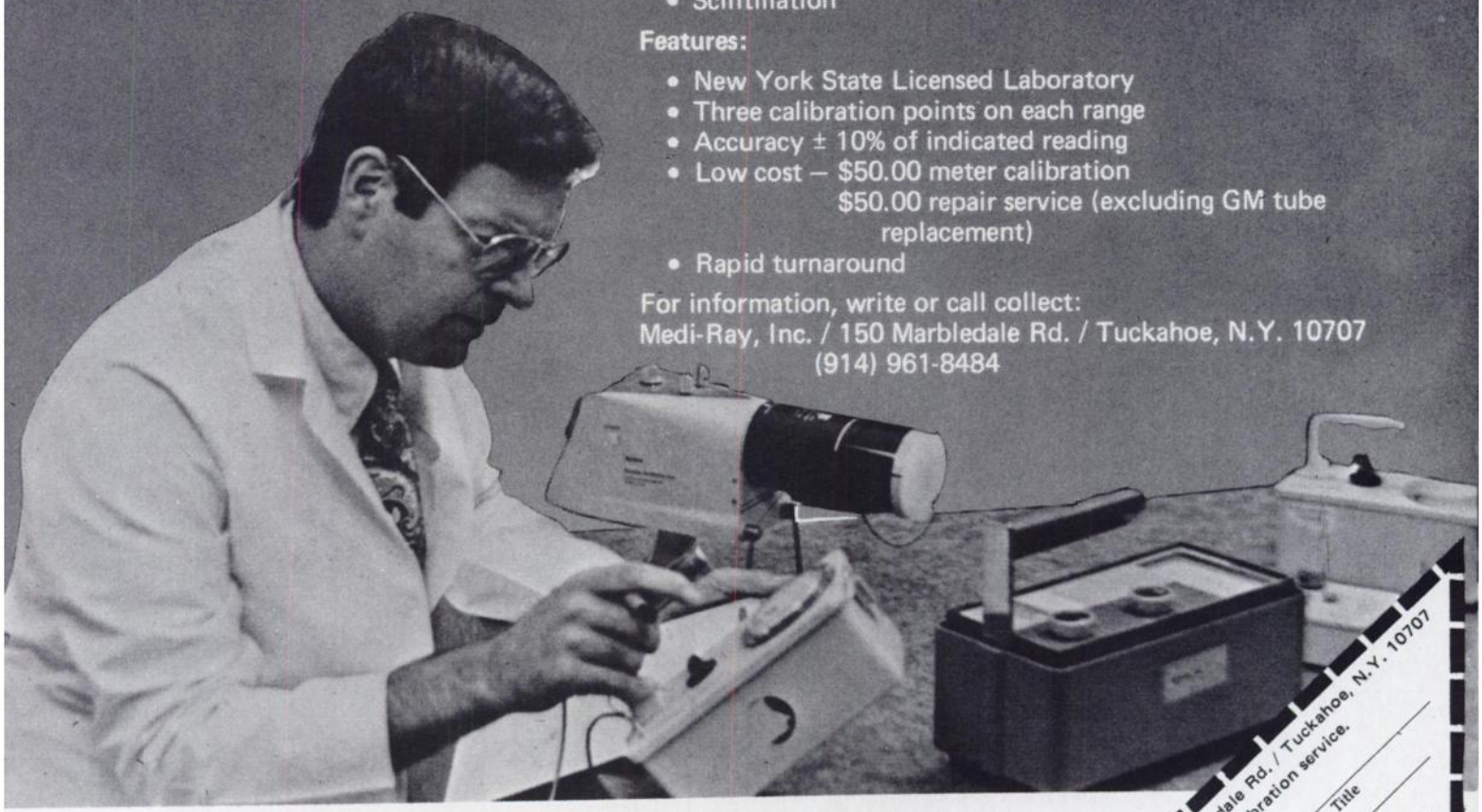

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AN-MDP™ Technetium Tc 99m Medronate Kit

If you've been waiting for an economical way to produce high-quality, low-background medronate (MDP) bone images, wait no more. AN-MDP™, from Ackerman Nuclear, Inc., gives you all of the advantages of medronate—and a lot of medronate for your money.

Superior images

Medronate produces high-target-to-background scans that readily demonstrate altered osteogenesis.[1]

- 90–94% blood clearance by two hours after administration
- Lowest soft-tissue uptake of all of the phosphonate bone agents in current use.[2]

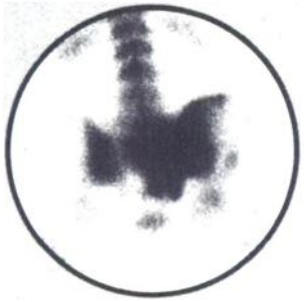
Convenience

- When necessary, imaging may begin an hour after injection (optimal imaging time is 1 to 4 hours).
- AN-MDP is stored and used at room temperature (15–30°C).

Economy

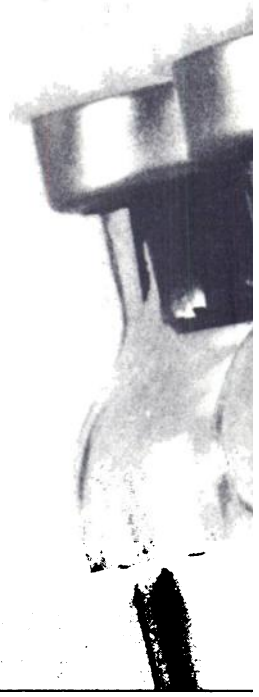
- You get 6 vials of reagent with each AN-MDP kit, instead of the usual 5.

Posterior pelvis



Posterior right side

A 54-year-old male with metastatic CA of the prostate was administered 15 mCi technetium Tc 99m-labeled AN-MDP. The images were recorded at 500K counts. Courtesy of Century City Hospital, Los Angeles.



For complete prescribing information, see [illegible] package insert or summary of this information.

AN-MDP™ Technetium Tc 99m Medronate Kit

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

Contraindications. [illegible]

Warnings. This agent should not be mixed with any other drug or radiopharmaceutical. Radiopharmaceuticals should be used by physicians who are qualified by specific training and experience in the safe use and handling of radionuclides.

Precautions. Components of this vial are intended only for use in the preparation of Technetium Tc 99m Medronate and are not to be administered directly to the patient. Technetium Tc 99m Medronate, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize radiation exposure to patients consistent with proper patient management.

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

The Technetium Tc 99m Medronate should be formulated within six hours prior to clinical use. Optimal imaging results are obtained 1–4 hours after administration.

Carcinogenesis, mutagenesis, impairment of fertility. No long term animal studies have been performed to evaluate carcinogenic potential or whether Technetium Tc 99m Medronate affects fertility in males or females.

Pregnancy category C. Animal reproductive studies have not been conducted with Technetium Tc 99m Medronate. It is also not known whether Technetium Tc 99m Medronate can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Technetium Tc 99m should be given to a pregnant woman only if clearly needed. Ideally examinations using radiopharmaceuticals, especially, those elective in nature, of a woman of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses.

Nursing mothers. Technetium Tc 99m is excreted in human milk during lactation; therefore formula feedings should be substituted for breast feedings.

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

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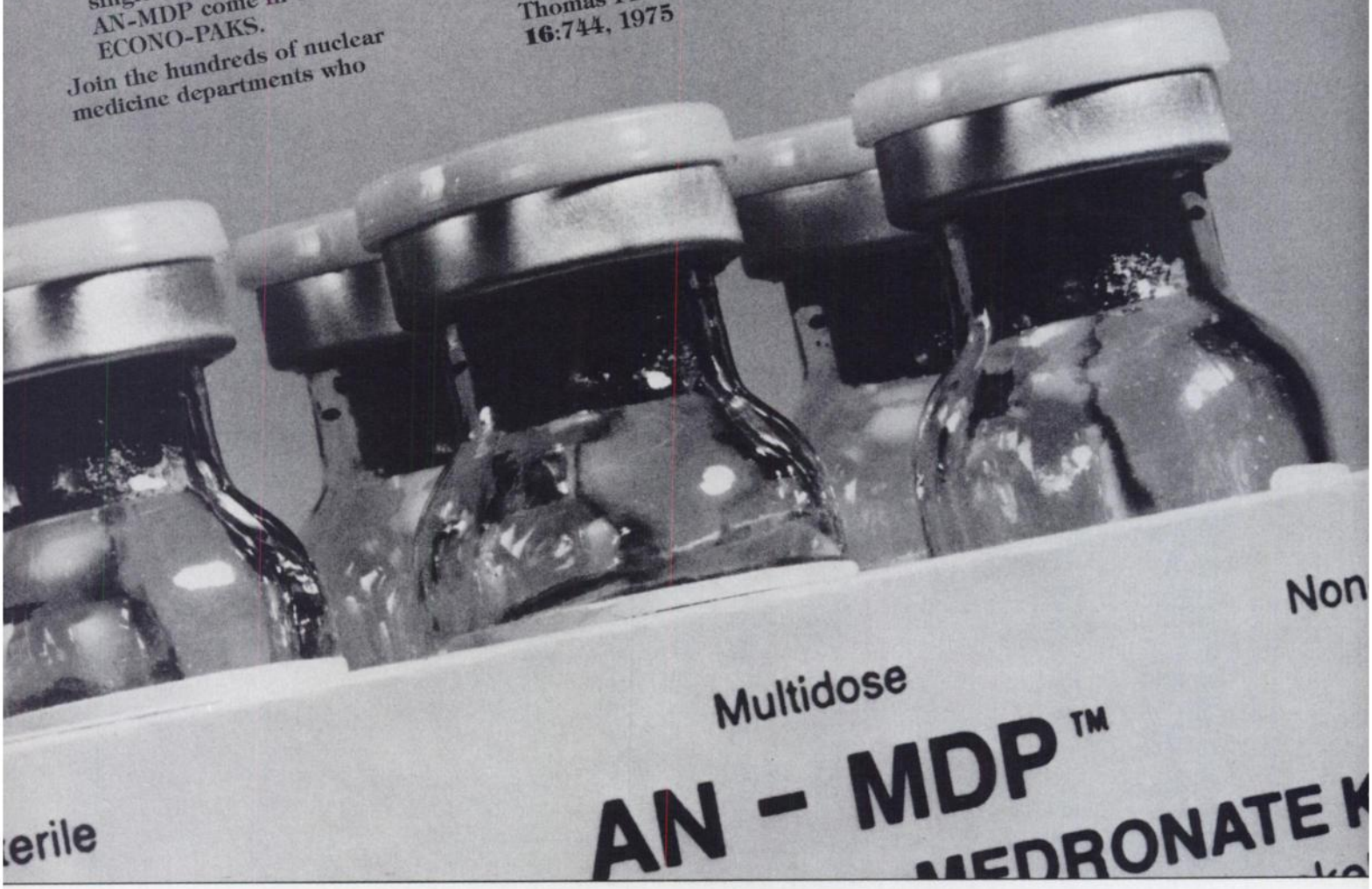

Multidose

AN - MDP™

MEDRONATE K

Non

terile

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

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

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

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

Bone imaging: 10–20 mCi Technetium Tc 99m Medronate

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

How supplied. AN-MDP™ is supplied both in the single-dose and multidose form. Both are available in sets of 6 or 30 sterile and nonpyrogenic vials. Each nitrogen-flushed vial contains, in lyophilized form:

	Single dose	Multidose
Medronic acid	5.0 mg	10.0 mg
Stannous chloride (minimum)	0.25 mg	0.51 mg
Maximum total stannous and stannic chloride	0.51 mg	1.01 mg

The pH is adjusted to 5.0–5.5 with HCl and NaOH prior to lyophilization. Included in each 6-vial kit is one package insert and 12 radiation labels. In each 30-vial kit is one package insert and 60 radiation labels. Refrigeration is not necessary.

Description	Catalog Number
Single dose 6-vial kit	K-401-S
Single dose 30-vial ECONO-PAK	K-402-S
Multidose 6-vial kit	K-401
Multidose 30-vial ECONO-PAK	K-402

AN-MDP™ is a trademark of Ackerman Nuclear, Inc.

PLACEMENT

POSITIONS OPEN

ACADEMIC POSITION AT THE ASSOciate or Assistant Professor level avilable in the Nuclear Radiology Division of the Department of Radiology at the University of Texas Medical School at Houston. Certification in radiology and Nuclear Medicine, or in Radiology with Special Competence in Nuclear Radiology is required. Applicant should have a sincere interest and a performance record in relevant clinical or basic nuclear research. Please send curriculum vitae to Robert W. McConnell, M.D., Director, Division of Nuclear Radiology, Department of Radiology, The University of Texas Medical School at Houston, 6431 Fannin Street, Houston, Texas 77030.

CALIFORNIA-EXPERIENCED NUCLEAR Medicine Technologists are invited to call us collect regarding immediate career opportunities at our 540-bed, acute care, university affiliated teaching hospital. In addition to excellent salary and benefits, we provide the finest in equipment and a very professional work environment. Call or submit resume to: Ms. Lynne Luboviski, Employment Manager, St. Mary Medical Center, 1050 Linden Avenue, Long Beach, CA 90801. (213) 435-4441, Ext. 420. An equal opportunity employer - male/female/handicapped.

NUCLEAR MEDICINE RESIDENCY: Applications are now being accepted for two-year AMA approved affiliated residency program based at the George Washington University Hospital. Begins July 1, 1981. Comprehensive training in basic science, computers, in-vivo and in-vitro nuclear medicine, including RIA and clinical patient services are provided. Participation in the on-going research program is encouraged. Contact: Richard C. Reba, M.D., Dir., Div. Nuc. Med., GWUMC, 901 - 23rd St., N.W., Wash., D.C., 20037. Phone: (202) 676-3458.

NUCLEAR PHARMACIST-STAFF POSItions available immediately in centralized nuclear pharmacies located throughout the United States. Board certified applicants with radiopharmacy experience preferred. Also good oppotunities for management oriented applicants. Excellent fringe benefits program. Salary commensurate with experience. Send resume and salary history to Personnel Department, Nuclear Pharmacy, Inc., P.O. Box 25141, Albuquerque, N.M., 87125, or call (505) 292-5820. EOE.

NUCLEAR MEDICINE RESIDENCY. 830-bed VA general hospital offers AMA approved two year program. Two positions available July 1981. Located in San Fernando Valley area of Los Angeles, 15 minutes from affiliated hospitals (UCLA and Wadsworth VA). Program covers isotope and ultrasound imaging, in vivo and in vitro procedures, including RIA, and all recent computer and cardiology procedures. Prerequisite: Two years post graduate training in medicine, radiology, or pathology. Minimum stipend: $23,438. Contact: Marvin B. Cohen, M.D., Chief, Nuclear Medicine Service. Nondiscrimination in employment. VA Medical Center, 16111 Plummer Street, Sepulveda, CA 91343.

RADIOLOGIST, BOARD CERTIFIED IN nuclear medicine, to join large multi-specialty prepaid medical group. Opportunity to expand department and plan department for new hospital in 1984. Salary negotiable. Liberal fringe benefits. Contact: Hawaii Permanente Medical Group, Inc. 1697 Ala Moana Boulevard, Honolulu, Hawaii 96815. (An Equal Opportunity Employer).

NUCLEAR MEDICINE TECHNOLGIST. Medical Technologist or registered or registry eligible Nuclear Medicine Technologist or CNMT with imaging experience wanted for progressive, well-equipped nuclear medicine department. This position offers and excellent salary and a fringe benefit package including medical insurance with major medical, dental care, prescription drugs and vision care, 10 paid holidays, vacation up to 5 weeks after 10 years, paid retirement program, life insurance and more. Send resume or call Mr. Hugh Miller at St. Luke's Hospital, 3555 Army St., San Francisco, CA 94110, area code (415) 641-6540. An equal opportunity employer.

APPLICATIONS ARE INVITED FROM Ph.D. physicists who have a strong background in medical imaging computing. The successful applicant will be expected to play an active role in ongoing clinical programs in positron emission tomography and ultrasonic tissue characterization, to teach radiological physics to medical residents and student technologist and to supervise instrument quality control procedures in the Division of Nuclear Medicine and Ultrasonography. Applicants should send a resume, the names of three referees and salary requirements to Prof. A.J. Gilson, Division of Nuclear Medicine and Ultrasonography, Mount Sinai Medical Center, 4300 Alton Road, Miami Beach, Florida 33140.

SENIOR NUCLEAR MEDICINE TECHnologist Wanted. Position available at a 349 bed modern hospital in a beautiful southeastern Tennessee town of 200,000 people with many recreational facilities and low cost of living. Position requires experience in cardiac imaging and certification by either ARRT or NMTCB. Position involves mainly cardiac imaging under a nuclear physician with new MDS A square computer and new mobile gamma camera. Send resume and salary requirements to: Mr. William R. Furrey, Associate Administrator, Memorial Hospital, 2500 Citico Avenue, Chattanooga, TN 37404.

NUCLEAR CARDIOLOGY TECHNOLOGIST. Position available in Nuclear Cardiology department of an 1100 bed teaching hospital. Candidate must be registered and have experience in cardiovascular Nuclear Medicine. For additional information write: Leslie Del Ventura, Nuclear Cardiology Department, The Methodist Hospital, 6565 Fannin, MS F903, Houston, Texas, 77030 or call (713) 790-3341.

NUCLEAR MEDICINE DIRECTOR, Radiologist: Ohio community hospital seeks experienced physician with Boards in Nuclear Medicine and Radiology. Excellent career potential. Location near metro and university centers. Forward C.V. in confidence to: Box 802, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR CARDIOLOGY COORDINAtor will assist in the establishment of a new Nuclear Cardiology section. Requires satisfactory completion of a recognized School of Nuclear Medicine Technology and previous working experience in Nuclear Medicine. Experience in Nuclear Cardiology utilizing Computer Analysis desirable. Qualified applicants send resume to: Personnel Office, St. Francis Hospital, P.O. Box 1358, Wichita, KS 67201. Equal Opportunity Employer.

TECHNOLOGISTS NEEDED IN SOUTHern California. Many jobs are available. If interested in relocating to this prime area, the Technologist Section will mail you a current list of available positions. Send inquiries to our placement service representative: Deborah Behrendt, Nuclear Medicine Service 115, 16111 Plummer Street, Sepulveda CA 91343.

ALASKA-C.T., N.M., ULTRASOUND. Fairbanks Memorial Hospital is now recruiting for a registered or registry eligible N.M. Technologist. Previous experience or the desire to learn ultrasound and C.T. preferable. Salary D.O.E. - Excellent fringe benefits. Fairbanks Memorial Hospital is a 150 bed acute care facility located in Fairbanks, Alaska. Enjoy the opportunity to live in a relatively small rural area (40,000-60,000) and practice in an atmosphere usually found only in the city. Contact: Russell Cox, R.T. Chief Technologist, Department of Radiology, Fairbanks Memorial Hospital 1650 Cowles St., Fairbanks, Alaska 99701.

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NUCLEAR RADIOLOGIST. 40 BOARD Certified in both Radiology and Nuclear Medicine. Extensive experience in Cardiac Nuclear Medicine and Computer. Prior experience in developing and organizing Nuclear Medicine Department. Currently Chief of Nuclear Medicine at University Center. Reply Box 801, Society of Nuclear Medicine, 475 Park Ave. South, New York, NY 10016.

NUCLEAR MEDICINE PHYSICIAN, ABNM, ABIM, FACP seeks relocation as Director of Nuclear Medicine at progressive hospital. Currently Director of active Department of Nuclear Medicine and Diagnostic Ultrasound. Experienced in all aspects of these specialties (administration, imaging, RIA, computers, cardiology B-Mode and real-time ultrasound). All positions will be considered. For further information and C.V., reply Box 800, Society of Nuclear Medicine, 475 Park Ave. South, New York, NY 10016.

All classified ads must be prepaid, or accompanied by a purchase order. For more information, contact the Advertising Department at the Society of Nuclear Medicine: (212) 889-0717.

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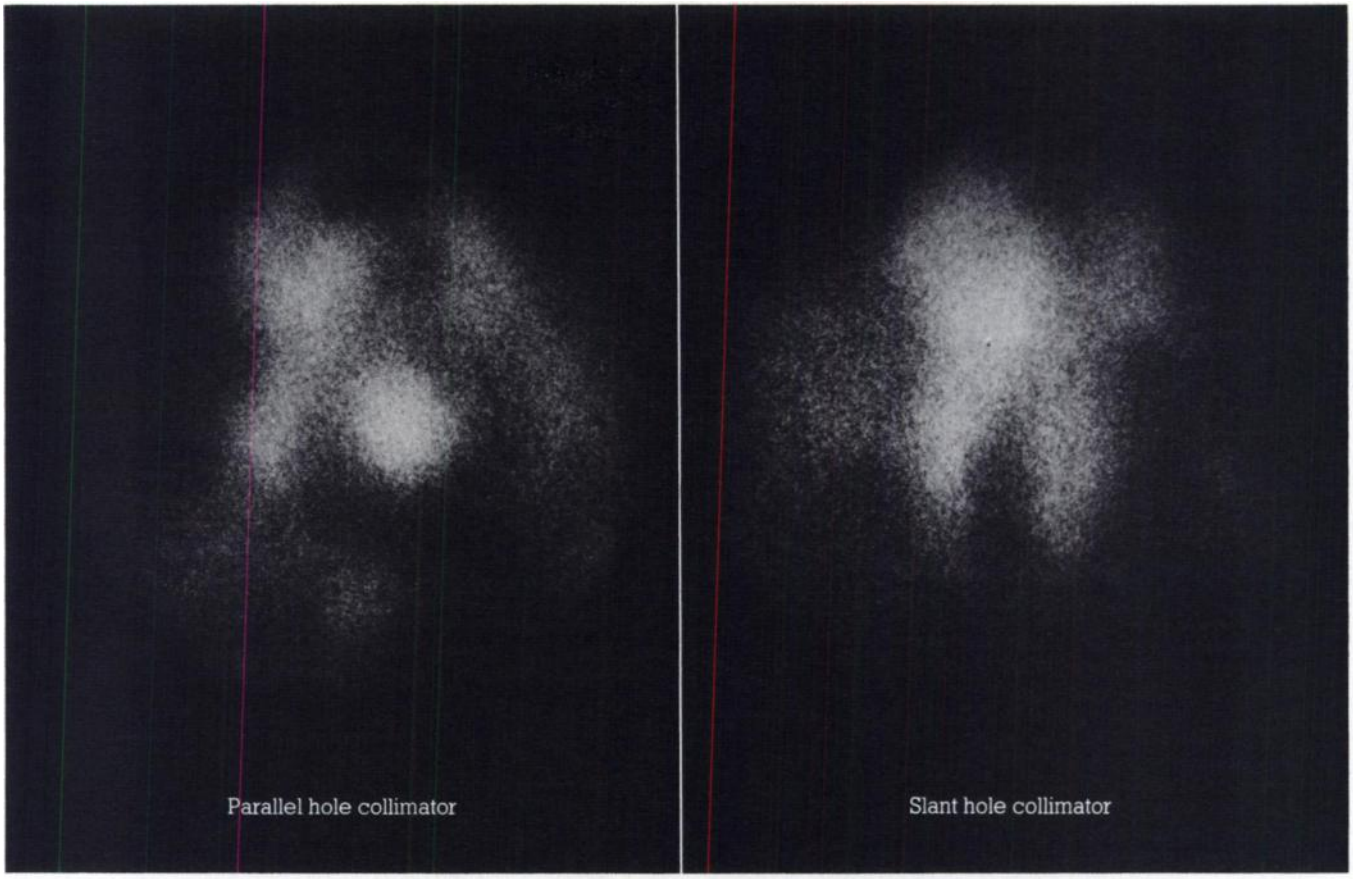

Improve your image with a different slant.

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

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

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

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

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

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

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

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

EDC collimators. . . . To improve your image and your patients'. Write or call EDC for further information:

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

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Tel. (617) 458-1456

Tomographic thallium imaging

Robert A. Vogel, MD
Associate Professor of Medicine
University of Colorado Health Sciences Center
Director, Coronary Care Unit and Medical Intensive Care Unit
Denver VA Medical Center

Dennis L. Kirch, MSEE
Assistant Professor of Radiology
University of Colorado Health Sciences Center
Research Engineer
Denver VA Medical Center

The initiative for tomographic thallium imaging arises from the segmental nature of coronary artery disease—which typically affects one portion of the myocardium more severely than others. An ischemic area of the heart that takes up less thallium may overlap or underlie another, normally perfused region. Planar imaging may resolve small deficits juxtaposed to normally perfused myocardium only with difficulty. Tomographic imaging may enable spatial separation of high- and low-uptake regions at different depths, thereby providing a better image of regional ischemia.

Thallium myocardial tomography provides advantages in addition to a series of depth-separated Z-axis images of relative isotope uptake. It ensures that the entire study is acquired as early as possible after injection, before any significant redistribution takes place, because only a single left oblique view is required to provide the data on regional thallium uptake provided in planar imaging by multiple views. And possibly of greatest importance, the technique permits objective computerized quantification of regional isotope uptake and redistribution—circumferential profile analysis—simplifying detection and interpretation of regional differences in thallium redistribution.

These three attributes together—Z-axis resolution, single-view image acquisition, and objective regional quantification—have increased the sensitivity and specificity of thallium myocardial perfusion imaging in our department to 90% or better. Optimum utilization of this imaging/image-processing technique requires a thorough technical appreciation of several features of the tomographic collimator and software.

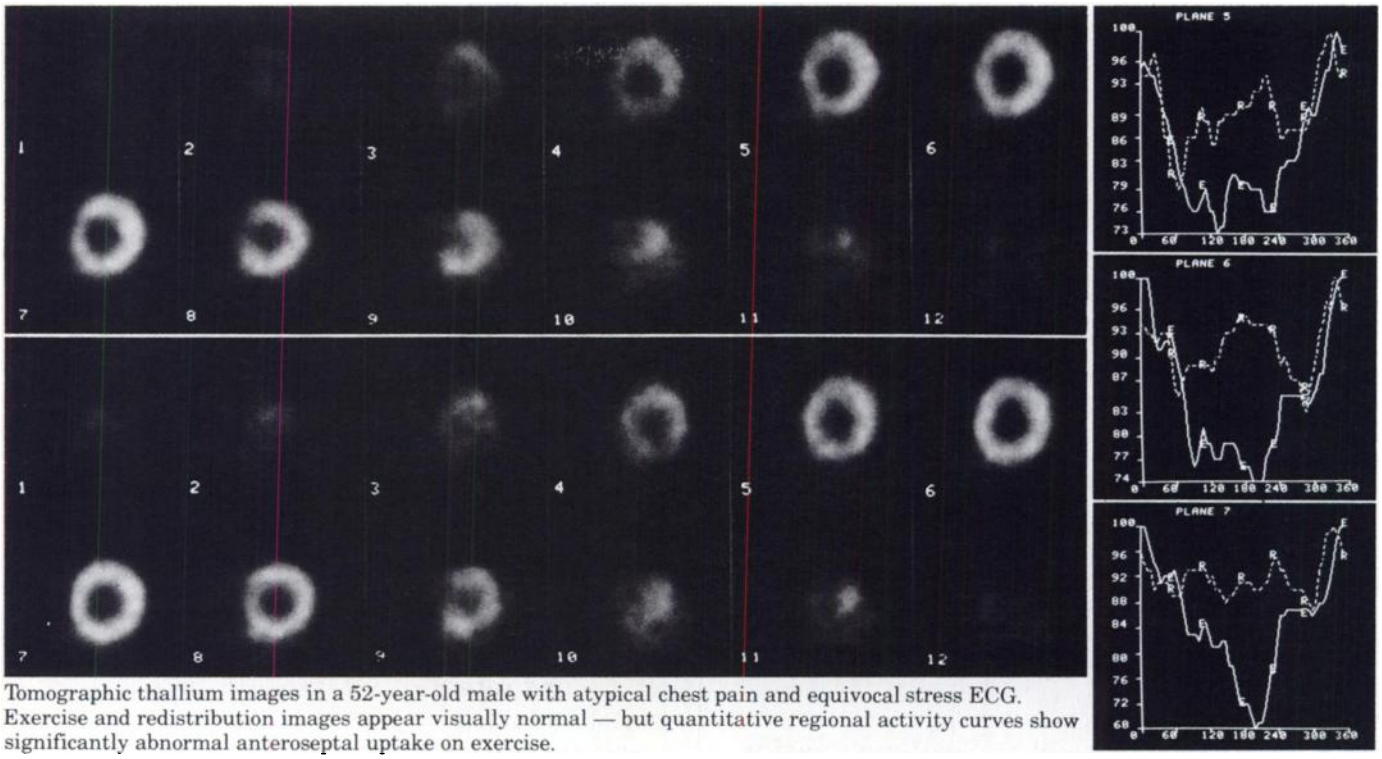
The seven-pinhole collimator

The seven-pinhole collimator is not a completely revolutionary or untried concept; rather it represents the combination of two well-accepted concepts in order to better image the thallium-perfused myocardium: single-pinhole collimation and rotating slant-hole collimation. A single-pinhole collimator can produce superior magnified myocardial images with only a minimal contribution from noncardiac background, but its low sensitivity lengthens acquisition time so much that significant redistribution may occur before a view is complete. The rotating slant-hole collimator was pioneered early in the development of the Anger camera as a technique to produce tomographic images. But it is a cumbersome device that is difficult to utilize rapidly and repeatedly, and uses a simple back-projection tomographic reconstruction technique unsatisfactory for myocardial imaging.

The seven-pinhole collimator represents a combination of these two techniques. By projecting seven pinhole images on the crystal, several advantages are gained:

- Instead of projecting a single image onto perhaps 10% of the camera crystal, and imaging background counts with the remaining 90%, the seven-pinhole collimator can project seven 1:1 myocardial images with very little noncardiac background contribution. This full utilization of the crystal for organ imaging makes the seven-pinhole collimator comparable in sensitivity to a high-sensitivity standard collimator... capable of collecting up to 750,000 myocardial counts within 10 minutes.
- Instead of developing angular perspective by taking several sequential planar views, or by rotating a slant-hole collimator, the seven-pinhole collimator uses the seven pinholes to simultaneously view the heart from slightly different angular perspectives, from which computer processing can provide tomographic reconstruction.

To these collimator-derived benefits, one must add two benefits from the quantitative analysis of seven-pinhole imaging: *enhanced subjective confidence* in the presence or absence of perfusion deficits on the displayed images and *objective quantification* of relative thallium distribution and redistribution kinetics in each of the important tomographic planes through the myocardium.



Tomographic thallium images in a 52-year-old male with atypical chest pain and equivocal stress ECG. Exercise and redistribution images appear visually normal — but quantitative regional activity curves show significantly abnormal anteroseptal uptake on exercise.

The impedance-estimation algorithm

Traditionally, tomographic nuclear images have been reconstructed by *back projection*, as in the original rotating slant-hole system, and in the Searle PhoCon. More complete, faster processing — with iterative capability for error correction — results from the use of the impedance-estimation technique of the seven-pinhole program.

The basic principle of this program is that a *voxel*, a volume element in space, has been viewed from seven points projected through pinholes onto the crystal. The program applies an *impedance-estimation algorithm* to the summing of the seven perspectives of each voxel, so that the lowest number of counts detected from any one perspective will dominate the greater counts detected from the other six—much as a single low-resistance resistor will conduct more current than numerous high-resistance elements in a parallel electrical circuit.

We believe this impedance-estimation program provides an initial estimate of real voxel value that is closer to actual isotope distribution than is possible with simple back projection. With a single 1- to 2-minute iterative pass to refine this estimate, the algorithm provides an accurate derivation of isotope distribution in a specific tomographic plane. Thus, the clinician can be confident that any perfusion defect which can be resolved by the camera/collimator is certain to be detected and displayed on the resultant "hard" image...without substantial degradation by overlying or surrounding normally perfused tissue, or by redistribution during image acquisition.

Circumferential quantification

Circumferential profile analysis of thallium-201 tomographic images may significantly increase the accuracy of evaluating regional thallium uptake and comparing uptake/redistribution kinetics. This quantification technique defines the center of the left ventricle, divides the myocardium into a predetermined number of segments, then quantitatively plots the relative thallium uptake in each segment against its angular location on the left ventricular wall. The procedure, as performed at the Denver VA Medical Center, permits objective comparison of stress/redistribution uptake curves—even in regions where ischemia cannot confidently be diagnosed solely by visual examination of the images.

In summary, the tomographic process reduces patient imaging time and, in our experience, has enabled improved visualization of segmental abnormalities in thallium-201 distribution, and has offered a means of data presentation well suited to quantitative interpretation and correlation.

Please see following page for brief summary of prescribing information.

Thallous Chloride Tl 201

November 1977

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.

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

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Medical Diagnostics Division
601 Treble Cove Rd., North Billerica, MA 01862

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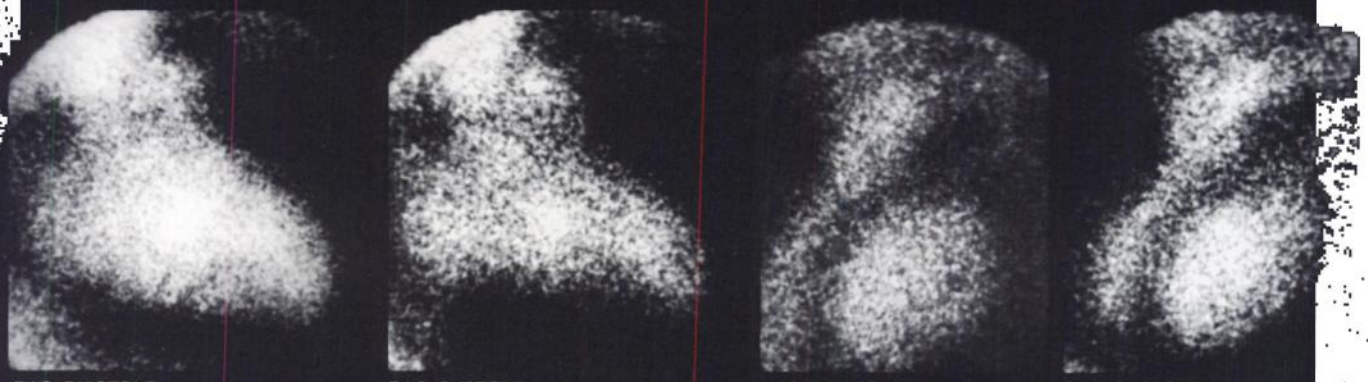
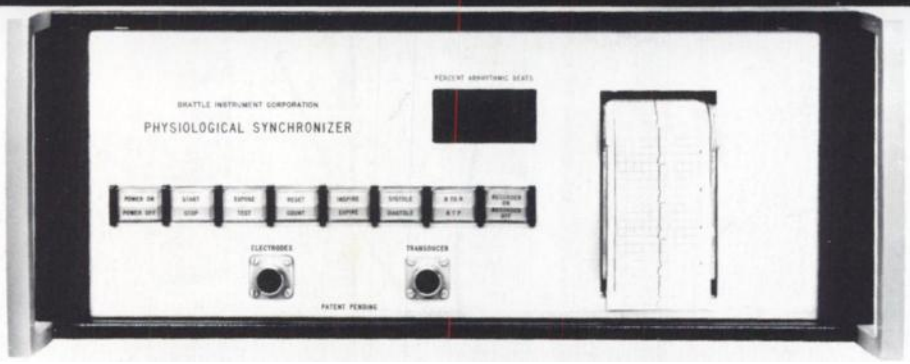
Help your cardiologist study heart kinetics non-invasively with Brattle-gated scintiphotos.



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

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



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

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

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

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

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

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

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

Brattle Instrument Corporation

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