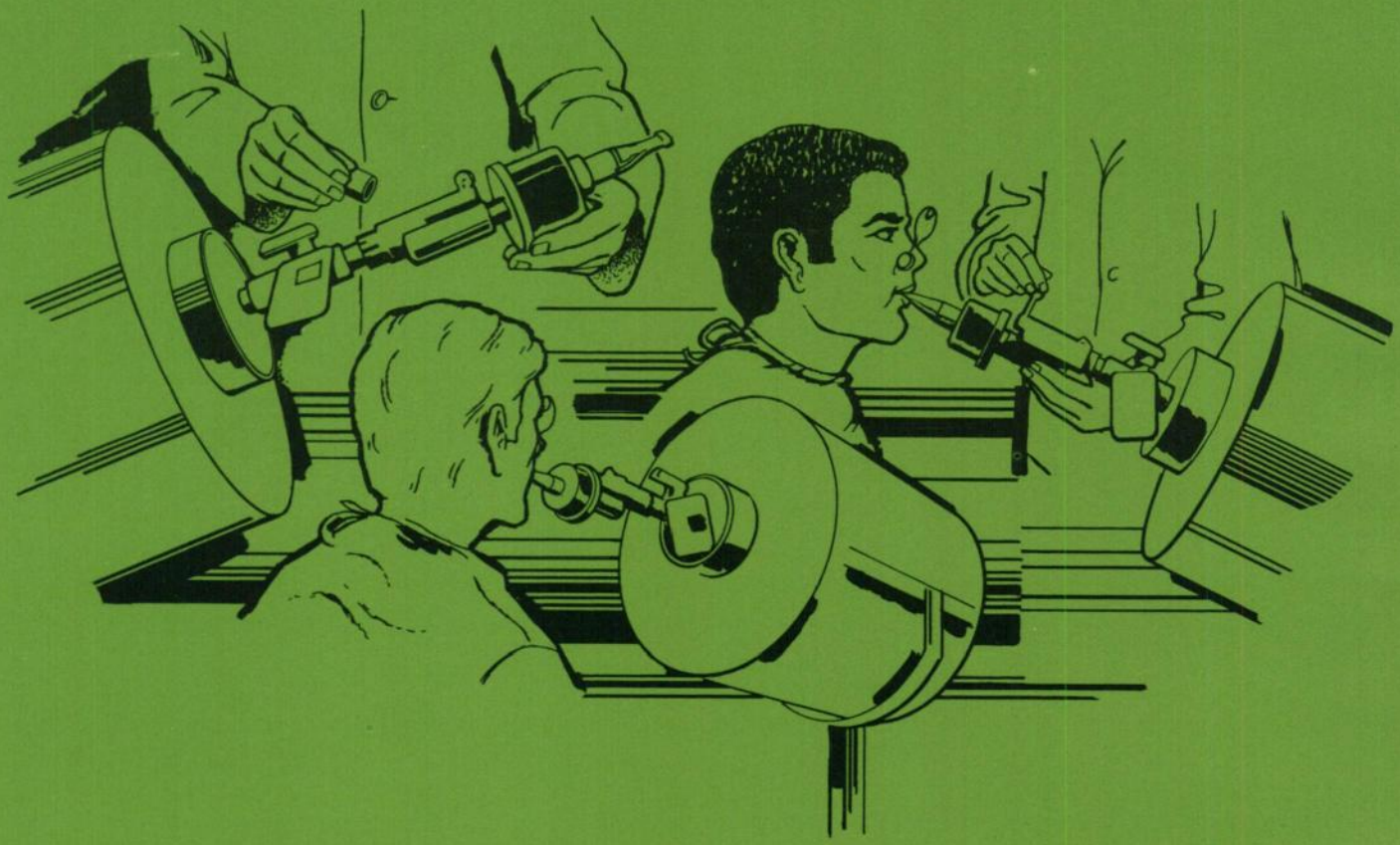
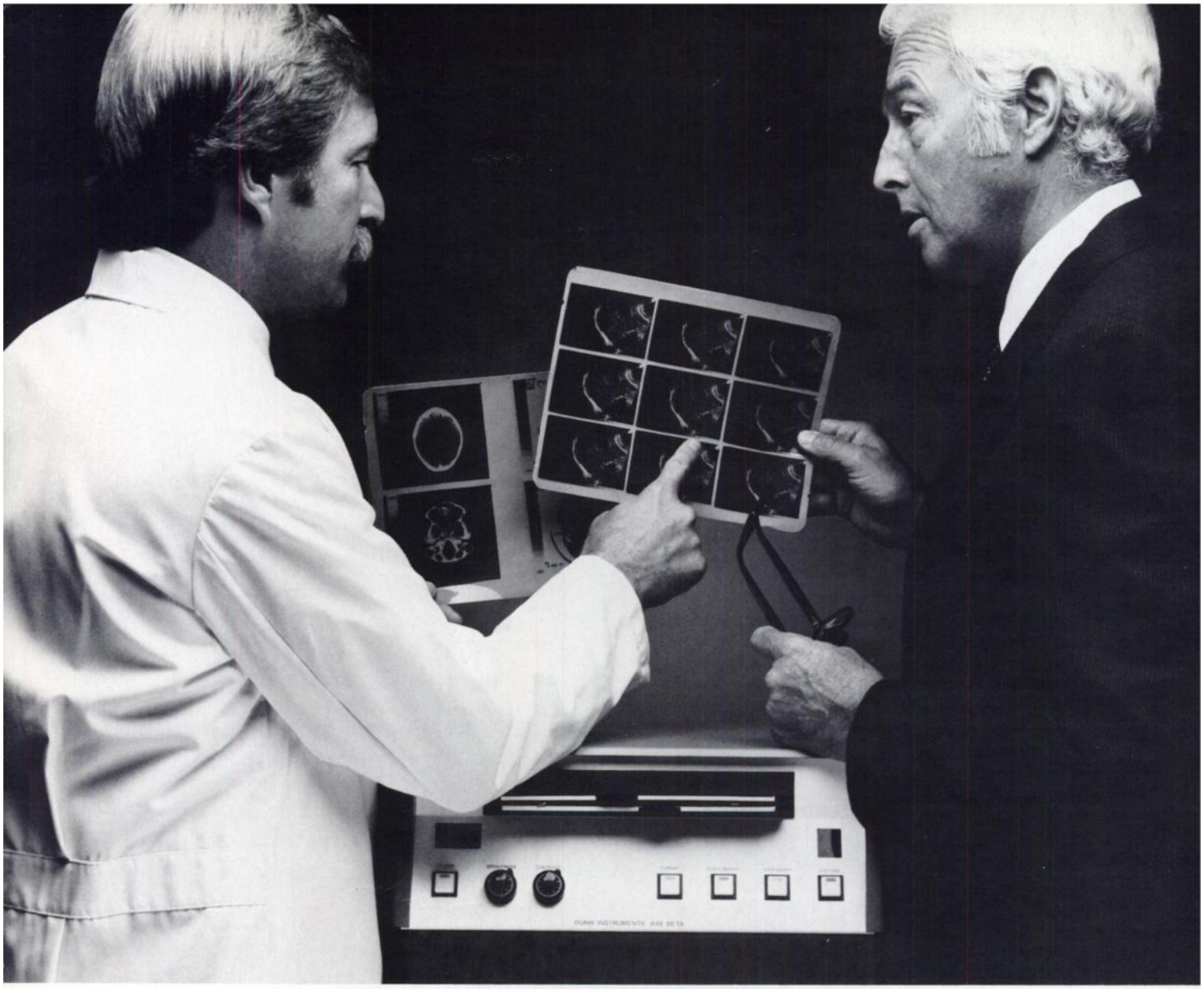
Safety • Convenience • Versatility



Xenon Xe 133-V.S.S.
Xenon Xe 133
Ventilation Study System

Please see complete Package Insert before prescribing; a Brief Summary is included on the following page.



New Faithful

The multi-format 649 camera joins the Beta Series.

Faithful rendition of the medical image. And faithful operation at the touch of a button. Dunn's Model 649 has been around long enough to prove its worth. But now it's new again. Why? Because it has been thoroughly re-designed and re-engineered to take its place in the Beta Series. Now the finest series of fixed-format multi-image cameras also offers the advantages of multiple formats where they're needed.

Beta design means effortless and error-proof operation, thanks to programmable microprocessor electronics. It means a service record to envy. And most important, the superb optical and video components mean perfect pictures every time, in any format.

Whatever your imaging needs, in CT, ultrasound or fluoroscopy, you will want to check out the Beta Series, including the new 649. Find out why the inventors of the multi-image camera still make the best. Call or write for full information and sample films. Dunn Instruments, Inc., 544 Second Street, P.O. Box 77172, San Francisco, CA 94107. Tel. 415/957-1600.

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The precision image

The new NEN generator

We kept it simple and convenient.

Just peel off the top and the new NEN generator is ready for the same top-handling charge-and-elute procedure as current NEN generators.

We kept it dependable.

Each generator is checked for sterility, apparent Mo 99 breakthrough, alumina breakthrough, and functionality. Pyrogenicity is checked by pooled sample — just like current NEN generators.

We even kept the same radiation profile... we just made it 10 lbs lighter.

That means about a half ton less total lead you'll have to move around each year — without sacrificing any of the radiation protection delivered by current NEN generators.

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THE STABLE SOLUTION TO YOUR BONE IMAGING NEEDS

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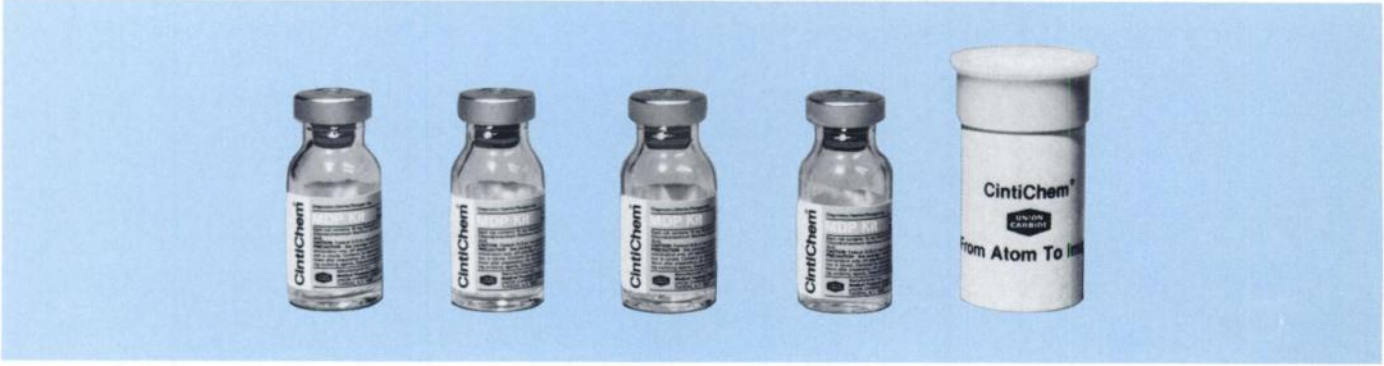


- **One Year Shelf Life**
- **No Refrigeration Required**
- **Full 6 Hour Use After Preparation**
- **Contains Ascorbic Acid as an Antioxidant**

For ordering, customer service, and technical information, call toll-free 800-431-1146 (in NYS call 914-351-2131, ext. 227).

CintiChem® MDP KIT

Technetium Tc 99m Medronate Kit

BRIEF SUMMARY OF PRESCRIBING INFORMATION

indications and usage

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

contraindications

None known.

warnings

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

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

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

precautions

general

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

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

This preparation contains no bacteriostatic preservative.

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

pregnancy category C

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

nursing mothers

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

pediatric use

Safety and effectiveness in children have not been established .

adverse reactions

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

how supplied

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

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

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

UNION CARBIDE **FROM ATOM TO IMAGE**

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

$4095 COMPLETE U.S. DOMESTIC

MODEL 256D
WELL COUNTING SYSTEM

GAMMA SPECTROMETER for NUCLEAR MEDICINE

Do you check your incoming radionuclides for purity and possible contamination? Better yet, do you have permanent proof of your quality assurance?

With over 20 years of experience in nuclear instrumentation, The Nucleus offers two complete gamma spectrometry systems designed for radionuclide analysis — and at a price suitable for tight budgets!

MULTICHANNEL ANALYZER

A multichannel analyzer is ideally suited for gamma scintillation spectrometry utilizing a NaI well-type detector. Out standard Model 256D (256 channels of memory) offers all the features required to analyze and compare a known gamma spectra with any unknown sample. And, the data add/subtract feature lets you "strip" known spectra from a mixture of radionuclides. For more sophisticated solid state detectors, we recommend the Model 1024D with 1024 channels of memory. Standard features on the 1024D include an integral 8-decade region of interest sum counter, multichannel scaling, and teletype output. Both models offer a direct reading LED display of channel number and total counts per channel with an illuminated marker cursor.

SCOPE DISPLAY

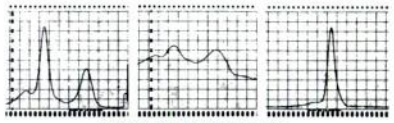
The built-in 5-inch CRT provides a bright, clear display of the accumulated data. On the Model 256D, the memory may be split into halves, 128/128 channels each. This permits direct comparison of spectra. For example, store a known I-125 spectrum in the first half, and then examine the second half spectrum of an incoming shipment. The Model 1024D features a 1024 channel memory which may be split into halves and quarters; each may be overlapped for direct comparison. Naturally, both vertical and horizontal expands are standard on every Nucleus MCA.

WELL DETECTOR

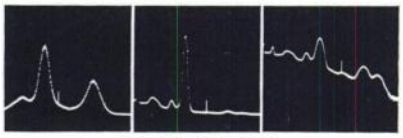
Numerous NaI scintillation probes are available for nearly every gamma spectrum analysis requirement. If you already have such a detector, most likely it will be compatible with either of these multichannel analyzers. Pictured is our Model WP-2000 well-type NaI scintillation probe with a 1.75" by 2" well crystal, on a 2" photomultiplier tube. Well size is .7" (17 mm) diameter by 1.5" (3.8 mm) deep. Resolution is 9% or better, full-width-half-maximum for Cs-137 (0.662 meV). The crystal is surrounded by .75 inches of lead.

HARD COPY RECORDER

For permanent records, a hard copy recorder documents the accumulated spectra. Any chart recorder is compatible, and several inexpensive models are available. Of course, a scope camera by Polaroid makes quick work of documentation. Linear and log readouts are standard features of these MCAs. Reproduced below are actual copies or photographs of some gamma spectra.



HARD COPY RECORD



SCOPE DISPLAYS

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Picture what a Nucleus Gamma Spectrometer can do in your lab. We have mentioned just a few uses - you can probably suggest many more. Some of our customers are presently using this system for monitoring lab waste, reading wipe/smear tests, and uptake applications. Complete systems are available now! But, if you have some equipment and want to talk with our engineers about compatibility or discuss your particular requirements, just write or call, today. Let us send you free brochures describing these and other fine nuclear instruments for quality assurance, health physics and teaching laboratories.

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A spirometer xenon rebreathing device for less than $2500!!! Impossible? Almost, but we did it! We used the technology and know-how gained from 5 years of experience with the Ventil-Con and created the first low-cost spirometer xenon unit.

XenaCon I basic spirometer unit

XenaCon II spirometer unit with built-in Xenon Trap

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PERTINENT SPECIFICATIONS

Mobility: all units are highly mobile, making bedside studies practical
Unit dead space: less than 25 ml in both washout and rebreathing
Spirometer volume: 0-10 liters
Breathing resistance: less than 0.1 inch of water to normal breathing
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trap area — ¼ inch lead
Oxygen replenishment: manual pushbutton valve
Xenon injection port: located in head valve for either direct bolus or homogeneous mixture patient administration

Bacteriological filter: inline autoclavable bacteriological filter

CO_2 trap: high capacity, easy access CO_2 trap

Xenon trap cartridge pack: New vertical activated Charcoal cartridge pack eliminates channeling

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RADX

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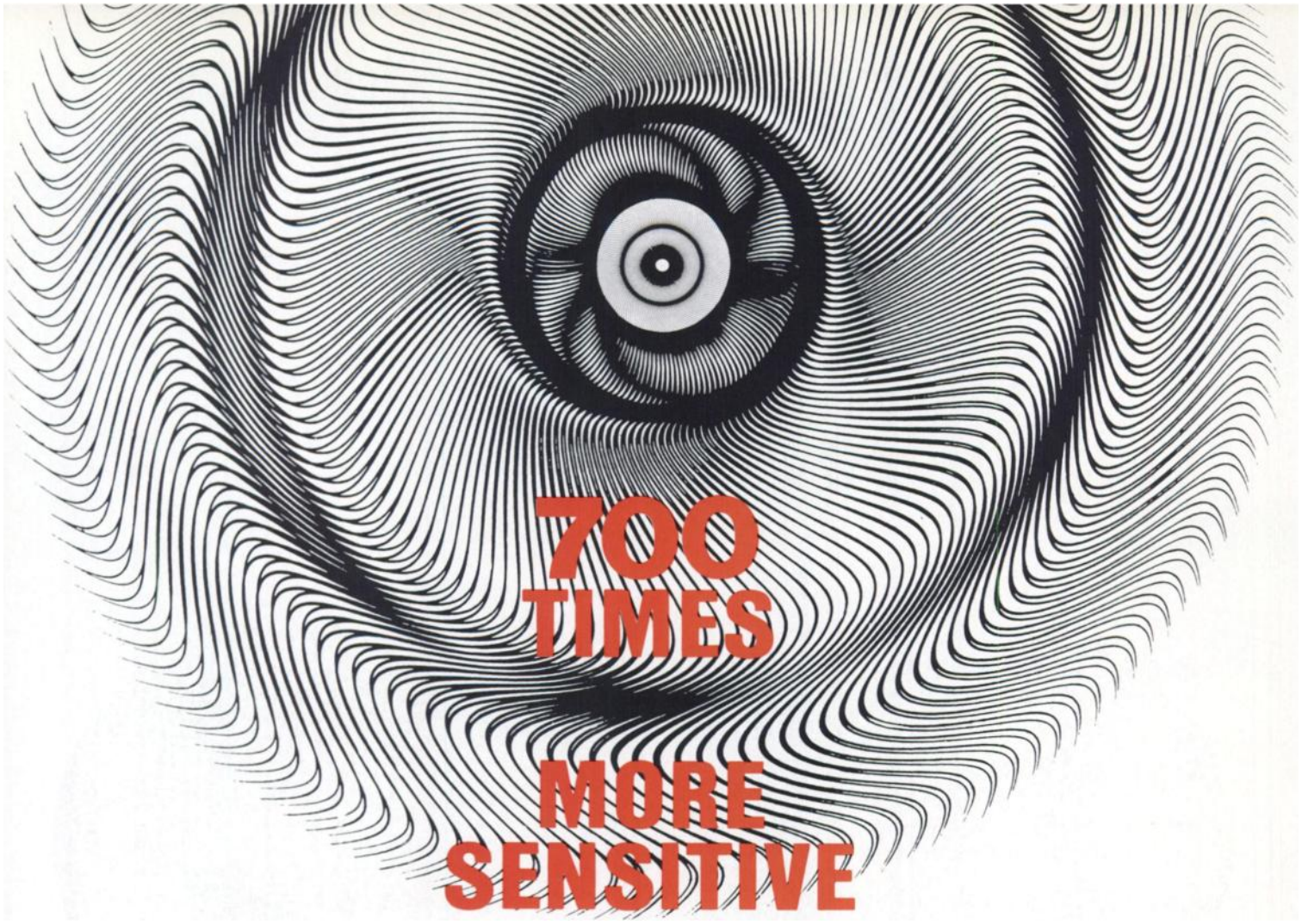

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Our ^{125}I Methotrexate Radioimmunoassay Kit provides a rapid, simple method with an unexcelled level of sensitivity and specificity.
Here is a comparison chart that speaks for itself.
Select the proven DBI ^{125}I MTX-RIA kit to monitor the circulating methotrexate levels in serum, plasma, cerebral spinal fluid or urine.

Also available:
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- ^{125}I T_4-One Step-RIA Kit
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Call or write for our low priced introductory kit.

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

*In units of 200

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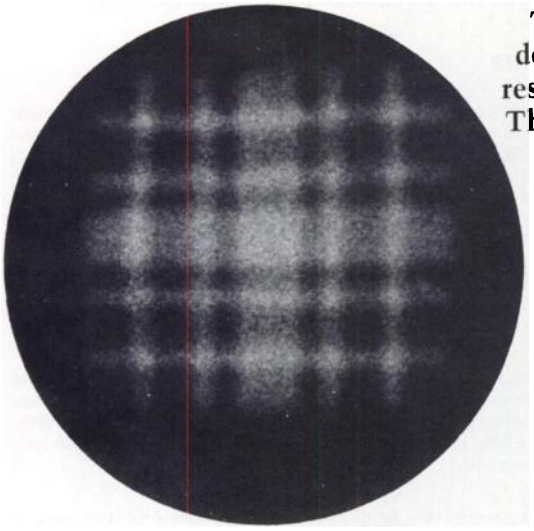
Tel. (714) 452-0950

Gamma Camera Upgrade

1/10 Inch or Better Resolution at a fraction of new system cost.

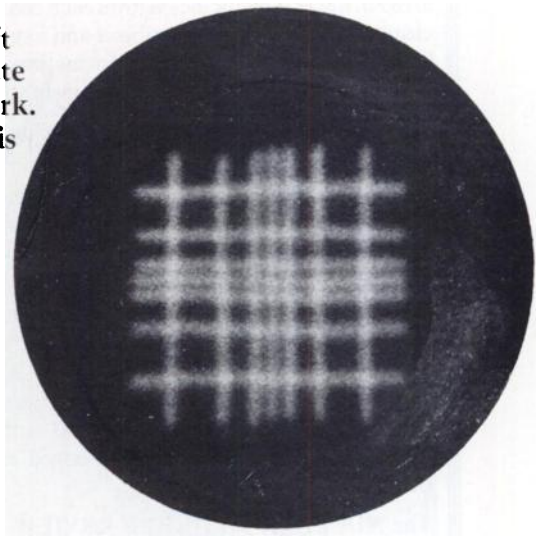
BEFORE
NEN Thallium 201 phantom at 2" distance from collimator.
500K



Picker 2C with ultrafine collimator.

The picture on your left does not provide adequate resolution for cardiac work. The picture on the right is more than adequate!

AFTER
NEN Thallium 201 phantom at 2" distance from collimator.
500K



Picker 2C with ultrafine collimator and SX-11 detector head.

Enjoy new camera performance without a major investment. Nuclear Service Inc. can upgrade your existing gamma camera system to provide you with 1/10" or better intrinsic resolution.

With NSI upgrade you not only receive State-of-the-Art resolution, but in most cases your converted system will provide you with IMPROVED FIELD UNIFORMITY.

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Up to 75% Better Resolution.

Picker	Improved Resolution
2	75%
2C	50%
3C, 4-12	40%
1/8"	20%

*Leasing plans and reconditioned upgraded systems also available.

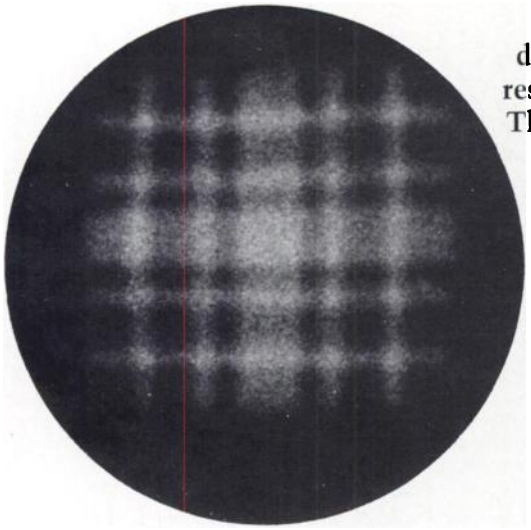
Nuclear Services Inc.

Nuclear Services Inc. (516) 752-9270
P. O. Box 5492 (203) 281-3957
Hamden, CT 06518

Gamma Camera Upgrade

1/10 Inch or Better Resolution at a fraction of new system cost.

BEFORE
NEN Thallium 201 phantom at 2" distance from collimator.
500K



Picker 2C with ultrafine collimator.

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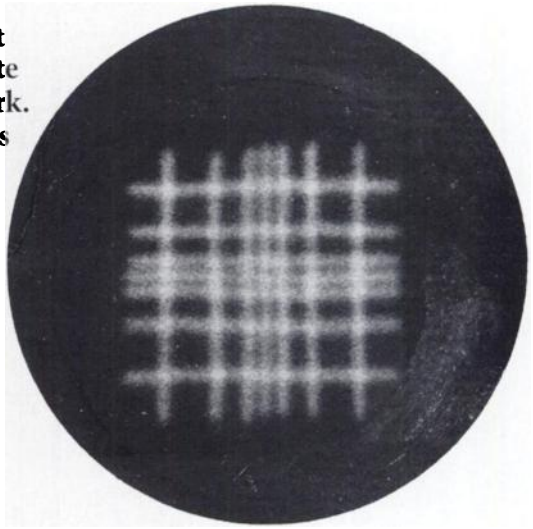
AFTER
NEN Thallium 201 phantom at 2" distance from collimator.
500K



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*Leasing plans and reconditioned upgraded systems also available.

Nuclear Services Inc.

Nuclear Services Inc.
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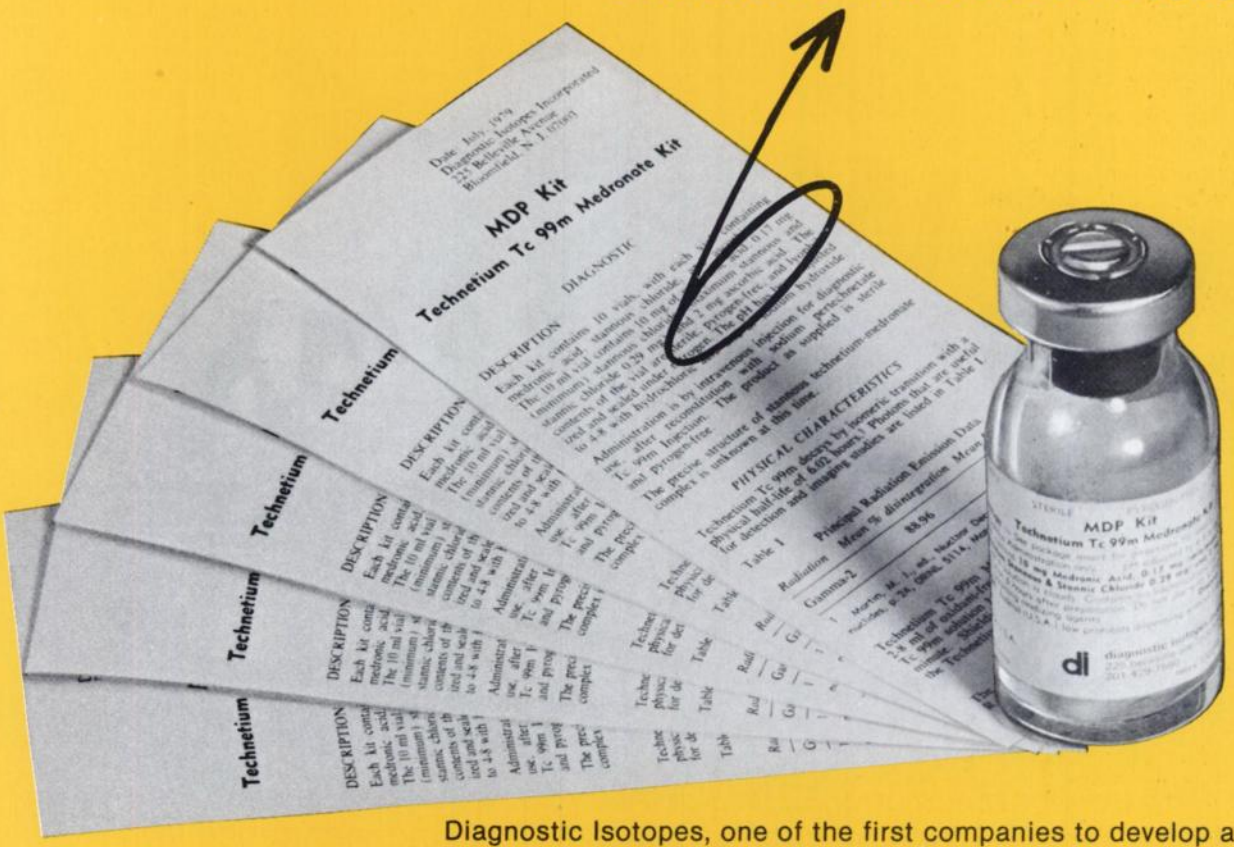
For Superior Bone Images*

DIAGNOSTIC ISOTOPES MDP

(Technetium Tc 99m Medronate Kit)

Our Formulation Is Not The Same!
Only Diagnostic Isotopes MDP
Contains Ascorbic Acid



Diagnostic Isotopes, one of the first companies to develop a Technetium labeled bone imaging agent, is proud to announce its new MDP Kit. Physicians who are acquainted with D.I. quality and service will welcome this latest addition to our product line. As with all D.I. reagents, MDP is conveniently packaged in 10 multi-dose vial kits which may be stored at room temperature.

For pricing information and prompt service, please call either of the numbers listed below.

*G. Subramanian, et al: Technetium-99m Methylene Diphosphonate — A superior agent for skeletal imaging. Comparison with other Technetium complexes. J. Nucl Med 16:74, 1975

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diagnostic isotopes incorporated

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See Opposite Page For Summary Of Prescribing Information

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NEW

DUAL CHANNEL ANALYZER CAPABILITY FOR THE SEARLE III, H.P. OR IV CAMERAS

The Iso-Graphics, Inc., DUAL CHANNEL ANALYZER can upgrade your camera to a dual channel system. Total independence in window width and energy level.

In multi-peak nuclide studies, as with Gallium-67 or Thallium-201, better target to non-target ratio in the image. Improved statistics, while decreasing scan time.

Easy to install — three cables. Can be used as a backup analyzer to the camera.

For Further Details Please Write or Call Us Collect

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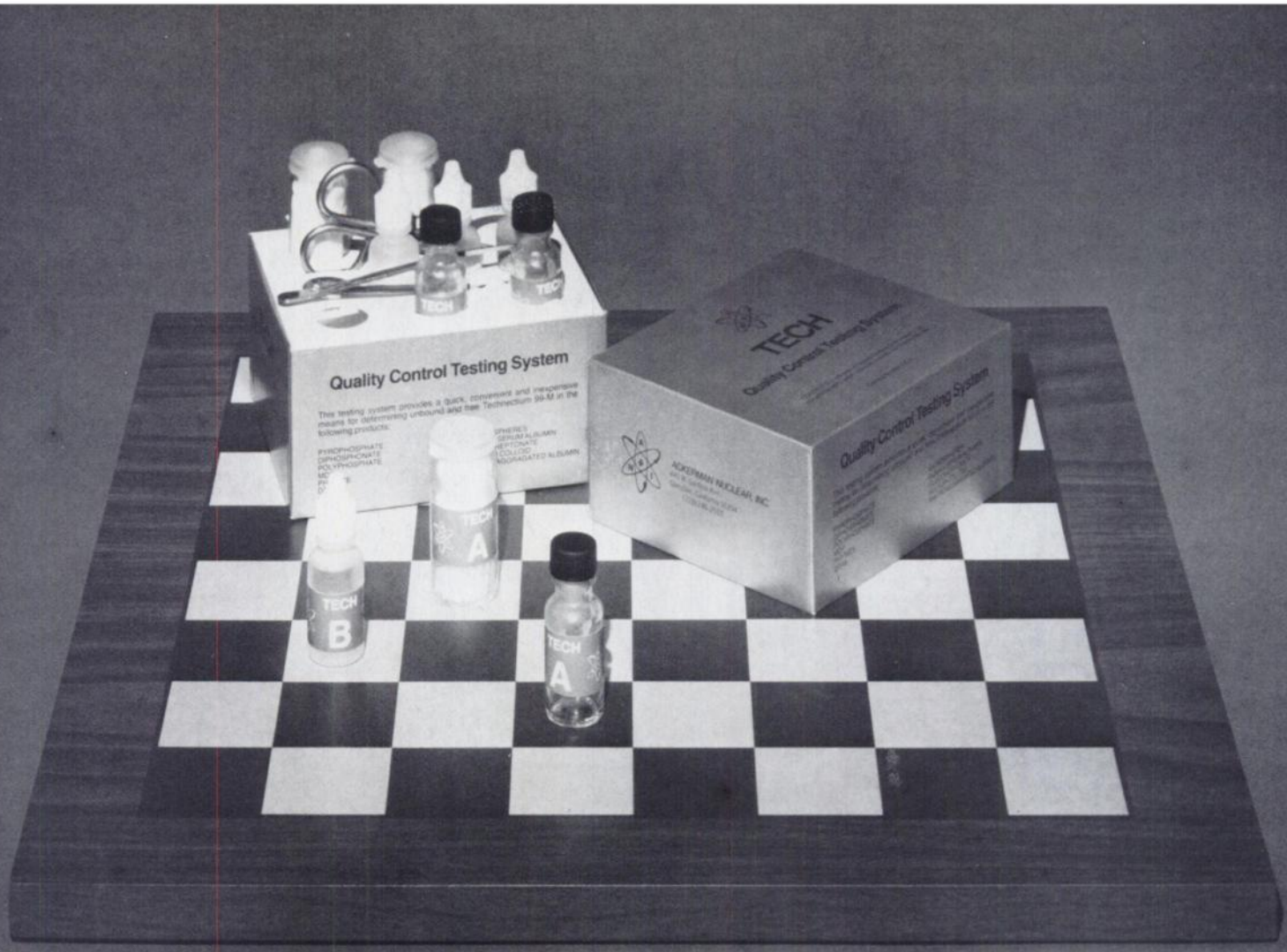

Tech It !

Because quality is important to your image ...Check your Products with a Tech Kit ! It's the only move to make.

Tech is a quality control testing system which provides a quick, convenient and inexpensive means for determining unbound and free Technetium 99m in the following products:

PYROPHOSPHATE
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For more detailed information, contact:

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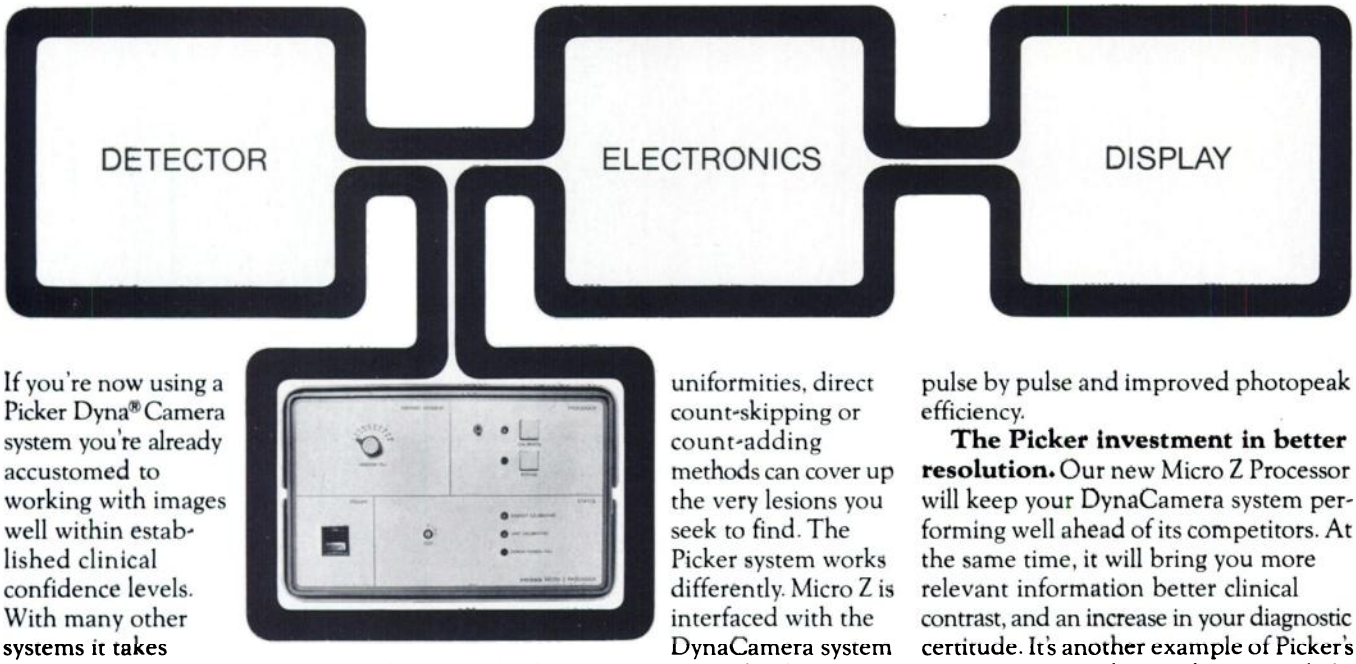
Clean up image uniformity without covering up clinical information.



If you're now using a Picker Dyna® Camera system you're already accustomed to working with images well within established clinical confidence levels. With many other systems it takes uniformity correction to approach Picker's intrinsic system image quality. When you start with a Picker system and add our new Micro Z™ Processor, you now get unequaled resolution and uniformity through our unique and exclusive energy correction technique. And, unlike other correction devices, Picker's Micro Z shows you more of what you're looking for—without eliminating events you might need to see—and in less time.

Beware the cover-up. Systems that reject counts at the scope end tend to produce cosmetically acceptable pictures. You can see definite improvement. Unfortunately, in correcting these non-uniformities, direct count-skipping or count-adding methods can cover up the very lesions you seek to find. The Picker system works differently. Micro Z is interfaced with the DynaCamera system at the front end between the detector and the electronics. It functions not by covering up information, but by accepting more good counts before electronic processing. Cosmetically you get the clinical image you expected. Diagnostically, you get a great deal more information.

Don't trade numbers for clarity. The accompanying defect of cosmetics is a loss of numeric accuracy. The Picker system gives you both—and a choice of either. A simple switch lets you optimize energy resolution and/or cosmetic uniformity. The secret of our Micro Z Processor is a digitally controlled energy window that is automatically set for optimum scatter rejection pulse by pulse and improved photopeak efficiency.

The Picker investment in better resolution. Our new Micro Z Processor will keep your DynaCamera system performing well ahead of its competitors. At the same time, it will bring you more relevant information better clinical contrast, and an increase in your diagnostic certitude. It's another example of Picker's continuing plan to let you do more with the diagnostic equipment you already own. For more information and a reprint of a paper delivered at SNM in Anaheim, entitled "Uniformity Correction with the Micro Z Processor," please write: Picker Corporation, 12 Clintonville Road, Northford, CT 06472 (203-484-2711); or Picker International, 595 Miner Road, Highland Hts., OH 44143.

PICKER®
ONE OF THE CIT COMPANIES

The Mallinckrodt Ultra-TechneKow® FM (Technetium Tc 99m) Generator.

Designed with people in mind.

The **Ultra-TechneKow FM** Generator was designed to bring you the best balance between safety, ease of operation and dependable yield efficiency. Over 15 years of experience and evolutionary progress is reflected in this state-of-the-art generator system.

Easier to lift and move.

Significant weight reductions have been made by changing the internal column shield design. Weight is down 44% on small units and 24% on large units. A large handle is on top for easier lifting and better maneuverability.

Improved shielding.

The auxiliary shield provides additional protection from radiation on all sides and the top. Radiation profile information is available from your Mallinckrodt representative.

Dependable yield efficiency.

While fluctuations in yield efficiency can be expected, the **Ultra-TechneKow FM** Generator is noted for producing consistently high yields of technetium Tc 99m.

Backed by the Mallinckrodt distribution and service team.

In a recent independent survey of 400 nuclear medicine departments, Mallinckrodt ranked first in delivery and service.* Because of this record of being on time and on hand when you need special assistance, we believe you can count on Mallinckrodt having the best and most complete technetium delivery "system" in the world.

***Data on file, Mallinckrodt, Inc.**

People: the most important part of our system.

Ultra-TechneKow® FM (Technetium Tc 99m) Generator

Mallinckrodt NUCLEAR

The IMAGE MAKERS

The Mallinckrodt Ultra-TechneKow® FM (Technetium Tc 99m) Generator. Designed with people in mind.

Ultra-TechneKow® FM
(Technetium Tc-99m Generator)
For the Production of Sodium Pertechnetate Tc 99m

DESCRIPTION

The **Ultra-TechneKow** FM Generator is prepared with fission-produced molybdenum-99. This generator provides a closed system for the production of sterile metastable technetium-99m, which is produced by the decay of molybdenum-99. Sterile, pyrogen-free isotonic solutions of Sodium Pertechnetate Tc 99m can be obtained conveniently by periodic aseptic elution of the generators. These solutions should be crystal clear.

The generator consists of a sealed glass chamber containing specially processed alumina. This treated alumina has a high absorption capacity for molybdenum-99 and a low affinity for technetium-99m. As a result, elution of the generator yields a solution of technetium-99m containing negligible amounts of molybdenum-99.

ACTIONS

The pertechnetate ion distributes in the body similarly to the iodide ion but is not organified when trapped in the thyroid gland. Pertechnetate tends to accumulate in intracranial lesions with excessive neovascularity or an altered blood-brain barrier. It also concentrates in thyroid gland, salivary glands, stomach and choroid plexus. After intravascular administration it remains in the circulatory system for sufficient time to permit blood pool, organ perfusions, and major vessel studies. It gradually equilibrates with the extracellular space. A fraction is promptly excreted via the kidneys.

INDICATIONS

Sodium pertechnetate Tc-99m is used for brain imaging, thyroid imaging, salivary gland imaging, placenta localization and blood pool imaging.

CONTRAINDICATIONS

None.

WARNINGS

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

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.

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.

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

ADVERSE REACTIONS

None.

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 dose range employed for various diagnostic indications in the average patient (70 kg) is:

brain imaging:	10 to 20 mCi
thyroid gland imaging:	1 to 10 mCi
salivary gland imaging:	1 to 5 mCi
placenta localization:	1 to 3 mCi
blood pool imaging:	10 to 20 mCi

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 imaging, placenta localization and blood pool imaging.

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

HOW SUPPLIED

The **Ultra-TechneKow FM** (Technetium Tc 99m) Generators contain the following amount of molybdenum-99 at the time of calibration stated on the label.

Catalog Number	
100	0.25 curies
101	0.50 curies
106	0.75 curies
102	1.0 curies
103	1.5 curies
104	2.0 curies
105	2.5 curies
107	3.0 curies

Each generator is supplied with the following components for the elution of the generator.

- 6—Sterile, graduated, evacuated collecting vials
- 6—Sterile Luer-Lock needles with plastic covers
- 6—Pressure-sensitive "Caution—Radioactive Material" collecting vial labels
- 6—Pressure-sensitive radioassay data labels for lead dispensing shield

EVACUATED COLLECTING VIALS. Collecting vials are available on request in 5, 10, 20 and 30 milliliter sizes.

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

Mallinckrodt® NUCLEAR
RADIOPHARMACEUTICALS

From 1 km the earth is flat.
From 10 km the earth is flat.
From 100 km the earth is round...
...at last.

TCK-15-S has the widest diagnostic spectrum...
at last.

Many hepatobiliary agents are fine for bilirubin levels up to 10 mg/100 ml. But only TCK-15-S allows diagnosis in icteric patients where the bilirubin level may be as high as 25 mg/100 ml.

SORIN allows "the earth to be seen as round".

TCK-15-S is a kit for labelling p-butyl Iminodiacetic Acid (IDA) with Tc-99 m and is characterised by very low renal excretion and negligible bilirubin dependancy.

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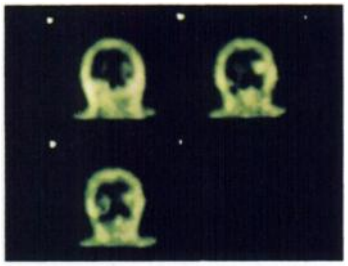
SINGLE PHOTON EMISSION TOMOGRAPHY

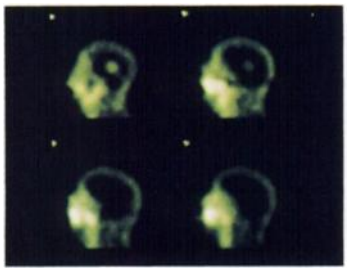
another example of Informatek versatility

INTRA CEREBRAL TUMORS
Both tumors are seen on:

transversal axial tomogram

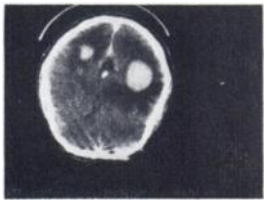


frontal tomograms



sagittal tomograms

Three hours after injection of 2 mCi of 99m-Tc, 64 views of 10 seconds each were acquired.
Hospital Frederic Joliot, Orsay, France.



C T image

Exciting results have been produced with Informatek's **SIMIS**™ nuclear image processing computer.

Using a single photon gamma camera with axial rotation, this study was gathered, processed and displayed in the same amount of time as standard gamma camera/ computer examinations.

Single Photon Emission Tomography is now possible with a system which can also be used for routine nuclear medicine procedures.

Throughout the world, Informatek software is at the forefront of nuclear image processing. Ask our users. They benefit from it every day.

Visit us at Booths 159 and 161 at the 29th Annual Scientific Session of the American College of Cardiology, Houston, Texas March 9 - 13

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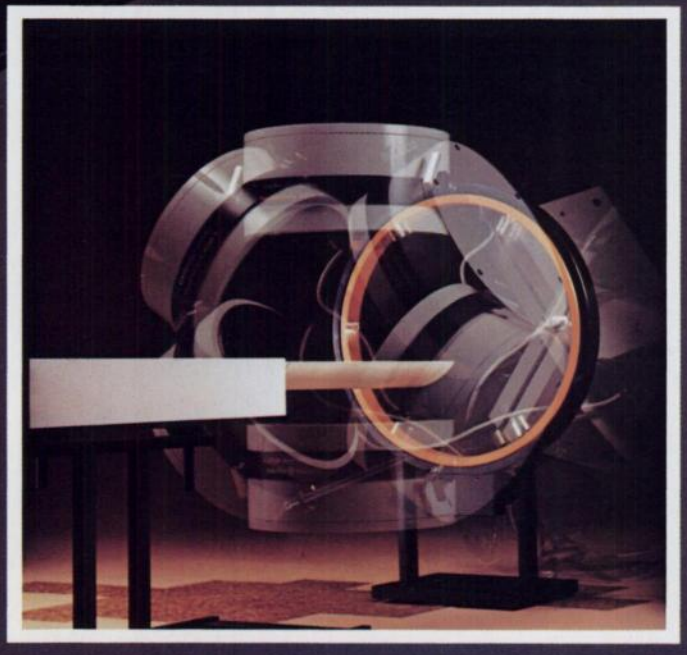
Informatek's clinical data processing systems are noninvasive instruments for use in clinical research and diagnosis which do not come into direct contact with the patient and cannot cause direct injury. For directions on proper use, refer to Informatek's instruction manual, as well as the instructions for use accompanying any products used in concert. Informatek clinical data processing systems were engineered solely for use under the direction of, and using methods approved by, a qualified physician.

The timeless system

Quality diagnostic images and "planned evolution" make today's MaxiCamera™II the nuclear system of choice. Modular electronics allow you to individualize your system while other options, like whole body capability and data processing meet expanding application needs.

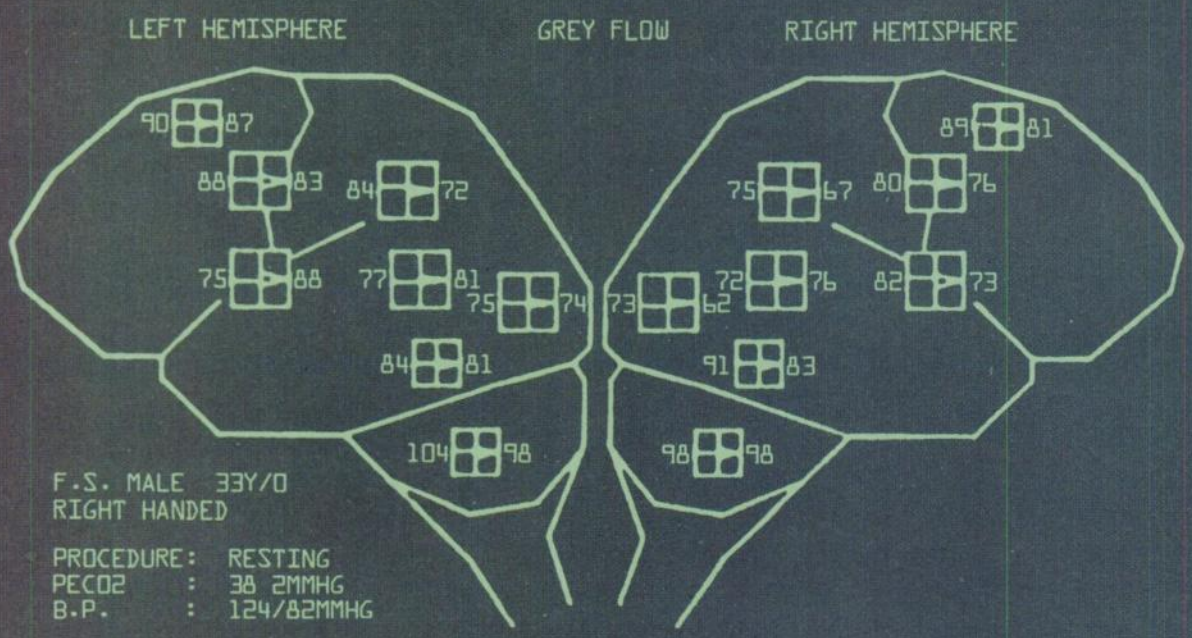
Since emission computed tomography, ECT, is the next logical step in nuclear imaging, GE has developed the MaxiCamera 400T. This simple, economical detection system replaces the gimbal stand with a rotating gantry so the detector can acquire images from numerous angles around the patient.

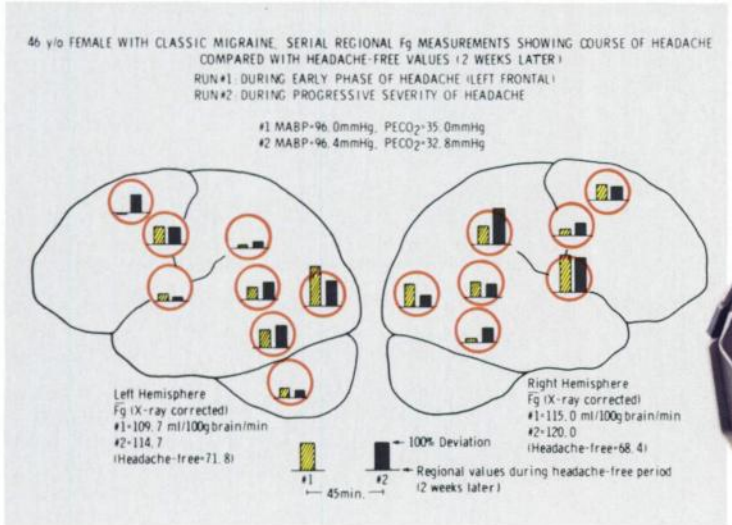
MaxiCamera II/400T is one-of-a-kind—timeless because you can have an outstanding camera system for routine studies and future tomographic capability. It's "planned evolution" at work for you. Ask your GE representative.



GENERAL ELECTRIC

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.

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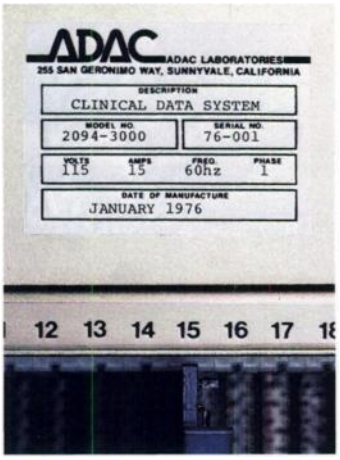

This makes ADAC owners very happy.

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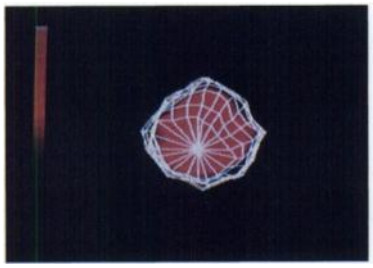
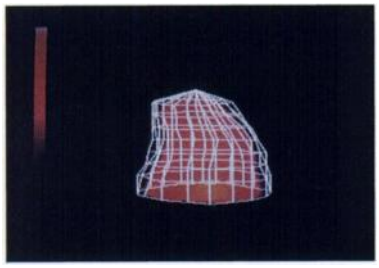
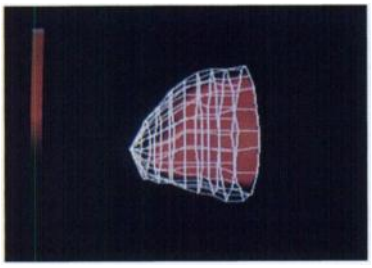
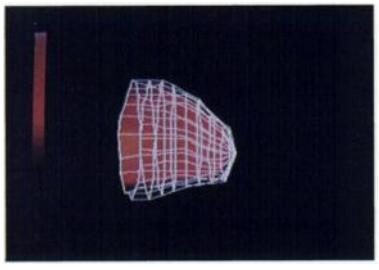
This is only one reason doctors have called the ADAC Nuclear Medicine Computer the finest system of its kind in the world.


LAO


Inferior


LPO


RAO

Shade Program:
A three dimensional representation of the left ventricle is constructed for each segment using the 8 areas of interest of each plane in each segment. The even spacing of the planes is known since it was specified to perform the reconstruction; therefore, the areas of interest, x and y dimensions, can be connected to create the depth, z dimension. The operator can specify the projection for the constructed three dimensional image or "birdcage." Rotation can be done on the heart's x, y and z axis. Clinically, it is very valuable to rotate to the RAO, LPO, Superior Aspect, and Inferior Aspect. For example, the RAO projection allows the viewing of the long axis of the left ventricle without the right ventricle superimposed, since the edge detection did not include the right ventricle.

built-in future.

Why? Among other things, a 512 × 512 display format and 64 shades of gray that deliver an image nearly identical to original analog scintiphotos.

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For additional information, please write or call collect.

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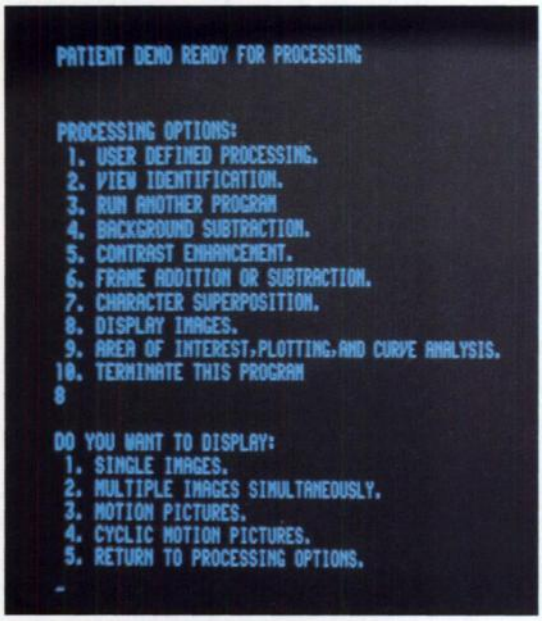
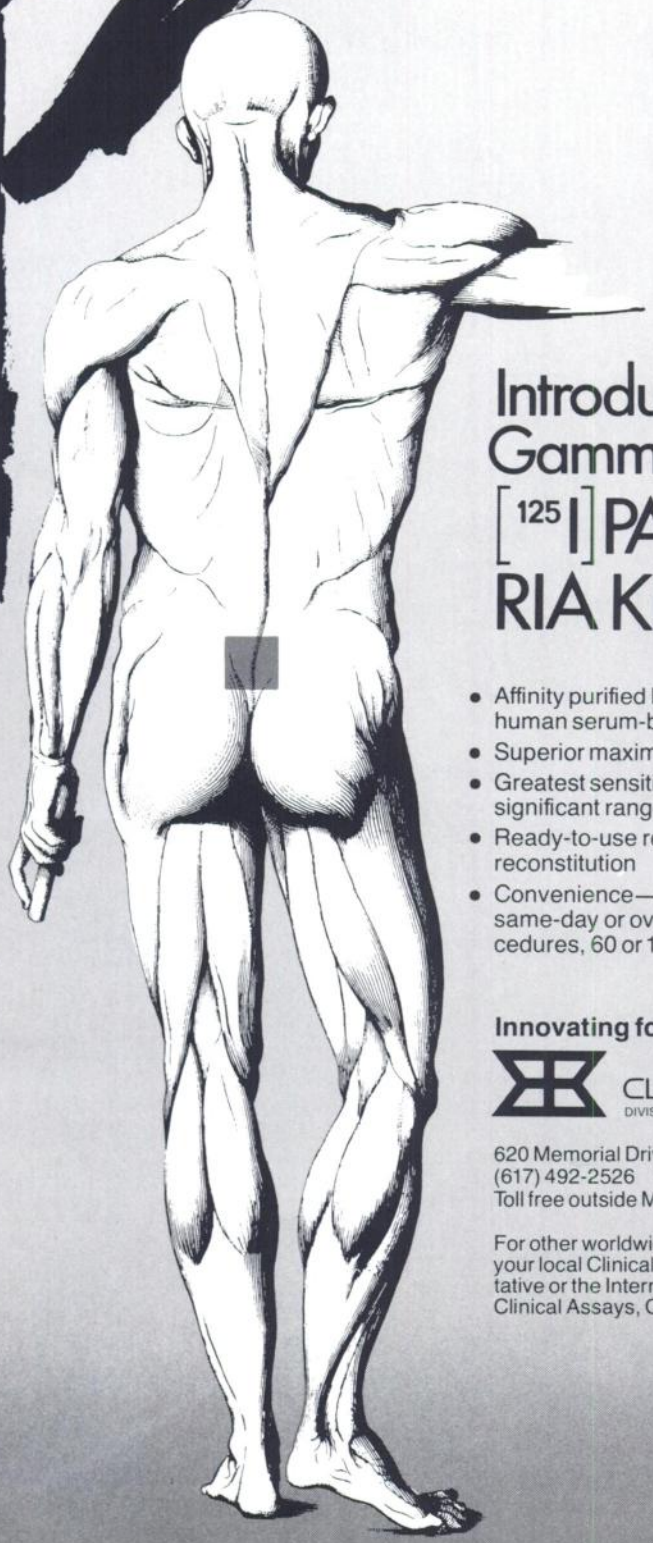


ADAC
Nuclear Medicine Computers

PRECISION ACCURACY PERFORMANCE

PAP



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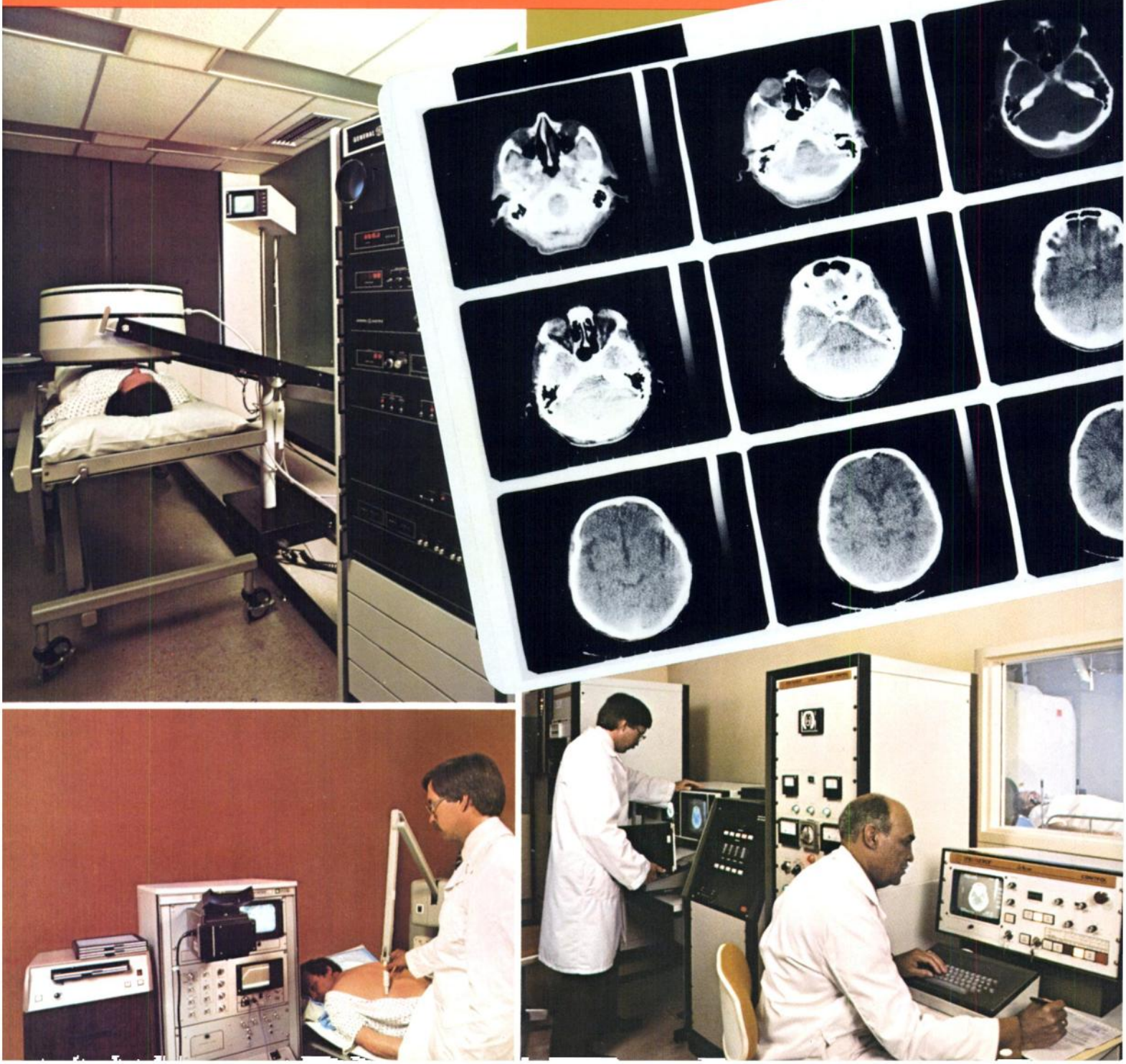

The one film for all your computed tomography, ultra-sound and nuclear medicine imaging needs...

Up to now, if you wanted good CRT image recording from computed tomography, ultra-sound and nuclear medicine equipment, you may have used several different "special purpose" imaging films.

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

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

Matched Response To All CRT Displays.

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

SCOPIX CR3 Film is a single-coated, orthochromatic, medium speed film of relatively high contrast, which gives outstanding recording of CT scan, ultra-sound and nuclear video images.

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

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Photos courtesy Mt. Sinai Hospital, N.Y.

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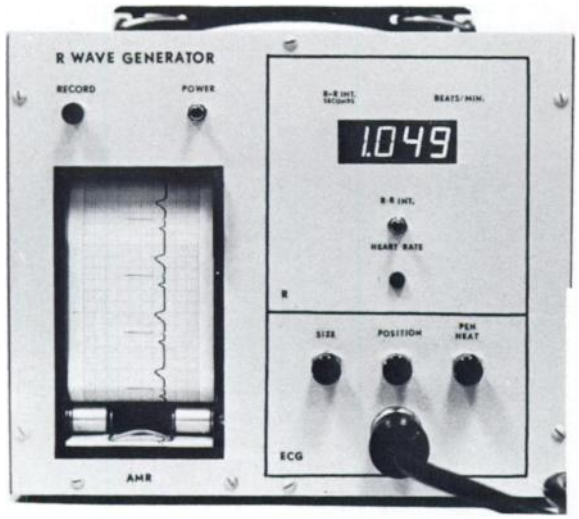
4). Trigger pulse LED.
5). No upper limit on heart rate.



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1). Computer is gated only on the R wave, high amplitude T waves are ignored by exclusive discrimination circuits.
2). Provides permanent record of patient ECG; insures proper lead placement.
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The Instrument Is Available In Four Models.

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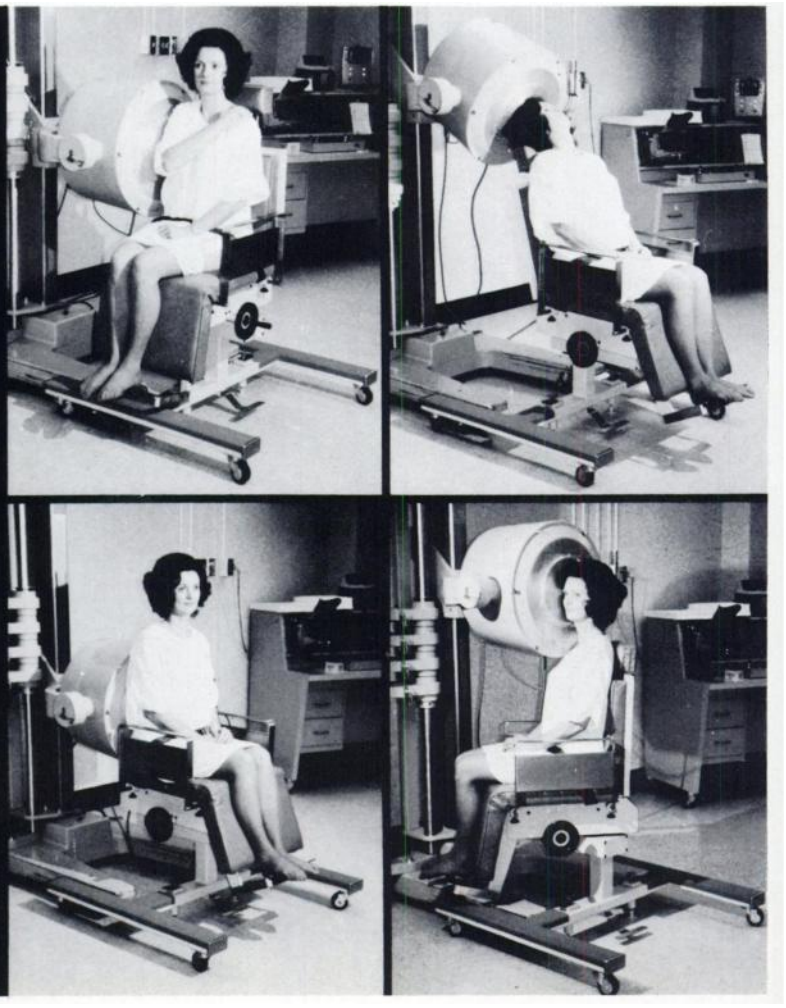

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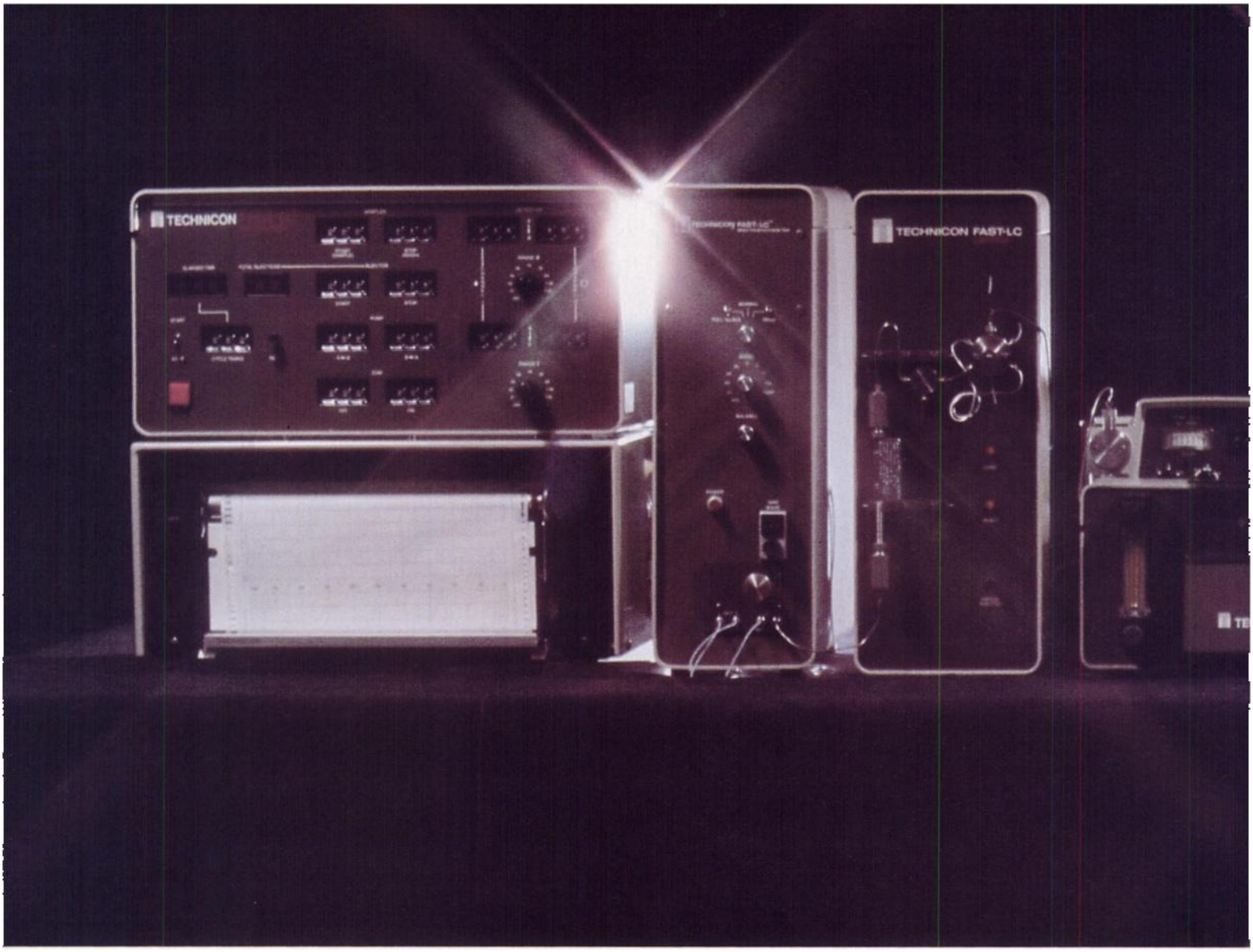

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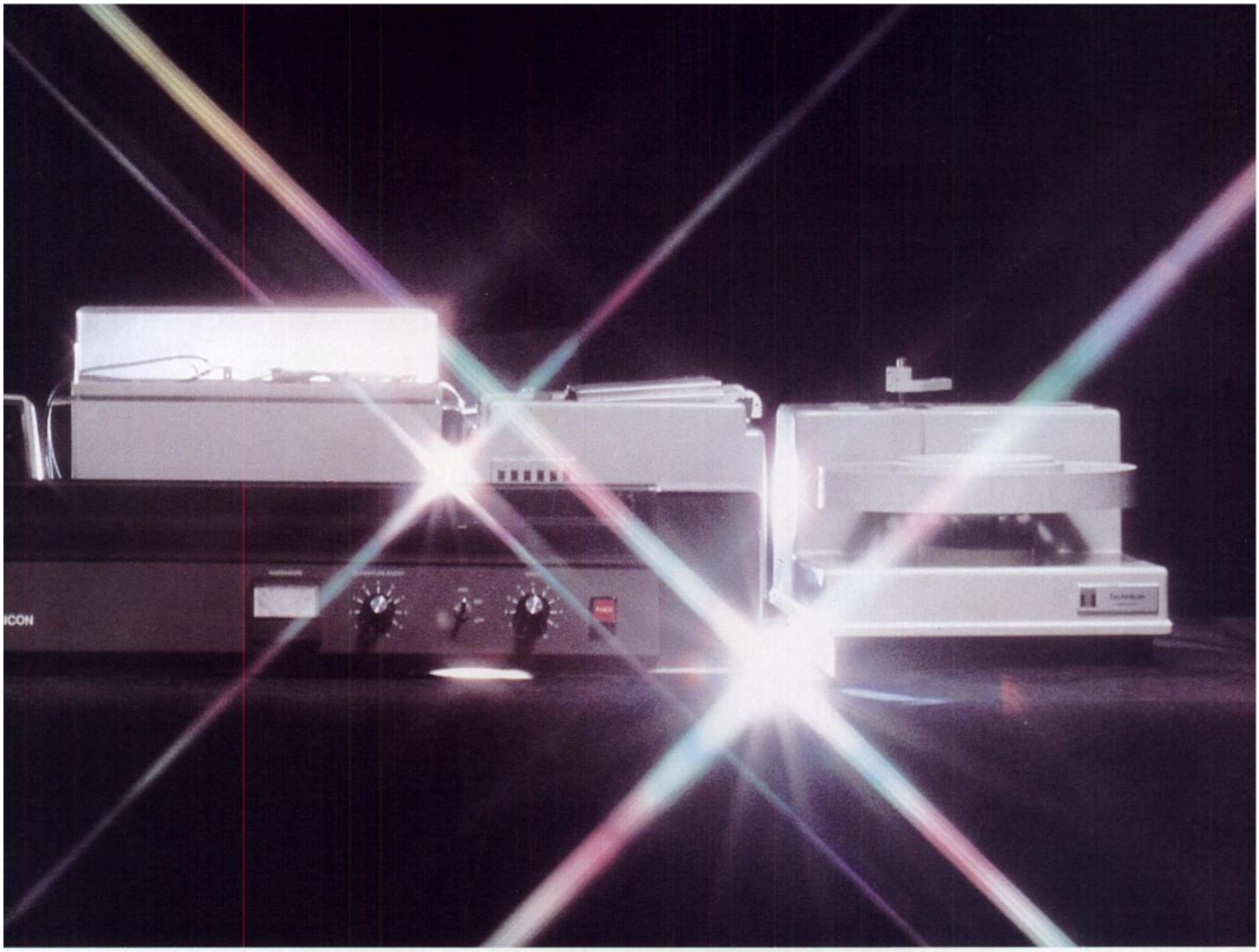
Introducing the keep-it-simple system: the new Technicon FAST-LC System.



Simple, because the System is simple to operate.
The technologist only has to load the unprepared samples into the sample tray. The rest is automatic.

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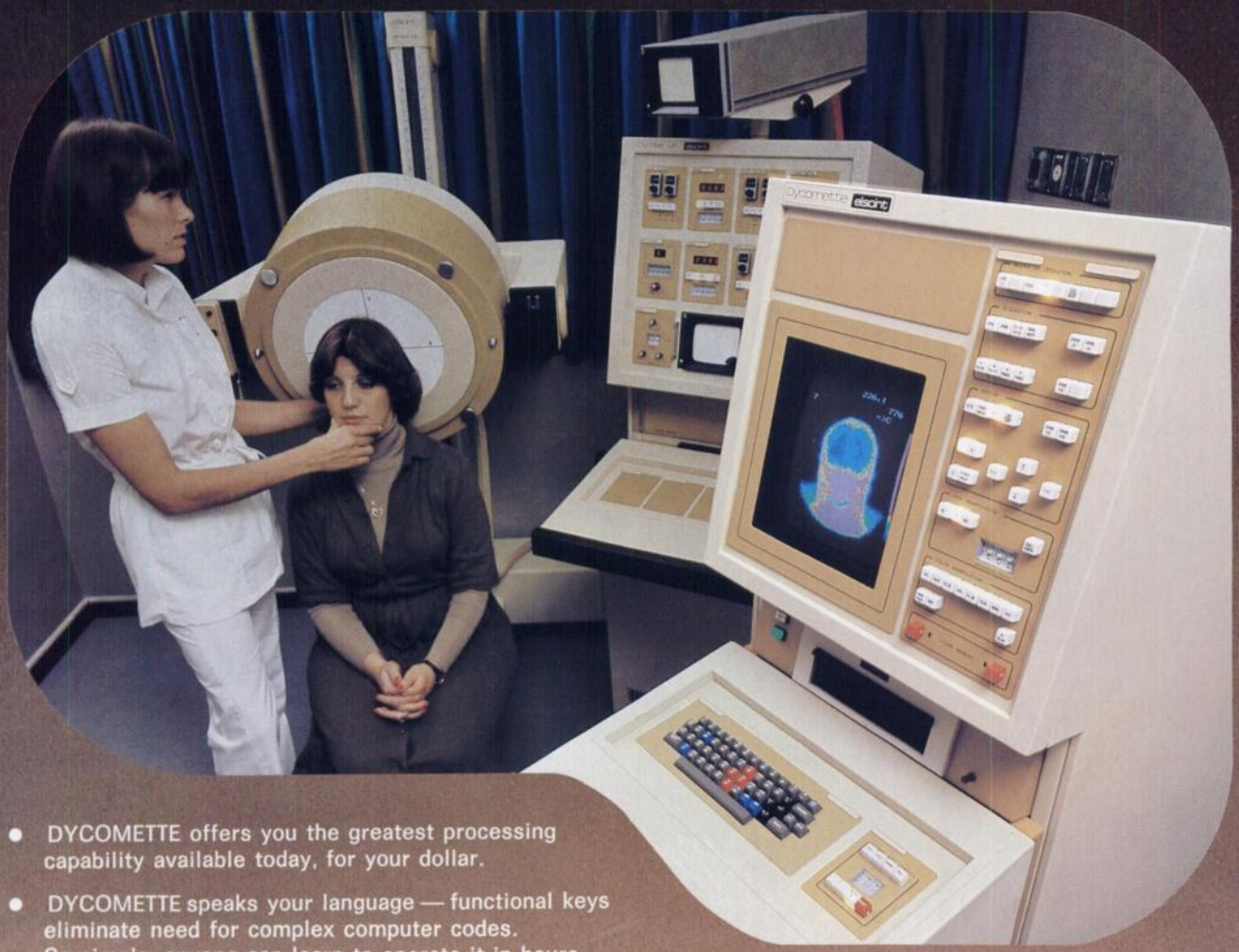

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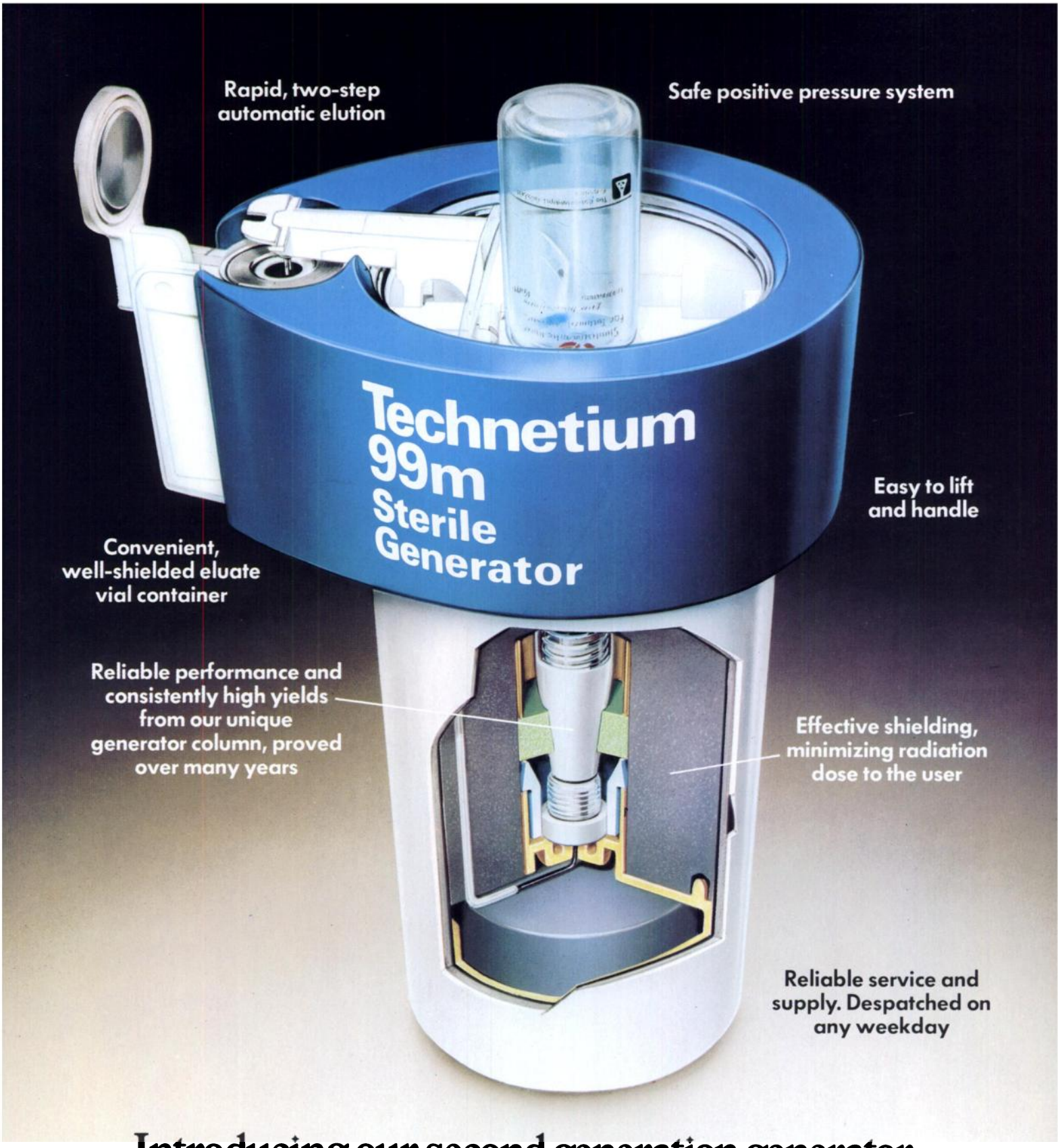

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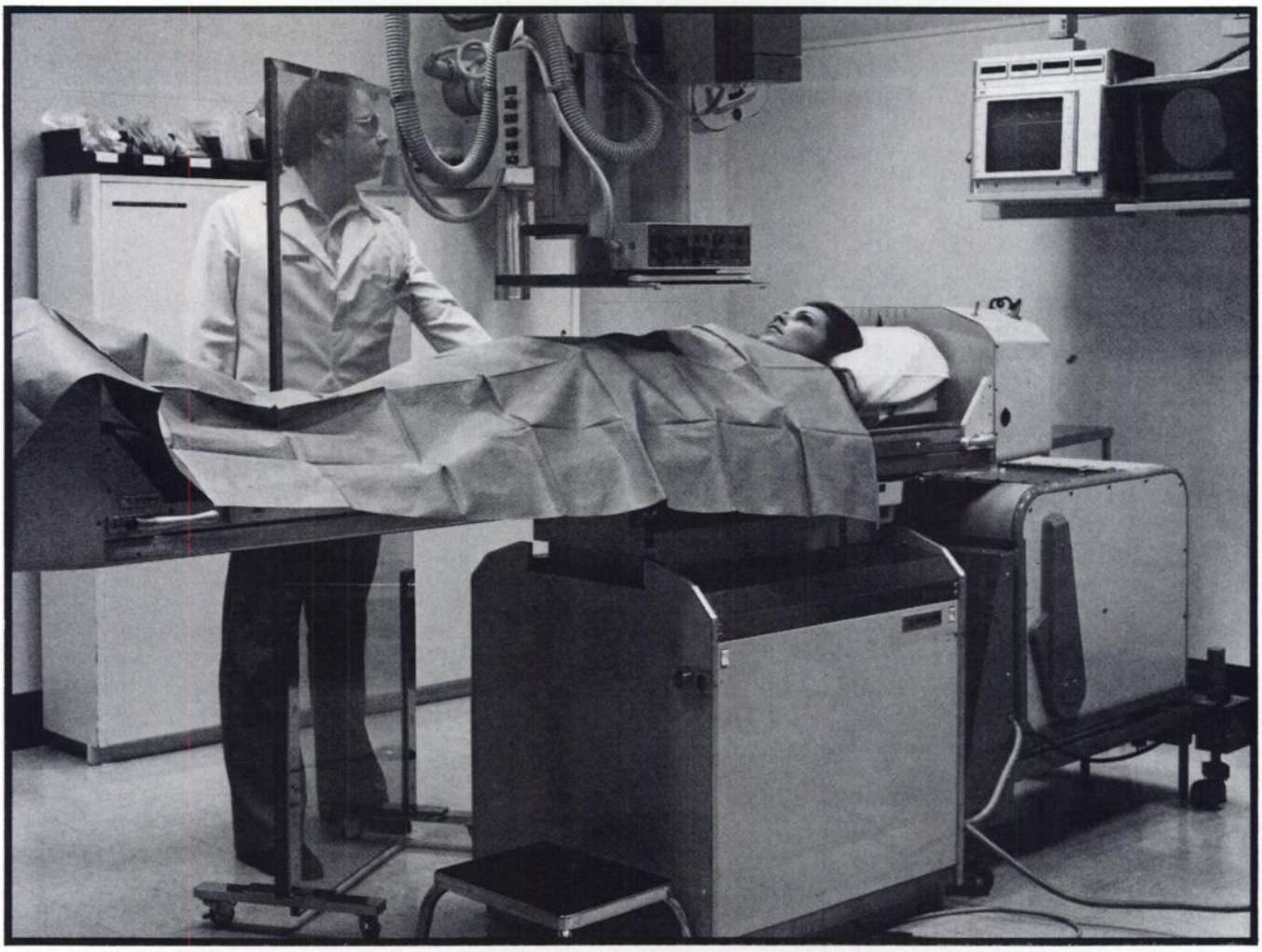

A portable, shatterproof acrylic shield is now available for much broader "uninhibited-sight" in Radiology and Nuclear Medicine applications. At a lead equivalency of .82mm, this new leaded acrylic provides two to three times the protection of the standard lead apron. At 30" wide and 67" tall and 0.7" thick, full body protection is possible while maintaining total visibility with the patient.

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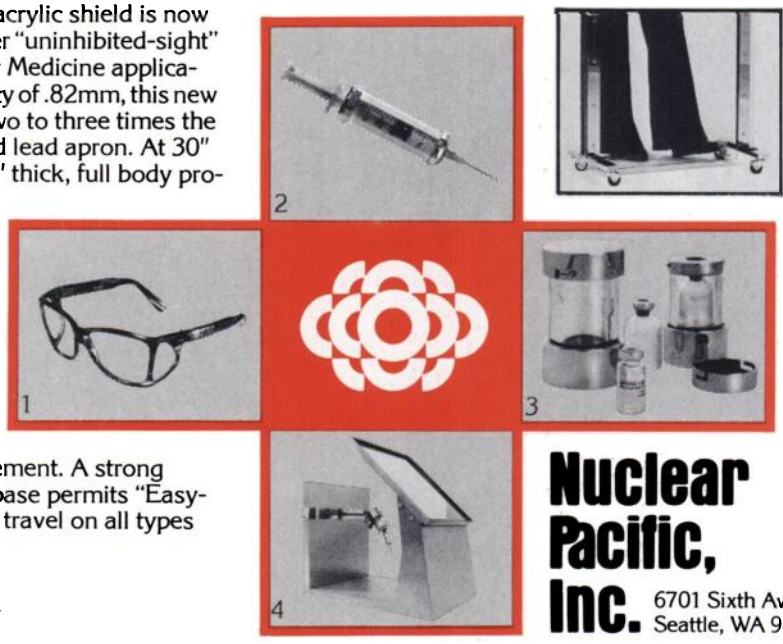

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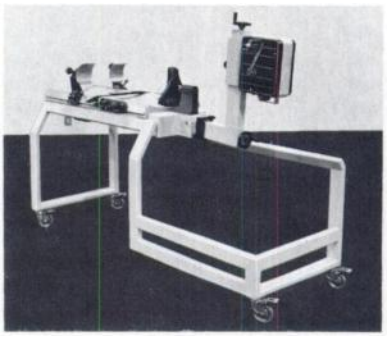
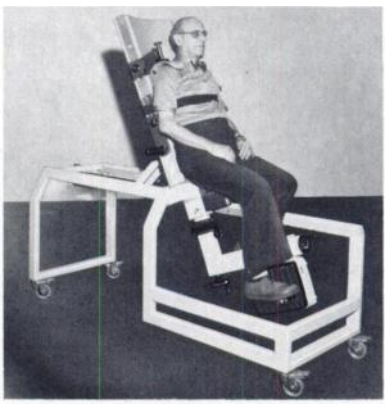


VERSATILE

- Permits all patient positions, from supine through upright.
- Adjustable seat, pedal unit, hand grips and shoulder braces.
- Table does "double duty" for standard imaging procedures.



PRACTICAL

- Full clearance for gamma camera base.
- Swing-away pedal unit for patient access.
- O.R.-type casters assure complete mobility.

COST EFFECTIVE

- High-quality Warren Collins pedal unit and control console can be used for standard stress testing.
- Exceptional performance, designed expressly to meet the requirements of nuclear cardiology.

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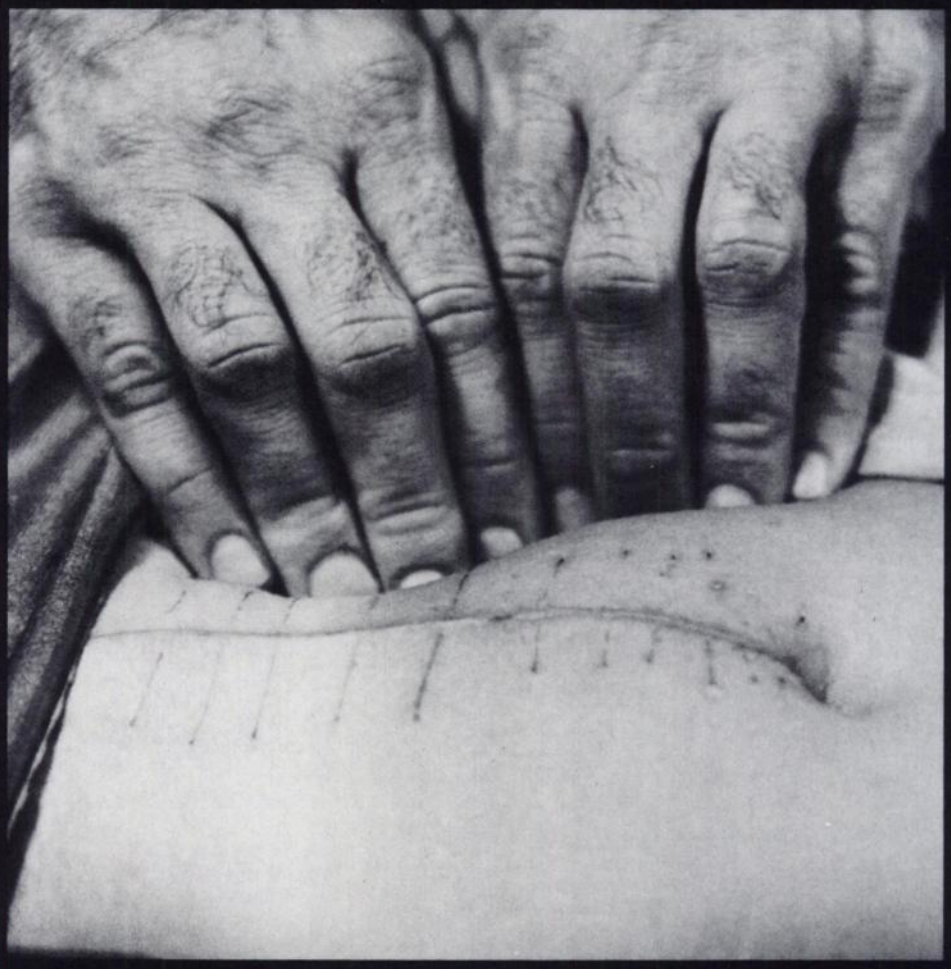
Postop sepsis?

Where does gallium-67 imaging fit into your fever workup?



PLEASE SEE LAST PAGE FOR FULL PRESCRIBING INFORMATION.

Gallium-67 imaging:

Why you should consider ordering a gallium scan when you suspect postop abscess:

Routinely available
Gallium scans are routinely available in virtually all nuclear medicine departments.

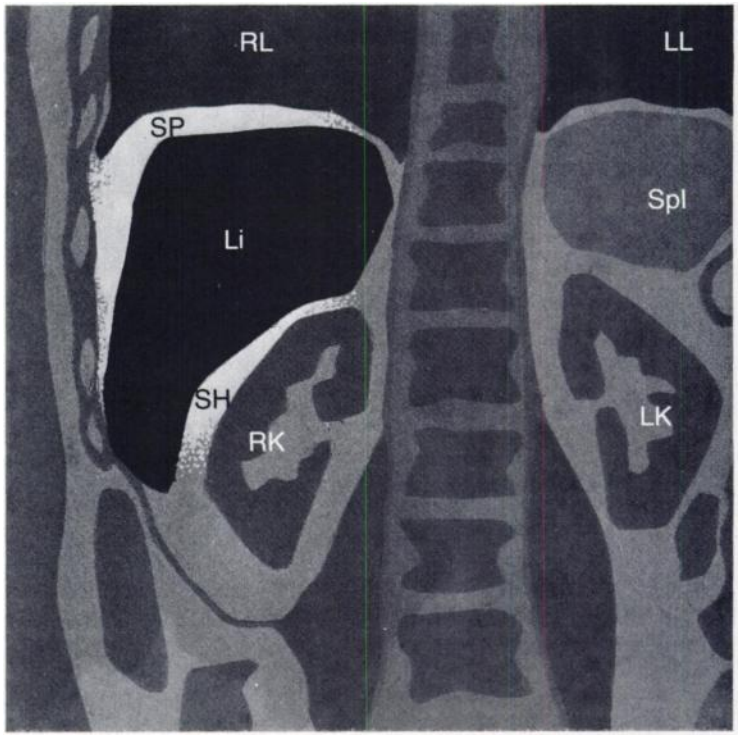
Diagnostic results early
Most abscesses avidly take up gallium 6-24 hours postinjection, although delayed (48-72 hour) images may be useful to distinguish pathologic from physiologic fecal concentration.

Superior to CT, ultrasound
CT and ultrasound generally do not localize inflammation that does not produce a mass (eg, peritonitis, pyelonephritis). In addition, small abdominal masses missed by CT have been seen on gallium studies.[1,2,3]

No interference from respiration, clips, staples
Respiratory motion of critically ill patients can render CT studies uninterpretable . . . as can metallic surgical clips, staples, and sutures.

No special preparation
Although bowel prep may be necessary for delayed studies, no cathartics need be administered for early images; NPO patients need no special preparations.

What a gallium scan can



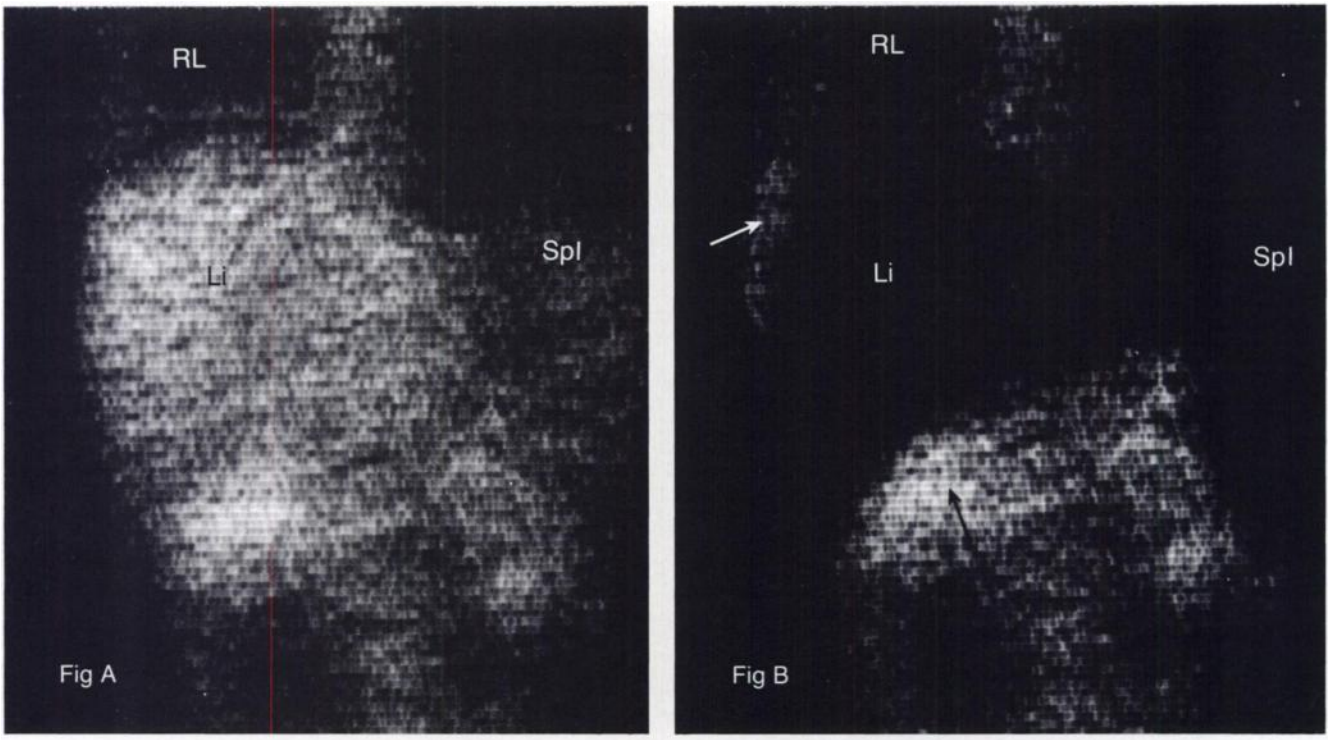
Idealized coronal section demonstrating the normal anatomic relationships between the right lung, liver, and right kidney, with highlighting of right subphrenic and subhepatic spaces. (Li = liver, LK = left kidney, LL = left lung, RK = right kidney, RL = right lung, SH = subhepatic space, Spl = spleen, SP = subphrenic space.)

A slide teaching program and home study monograph, *Diagnosing Postop Infection*, is available upon request from NEN. Use the coupon at right, or call
(800) 225-1572, ext. 2234 TOLL FREE.

If the gallium study is normal, no further radiographic evaluation may be required.[4]

Detects and localizes focal inflammation Superior to CT, ultrasound

show you in subphrenic and subhepatic abscesses:



CASE REPORT: *James R, 35 y M* The patient was a 35-year-old male who developed leukocytosis and spiking fevers eight days following surgical resection for regional enteritis. Chest X-ray demonstrated a small right pleural effusion. Abdominal echography was inconclusive due to excessive bowel gas. An anterior gallium scan (Fig A) showed normal isotope uptake in the liver, and suspicious areas of increased uptake in right subphrenic and right subhepatic spaces, suggesting focal infection. The same anterior view, but with computer subtraction of normal liver-spleen uptake (Fig B), clearly reveals persistent gallium accumulation in small right subphrenic and larger right subhepatic abscesses (arrows). These findings were confirmed at laparotomy. Anatomic detail in the gallium studies can be appreciated by comparison to the coronal anatomic section drawing.

Gallium Citrate Ga67

See following page for full prescribing information.

Teaching Program Administrator

New England Nuclear
Medical Diagnostics Division
549 Albany St., Boston, MA 02118

Please send me information on Diagnosing Postop Infection.

Name_____

Title/Specialty _____

Institution _____

Address_____

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0109

Gallium Citrate Ga67

FOR DIAGNOSTIC USE

DESCRIPTION: Gallium Citrate Ga 67 is supplied in isotonic solution as a sterile, non-pyrogenic diagnostic radiopharmaceutical for intravenous administration. Each milliliter of the isotonic solution 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. Gallium Ga 67, with a half-life of 78 hours, is cyclotron produced by the proton irradiation of enriched zinc oxide, is essentially carrier-free and contains negligible concentrations of other radioactive isotopes.

PHYSICAL CHARACTERISTICS

Gallium Ga 67 decays to stable Zinc Zn 67 by electron capture with a physical half-life of 78 hours.

TABLE 1. Principle Radiation Emission Data

Radiation	Mean % per Disintegration	Mean Energy (keV)
Gamma-2	38.3	93.3
Gamma-3	20.9	184.6
Gamma-5	16.8	300.2
Gamma-6	4.7	393.5

TABLE 2. Gallium Ga 67 Decay Chart Half-Life 78 Hours

Hours	Fraction Remaining	Hours	Fraction Remaining	Hours	Fraction Remaining
-48	1.53	30	0.77	90	0.45
-36	1.38	36	0.73	96	0.43
-24	1.24	42	0.69	108	0.38
-12	1.11	48	0.65	120	0.35
- 6	1.05	54	0.62	132	0.31
0*	1.00	60	0.59	144	0.28
6	0.95	66	0.56	156	0.25
12	0.90	72	0.53	168	0.23
18	0.85	78	0.50		
24	0.81	84	0.47	*Calibration Time	

EXTERNAL RADIATION

The specific gamma ray constant for Gallium Ga 67 is 1.6R/mCi-hr. at 1cm. The first half value thickness of lead is 0.66mm. 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 3. For example, the use of 4.1mm of Pb will decrease the external radiation exposure by a factor of 10.

TABLE 3. Radiation Attenuation by Lead Shielding

mm of Pb	Radiation Attenuation Factor	mm of Pb	Radiation Attenuation Factor
4.1	10^{-1}	25	10^{-3}
12	10^{-2}	48	10^{-4}

CLINICAL PHARMACOLOGY: Carrier-free Gallium Citrate Ga 67 has been found to concentrate in certain viable primary and metastatic tumors. The mechanism of concentration is unknown, but investigational studies have shown that Gallium Ga 67 accumulates in lysosomes and is bound to a soluble intracellular protein.

It has been reported in the scientific literature that following intravenous injection, the highest tissue concentration of Gallium Ga 67—other than tumors—is in the renal cortex. After the first day, the maximum concentration shifts to bone and lymph nodes, and after the first week, to liver and spleen. Gallium is excreted relatively slowly from the body. The average whole body retention is 65% after 7 days, with 26% having been excreted in the urine and 9% in the stools.

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.

RADIATION DOSIMETRY

The dosimetry values listed in Table 4 for Gallium Citrate Ga 67 are those of the MIRD Committee.*

TABLE 4. Dosimetry of Gallium Citrate Ga 67 for Maximal Dose of 5mCi

	Rads/5mCi		Rads/5mCi
Whole Body	1.30	Testes	1.20
Skeleton	2.20	Gastrointestinal Tract	
Liver	2.30	Stomach	1.10
Bone Marrow	2.90	Small Intestine	1.80
Spleen	2.65	Upper Large Intestine	2.80
Kidney	2.05	Lower Large Intestine	4.50
Ovaries	1.40		

*MIRD Dose Estimate Report No. 2, J. Nucl. Med. 14: 755-6. (1973).

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 **511300** December 1979

References

1. Haaga JR, Alfidi RJ, Havrilla TR, et al: CT detection and aspiration of abdominal abscesses. *AJR* 128:465-474, 1977.
2. Shimshak RS, Korobin M, Hoffer PB, et al: Complementary role of Ga^{67} imaging and CT in evaluation of suspected abdominal infection. *J Nucl Med* 19:262-269, 1978.
3. Levitt RG, Biello DR, Sagel SS, et al: Computed tomography and ^{67}Ga citrate radionuclide imaging for evaluating suspected abdominal abscess. *AJR* 132:529-534, 1979.
4. Biello DR, Levitt RG, Melson GL: The roles of Gallium-67 scintigraphy, ultrasonography and computed tomography in the detection of abdominal abscesses. *Sem Nucl Med* 9:58-67, 1979.

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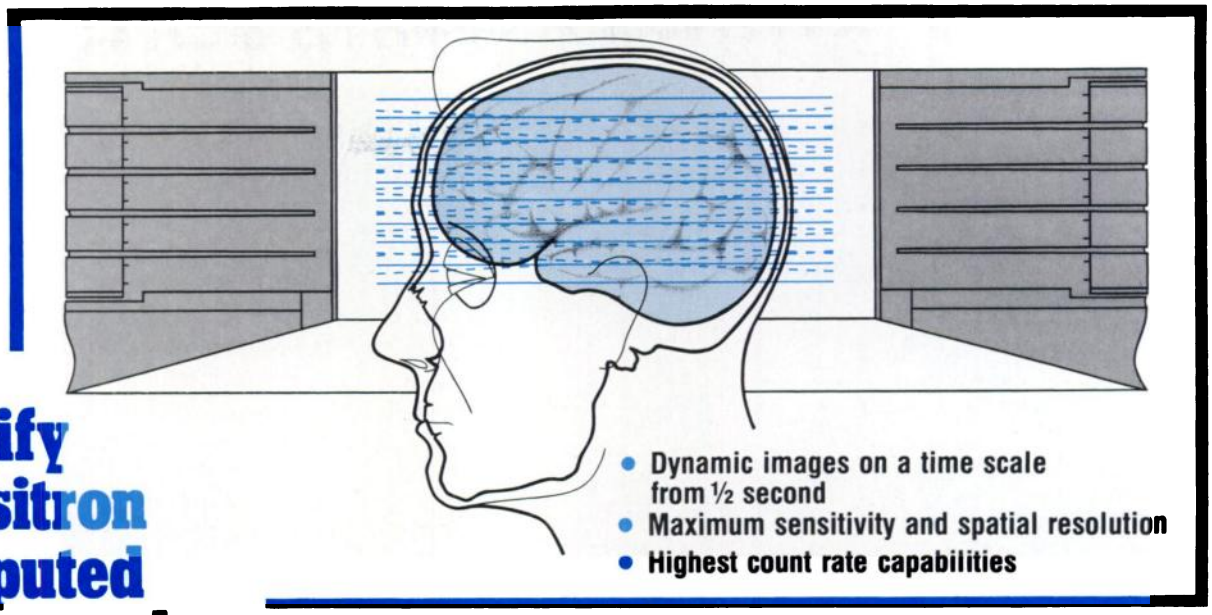

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Model Number	Application	Number of Simultaneous Image Planes	Geometric Resolution (x, y, z) (mm FWHM)	Average Sensitivity Per Image Plane*	Maximum Useable System Count Rate**
4500	Body	7	10.0	16000	10^6
4600	Neuro	9	8.5	29000	5×10^5
4650	Neuro	7	5.5	16000	3.8×10^5

*Sensitivity expressed as counts/sec per $\mu Ci/cm^3$ for activity uniformly dispersed in 20 cm diameter, water-filled vessel.

**Defined as the "Trues" rate (counts/sec) at which true counts and random counts are equally abundant in the raw data prior to correction and image reconstruction. Tests conducted with 20 cm diameter water-filled phantom extending well beyond detector shield.

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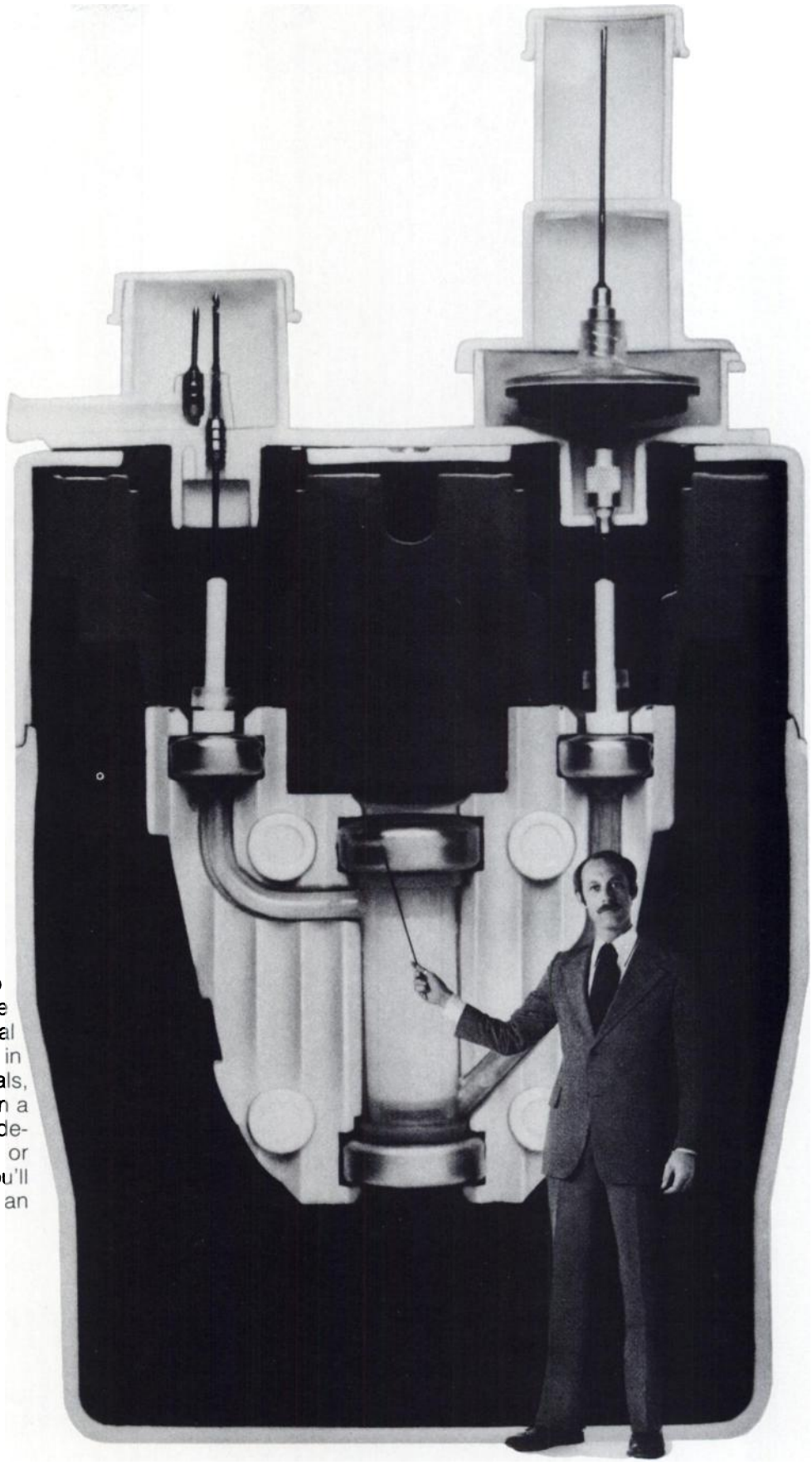

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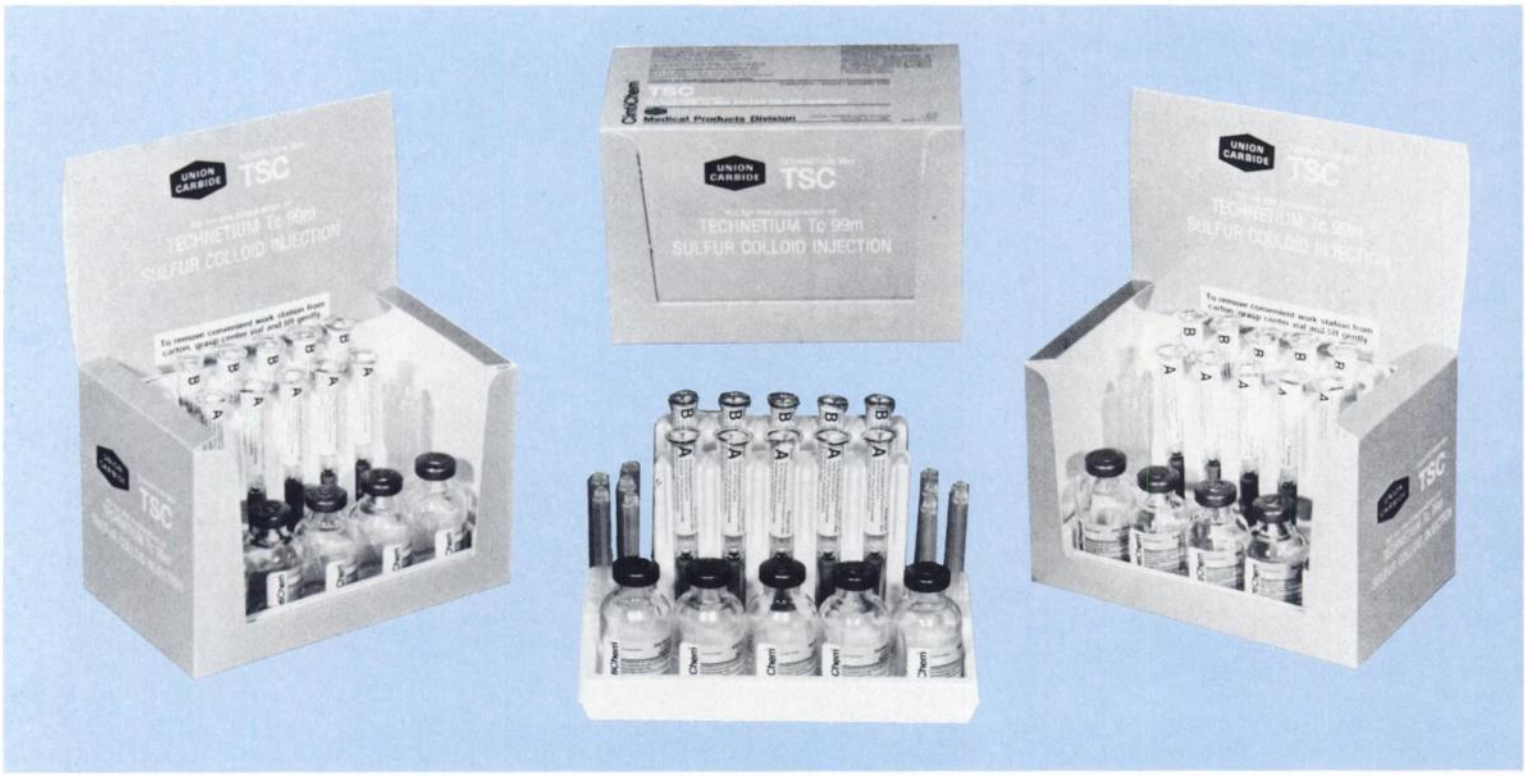

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indications and usage

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

contraindications

None known.

warnings

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

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

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.

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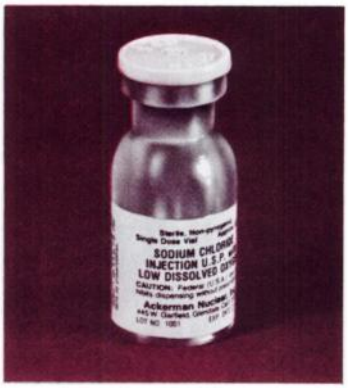

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SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN is indicated for eluting, preparing and/or diluting pharmaceuticals that specify oxidants may cause adverse effects on the final product. SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED 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.

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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:

ACKERMAN NUCLEAR, INC.
Pharmaceuticals for Nuclear Medicine
445 W. Garfield Ave.
Glendale, CA 91204, USA
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A New Generation Microprocessor System

FARMER DOSEMETER 2570

Improved accuracy, precision and simplicity of operation are major features in this new generation microprocessor dosemeter. Facilities include: a fully auto-corrected readout with keyboard entry of pressure, temperature and chamber correction factors; and keyboard entry of time for measurement of dose and exposure.

Operator's error is minimised by arrangement of controls, and the information display indicates mode of operation, corrections applied, dose range multiplier and unit of measurement.

The fully portable and battery operated 2570 is offered with a 0.6cm³ chamber which is conveniently housed in the instrument case. In-built facilities are provided for conversion to readout in unit absorbed dose, gray.

Full details on request.

SAFETY FEATURES

- Keyboard disabled during measurement.
- Measurement aborted if switches are operated during measurement.
- Built-in display clock.
- Indication of "off zero" condition and adjustment required clearly shown on information Display.
- Measurement of applied dose, if any, continues even after Trip Output is actuated.
- Elimination of range setting errors.
- Unit of measurement and associated multiplier displayed automatically.

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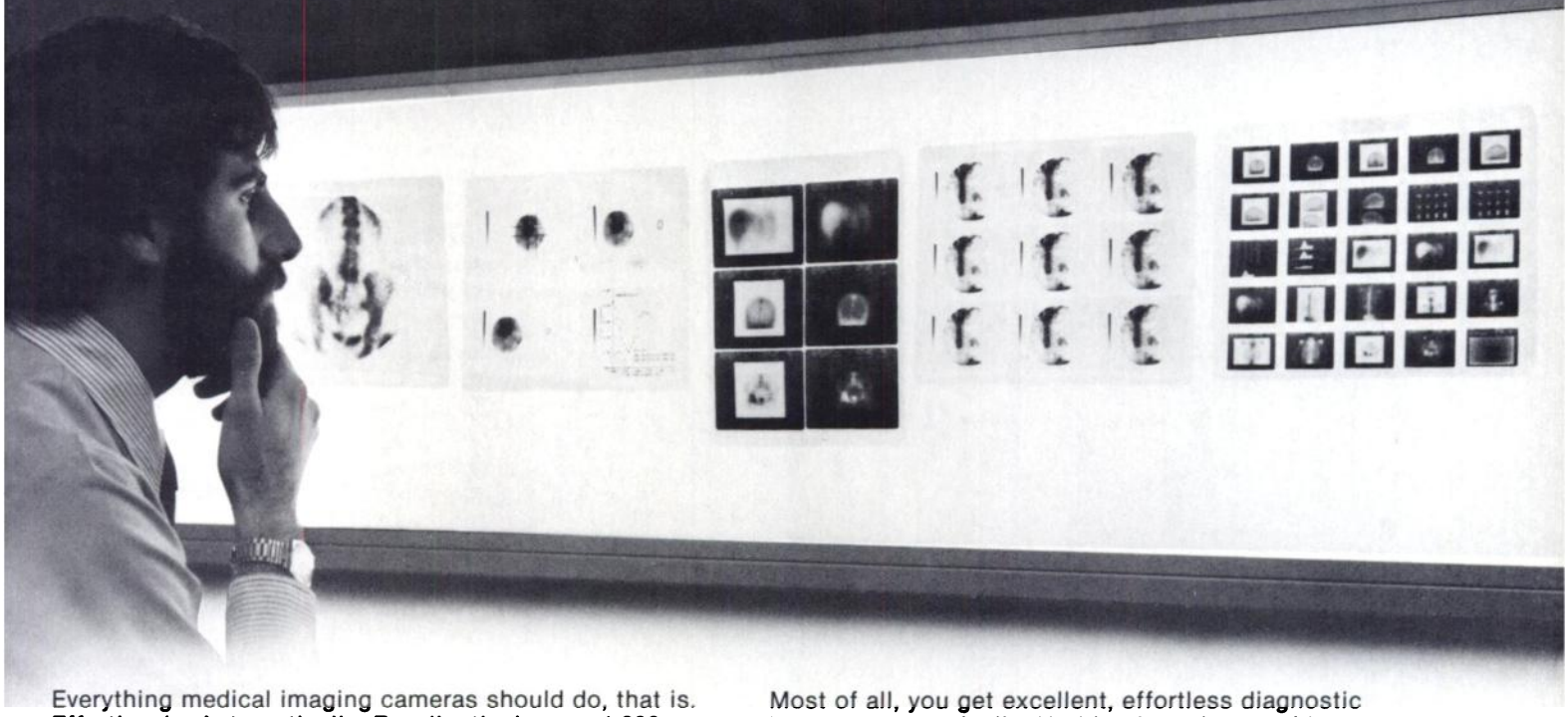
Matrix video cameras do everything but develop the film...

and that's next.



Everything medical imaging cameras should do, that is. Effortlessly. Automatically. Excellently, in over 1,000 new installations a year. Matrix video cameras embody the latest in video, optical and microprocessor technology. They handle the relatively diverse demands of ultrasound and nuclear computers as well as the special, high line rate requirements of CT or fluoroscopy reproduction. They give you quality images, from which you can diagnose confidently.

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Most of all, you get excellent, effortless diagnostic images, automatically. Nothing less than you'd expect from the camera that does everything but develop the film...AND THAT'S NEXT, FROM MATRIX.

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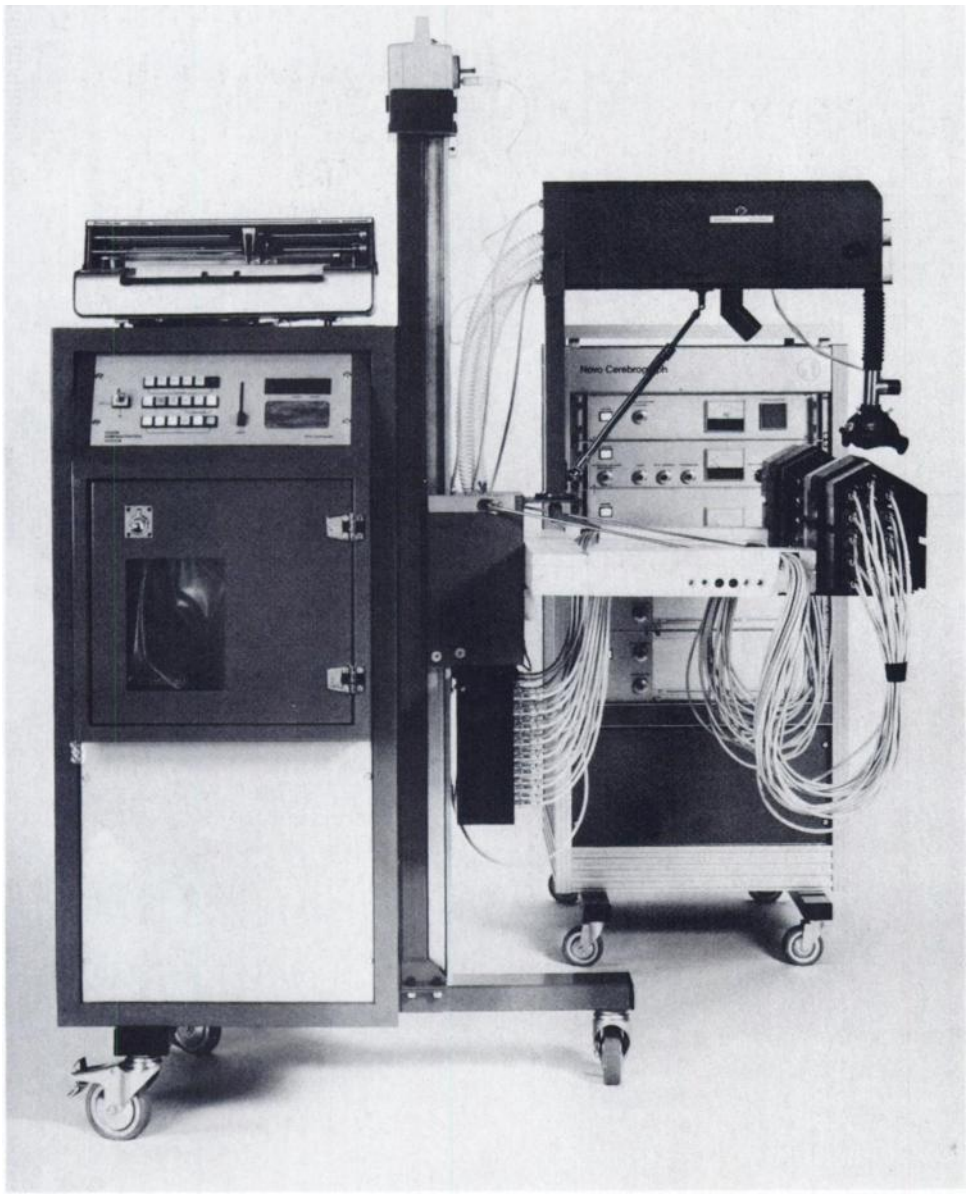
NOVO

A dynamic quantitative study of rCBF



The *Novo Cerebrograph* gives you dynamic quantitative measurement of regional Cerebral Blood Flow.

Computerized digital and graphical printouts provide on-the-spot data on the functional level of the brain, data that cannot be obtained by other investigative methods.

And the *Novo Cerebrograph* gives you a choice of three ^{133}Xenon administration techniques: inhalation, intravenous or intracarotid injection.

Using the ^{133}Xenon inhalation method or the intravenous method, a safe and simple measurement of rCBF is obtained. It eliminates the trauma of intracarotid artery puncture. Permits simultaneous bilateral measurements, enabling an unaffected hemisphere to serve as reference for an affected one. Is widely used for research volunteers and on a broad patient spectrum for frequent measurements over prolonged periods.

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When you buy a *Novo Cerebrograph* you get a complete system, inclucing a pushbutton Xenon administration system with trap. Optional Xenon Recovery Unit. An air-detector. Up to 32 brain detectors with interchangeable collimators. A mobile detector stand that permits measurements with patients sitting or supine. Nuclear electronics and accumulation interface rack-mounted in cabinet. And your choice of on-line table-top or off-line data calculators and clinically verified proprietary computer programs.

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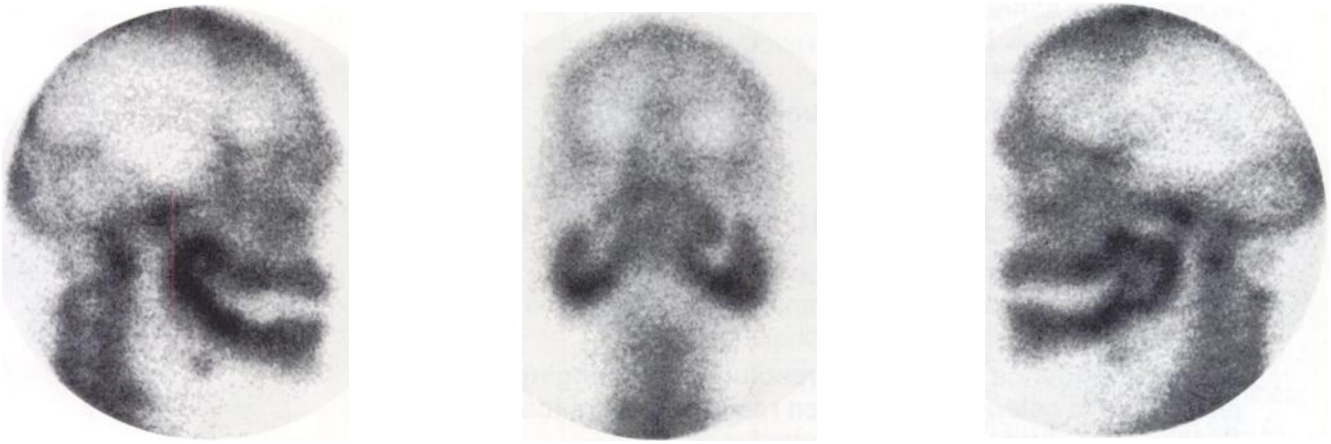
OSTEOLITE bone imaging in oncology

The superior technique:

"Perhaps the greatest contribution of bone imaging is its superiority over conventional radiography in the detection of metastatic bone tumors."[1]

1. *J Nucl Med* 19:324, 1978



The superior agent:

OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (MDP)

NEN New England Nuclear®

OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (Formerly Known as MDP)

October 1977

DESCRIPTION: New England Nuclear's OSTEOLITE™ Technetium Tc 99m Medronate Sodium Kit (formerly known as MDP), is supplied sterile and non-pyrogenic in lyophilized kit form suitable for reconstitution with sodium pertechnetate Tc 99m to form a diagnostic skeletal imaging agent for intravenous administration. Each vial contains 10mg medronate disodium, and 0.85mg stannous chloride dihydrate; pH is adjusted to between 7.0–7.5 with hydrochloric acid and/or sodium hydroxide solution. The contents of the vial are lyophilized and stored under nitrogen.

PHYSICAL CHARACTERISTICS

Technetium Tc 99m decays by isomeric transition with a physical half-life of 6.02 hours. (SOURCE: Martin, M. J. Nuclear Data Project, Oak Ridge National Laboratory, March, 1976.) Photons that are useful for imaging studies are listed in Table 1.

Table 1. Principal Radiation Emission Data—Technetium Tc 99m

Radiation	Mean %/ Disintegration	Mean Energy (keV)
Gamma-2	88.96	140.5

To facilitate correction for physical decay of Technetium Tc 99m, the fractions of initial activity that remain at selected intervals after the time of calibration are shown in Table 2.

Table 2. Physical Decay Chart: Technetium Tc 99m Half-Life 6.02 Hours

Hours	Fraction Remaining	Hours	Fraction Remaining
0*	1.000	8	.398
1	.891	9	.355
2	.794	10	.316
3	.708	11	.282
4	.631	12	.251
5	.562	18	.126
6	.501	24	.063
7	.447		

*Calibration Time

EXTERNAL RADIATION

The specific gamma ray constant for Technetium Tc 99m is 0.8R/mCi-hr. at 1cm. The half value layer is 0.2mm of Pb. To facilitate control of radiation exposure from millicurie amounts of Technetium Tc 99m, the use of a 6.35mm thick standard radiation elution lead shield will attenuate the radiation emitted by a factor greater than 10^6.

Table 3. Radiation Attenuation By Lead Shielding

Shield Thickness (Pb)mm	Coefficient of Attenuation
0.2	0.5
0.95	10^{-1}
1.8	10^{-2}
2.7	10^{-3}
3.6	10^{-4}
4.5	10^{-5}
5.4	10^{-6}
6.3	10^{-7}

CLINICAL PHARMACOLOGY: Upon intravenous injection, Technetium Tc 99m OSTEOLITE exhibits a specific affinity for areas of altered osteogenesis. In humans, blood levels fall to 4-10% of the injected dose by two hours post-injection and to 3-5% by three hours. During the first 24 hours following its administration in patients with normal renal function, 50-75% of the radioactivity is excreted into the urine and less than 2% of the injected dose remains in the vascular system.

Uptake of the Technetium Tc 99m in bone appears to be related to osteogenic activity and to skeletal blood perfusion. The deposition in the skeleton is bilaterally symmetrical, with increased accumulation in the axial structure as compared to the appendicular skeleton. There is increased activity in the distal aspect of long bones as compared to the diaphyses. In pediatric patients, in whom the epiphyseal centers are still open, there is more marked accumulation of the radiopharmaceutical in the distal aspects of long bones than is seen in adults in whom the epiphyseal centers are closed. Localized areas of abnormal accumulation of the radiopharmaceutical may be seen in primary skeletal malignancies, metastatic malignancies to bone, acute or chronic osteomyelitis, arthritides, recent fractures, areas of ectopic calcification, Paget's disease, regional migratory osteoporosis, areas of aseptic necrosis and, in general, any pathological situation involving bone in which there is increased osteogenic activity or localized increased osseous blood perfusion. Since increased osteogenic activity and localized increased osseous blood perfusion are not usually present in chronic bone diseases, bone imaging agents, in general, are not effective in detecting such diseases. Localized areas of decreased accumulation of the radiopharmaceutical may be noted in areas of bone which have received localized fields of external radiation or to which blood flow has been interrupted. OSTEOLITE has also been noted to accumulate in areas of acute myocardial infarction from one to fourteen days after the pathologic event.

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

CONTRAINDICATIONS: None known.

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

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

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

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

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

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

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

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

Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: None reported.

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

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

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

The vial contains no bacteriostat.

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

RADIATION DOSIMETRY

The estimated absorbed radiation dose to an average patient (70kg) from an intravenous injection of a maximum dose of 20 millicuries of Technetium Tc 99m OSTEOLITE is shown in Table 4.

Table 4. Absorbed Radiation Dose

Technetium Tc 99m Medronate Sodium Organ		(rads/20mCi)
Total Body		0.13
Bone Total		0.70
Red Marrow		0.56
Kidneys		0.62
Liver		0.16
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.

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

Medronate Disodium—10mg
Stannous Chloride Dihydrate—0.85mg

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

INSTRUCTIONS FOR PREPARATION OF TECHNETIUM Tc 99m OSTEOLITE: Aseptically inject 2 to 8ml of sodium pertechnetate Tc 99m (pertechnetate in isotonic saline without a bacteriostat) into the supplied vial of OSTEOLITE enclosed by a radiation shield. Swirl for at least ten seconds to dissolve completely. Label appropriately. Suitable labels have been supplied with each OSTEOLITE Kit. Use within six hours after reconstitution. For optimum results, this time should be minimized.

Using proper shielding, the vial containing the reconstituted solution should be visually inspected to insure that it is clear and free of particulate matter.

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

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

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

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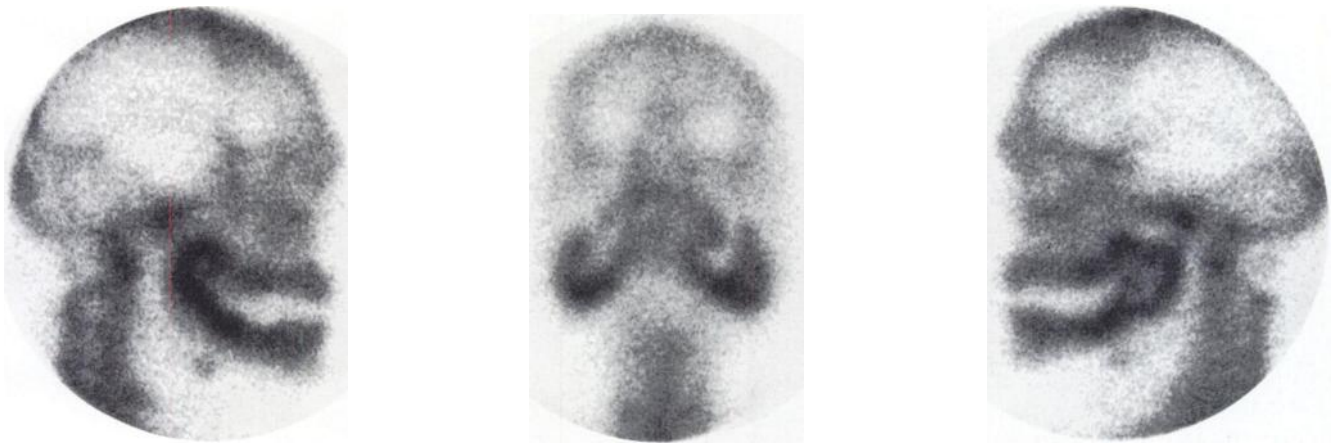
OSTEOLITE bone imaging in oncology

The superior technique:

"Perhaps the greatest contribution of bone imaging is its superiority over conventional radiography in the detection of metastatic bone tumors."[1]

1. *J Nucl Med* 19:324, 1978



The superior agent:

OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (MDP)

NEN New England Nuclear®

In oncology. for reliable early detection of bone metastases:

Most rapid blood clearance[2]

- At 90 minutes postinjection, blood clearance of MDP pharmacologically identical to OSTEOLITE was approximately equal to that of tested pyrophosphate agents at 6 hours postinjection.
- At 3 hours, MDP blood levels were considerably less than those of tested EHDP and pyrophosphate.

Result: low-background studies, whether you must scan early to meet patient-flow demands, or at 3 hours for more optimal image detail.

Lowest soft tissue activity[2,3]

The "difference in soft tissue activity (highest with polyphosphate and lowest with MDP) is discernible in clinical images."[2] A University of Minnesota study found that only 4% of 175 MDP images showed moderate to marked soft tissue activity, compared to 17% of EHDP images.[3]

Result: highest assurance of visualizing all skeletal structures.

Highest target-to-background differential[4]

OSTEOLITE's rapid blood clearance and lower soft tissue uptake usually enable current gamma cameras to resolve peripheral skeletal structures and phalanges.

Result: confidence of detecting resolution-challenging alterations in osteogenesis...even roentgenographically "invisible" fractures and small metastases.

Convenient storage and preparation

Available in 5-vial or 30-vial "Convenience Packs," OSTEOLITE can be stored and used at room temperature (15–30 C).

REFERENCES:
1. Harcke HT Jr: *J Nucl Med* **19**:324, 1978
2. Subramanian G et al: *J Nucl Med* **16**:744, 1975
3. Forstrom L et al: Data on file at New England Nuclear, Medical Diagnostics Division, North Billerica, MA
4. Davis MA, Jones AG: *Sem Nucl Med* **6**:19, 1976

OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (MDP)

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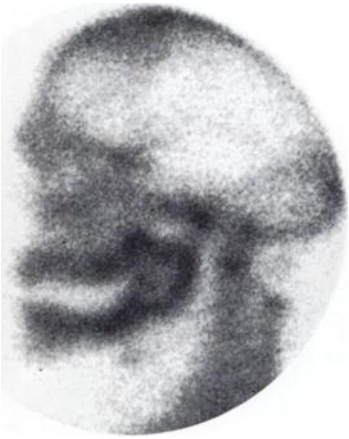

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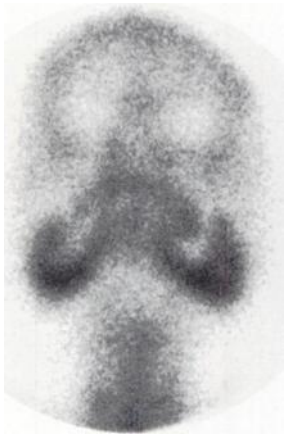

Base view

Images produced with 20.5 mCi technetium-99m labeled OSTEOLITE; spot images recorded at 500 K counts, Searle LFOV™ camera with Micro Dot™ Imager.

A 19-year-old male with known eosinophilic granuloma involving the mandible bilaterally was referred for a bone scan to rule out occult sites of involvement. Bone imaging with OSTEOLITE showed increased uptake in the rami of the mandible on both sides. The medial portion of the mandible anteriorly and the remainder of the skull, the spine, ribs, pelvis and long bones show no abnormalities suggestive of multiple foci of disease. The increased area of uptake around the left ankle was attributed to soft tissue swelling due to a recent ankle sprain.

Please see following page for full prescribing information.

OSTEOLITE™

Technetium Tc 99m Medronate Sodium Kit (Formerly Known as MDP)

October 1977

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CONTRAINDICATIONS: None known.

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Medronate Disodium—10mg
Stannous Chloride Dihydrate—0.85mg

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

INSTRUCTIONS FOR PREPARATION OF TECHNETIUM Tc 99m OSTEOLITE: Aseptically inject 2 to 8ml of sodium pertechnetate Tc 99m (pertechnetate in isotonic saline without a bacteriostat) into the supplied vial of OSTEOLITE enclosed by a radiation shield. Swirl for at least ten seconds to dissolve completely. Label appropriately. Suitable labels have been supplied with each OSTEOLITE Kit. Use within six hours after reconstitution. For optimum results, this time should be minimized.

Using proper shielding, the vial containing the reconstituted solution should be visually inspected to insure that it is clear and free of particulate matter.

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

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

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

New England Nuclear
Medical Diagnostics Division
601 Treble Cove Rd., North Billerica, MA 01862
Call toll-free: 800-225-1572 Telex: 94-0996
(In Massachusetts and International: 617-482-9595)

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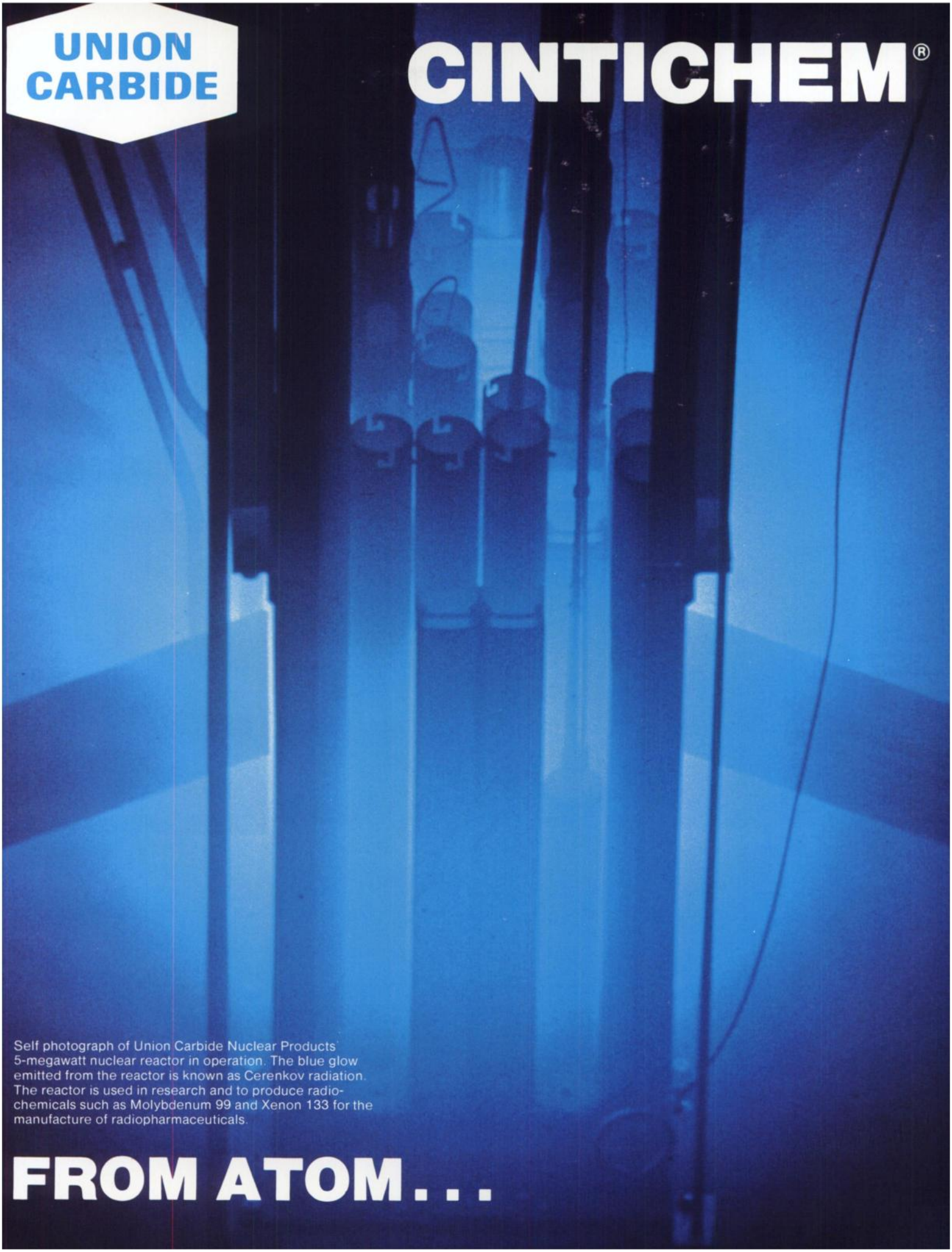
Tel: 514-636-4971
Europe: NEN Chemicals GmbH, D-6072 Dreieich, W. Germany,
Postfach 401240 Tel: (06103) 85034 Order Entry: (06103) 81013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Self photograph of Union Carbide Nuclear Products' 5-megawatt nuclear reactor in operation. The blue glow emitted from the reactor is known as Cerenkov radiation. The reactor is used in research and to produce radiochemicals such as Molybdenum 99 and Xenon 133 for the manufacture of radiopharmaceuticals.
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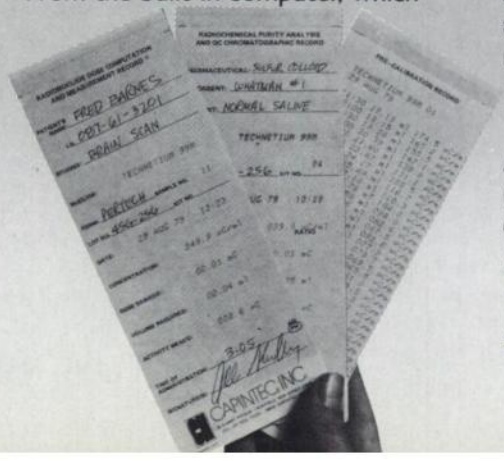
EVERYONE IS CONCERNED WITH PATIENT EXPOSURE. OUR CALIBRATOR IS CONCERNED WITH YOURS.

Our CRC-30 calibrator has a calibration chamber that can be physically isolated from the rest of the unit, thereby sparing you unnecessary doses of radiation. An important feature, in this age of radiation safety enlightenment.

But then, *everything* our CRC-30 does is designed to limit radiation exposure. From the built-in computer, which pre-calibrates, a whole day's worth of doses at one shot; to our QC analyzer that insures correct target to non-target ratios.



Get all the facts on our CRC-30. Write: Capintec, Inc., 136 Summit Avenue, Montvale, NJ 07645. (201) 391-3930. Call Toll Free (800) 631-2557. TELEX 642375 CAPINTEC MTLE.

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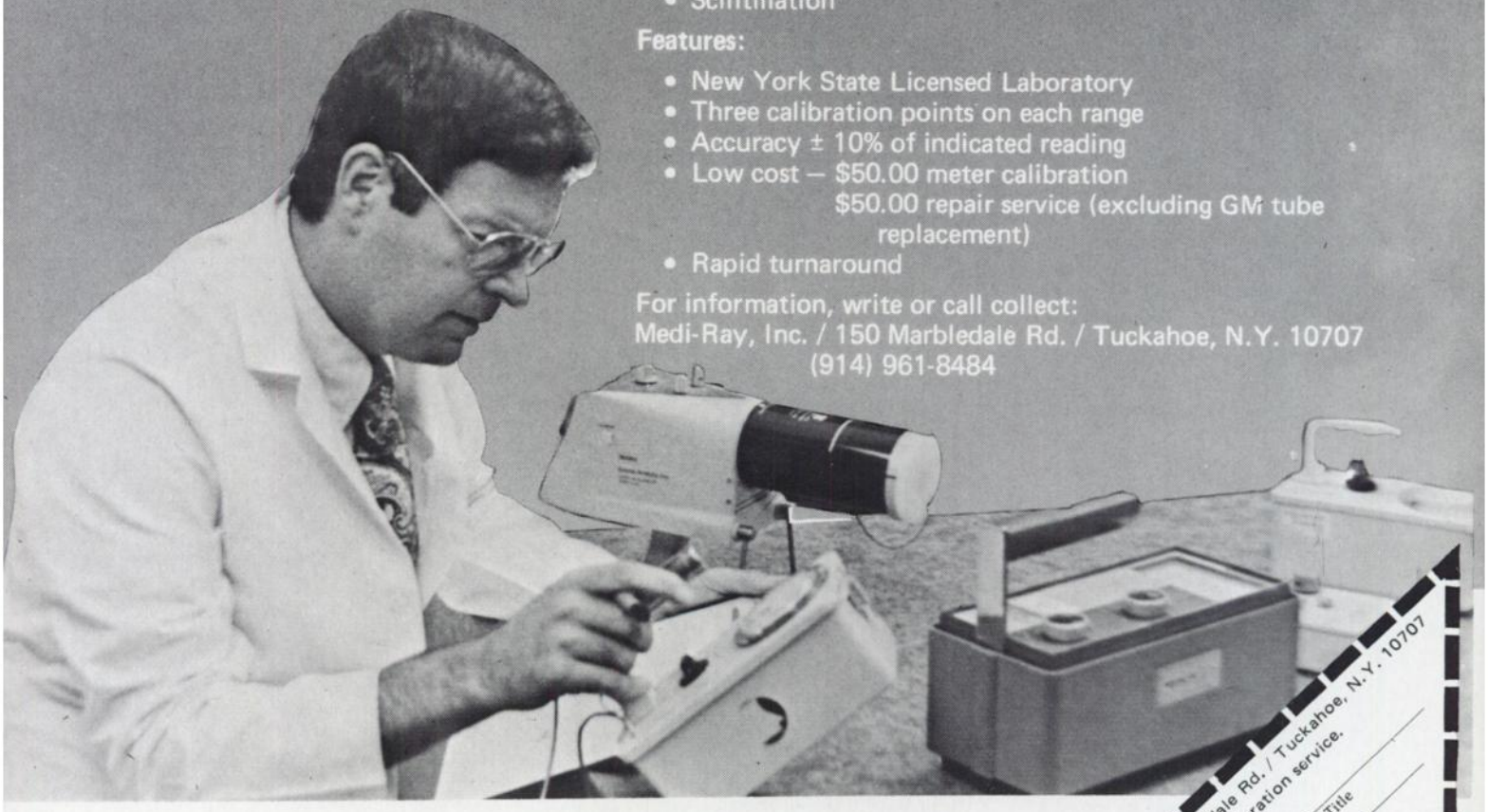

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PLACEMENT

POSITIONS OPEN

NUCLEAR MEDICINE (2 YR)/ NUCLEAR Radiology (1 yr) residencies in combined University Hospital-VA Hospital program. Training available in nuclear imaging and nuclear in vitro procedures. Opportunities for clinical and laboratory research. W.N. Tauxe, Director, Division of Nuclear Medicine, University of Alabama Hospitals, Birmingham, Alabama 35233.

NUCLEAR MEDICINE RESIDENCY Medical College of Wisconsin. Two year integrated program including 710 bed VA General Hospital, 600 bed County Medical Complex and two large community hospitals. Several cameras each interfaced to computer. Ultrasound training included. Positions available in July 1980. Nondiscrimination in employment. Contact: Robert C. Meade, M.D., Chief, Nuclear Medicine Service, VA Center, Milwaukee, WI 53193. (414) 384-2000, EXT 2138.

NUCLEAR MED TECH — ARE YOU looking for a challenging position in the field of nuclear medicine? If you are registered or registry eligible and need a full time position, then this may be the opportunity you've been looking for. This is a beautiful university community with several lakes and parks in close proximity. Bloomington Hospital is a 314 bed Hospital that services Bloomington and the surrounding areas. If interested please call or write: Bloomington Hospital, 619 W. First St., Bloomington, In. 47401. (812) 336-9535. An Equal Opportunity Employer M/F.

ASSISTANT CHIEF, NUCLEAR MEDICINE Service. The Minneapolis Veterans Administration Medical Center seeks candidate for the position of Assistant Chief, Nuclear Medicine Service effective July 1, 1980. Requirements include certification by the ABNM, a strong patient orientation and expertise in all phases of clinical nuclear medicine, including imaging, radioassay and internal radionulcide therapy. In addition, the Assistant Chief, Nuclear Medicine Service will have specific responsibilities in research and education. Applications from all qualified candidates are welcome. Inquiries, including a curriculum vitae and an autobiographical letter, should be sent to: Rex B. Shafer, M.D., Chief, Nuclear Medicine Service (115), Veterans Administration Medical Center, 54th Street & 48th Avenue South, Minneapolis, MN. 55417. An Equal Opportunity Employer.

PATHOLOGY-NUCLEAR MEDICINE Physician being sought to join practice in a 400 Bed community hospital. Send Resume to William M. Bridger, M.D. Baptist Medical Center, 2105 East South Boulevard, Montgomery, Alabama 36116.

CONFIDENTIAL SERVICE NATIONwide. We are a search firm dealing nationwide in the Health Care Industry. All Fees Paid By Employer. Forward resume with salary requirements and location preferences to BMI, Health Care Division, P.O. Box 6457, Columbia, S.C. 29260, (803) 787-8710.

DIRECTOR RADIOLOGY/ NUCLEAR medicine/ultrasound. Family living in beautiful mountains of western Pa. Recreational lakes nearby. Wide range of summer and winter sports. 255-bed hospital (160 acute, 95 SNF). F.C. Powell, Administrator/ CEO, Bradford Hospital, 116 Interstate Parkway, Bradford, Pa., 16701. (814) 368-4143.

NUCLEAR MEDICINE TECHNOLOGIST Staff position for a registered nuclear medicine technologist in a rapidly expanding regional medical center in North Central Pennsylvania. Department has its own school of Nuclear Medicine. Competitive salary and excellent benefits in scenic semi-rural location. Send resume including salary requirements to: Personnel Supervisor, Personnel Department, Geisinger Medical Center, Danville, PA 17821. EOE M/F/H.

NUCLEAR MEDICINE RESIDENCY Two years, program Jackson Memorial Hospital Training in all aspects of Imaging including Nuclear Cardiology, Echocardiography, Radioassay, Computer and Basic Sciences; elective in CT and Ultrasound. Information to be directed to Aldo N. Serafini, M.D., Director, Division of Nuclear Medicine, University of Miami School of Medicine, P.O. Box 016960, Miami, Florida 33101.

NUCLEAR MEDICINE TECHNOLOGIST Position available at VA Medical Center, Little Rock, Arkansas. Affiliated with University of Arkansas College of Medicine. Position requires experience in radioimmunoassay work, imaging, dynamic studies and ultrasound. Bachelor's degree in chemistry, physics, mathematics, health or biological science, including courses in Nuclear Medicine Science. Starting salary $11,243 to $17,035 per year, and excellent Federal Civil Service Benefits. Call Arnold Olson (501) 372-8361, ext. 1-236 for further information. VA Medical Center, Little Rock, AR. 72206. Equal Opportunity Employer.

DIAGNOSTIC IMAGING FELLOWSHIP. 2 year program including Computed Tomography, Ultrasound and Nuclear Medicine. 820 bed hospital associated with medical school. 14,000 scans per year. Contact E. Nijensohn, M.D., Christ Hospital, 4440 W. 95th Street, Oak Lawn, Illinois 60453.

A TWO YEAR TRAINING PROGRAM in nuclear medicine leading to certification by the American Board of Nuclear Medicine or one year training program leading to certification in nuclear radiology by the American Board of Radiology is offered in an AMA approved integrated program offered by Vanderbilt University Hospital and the Veteran's Administration Hospital in Nashville, Tennessee. Five full-time board certified nuclear medicine physicians and eight full-time nuclear medicine Ph.D.'s participate in the didactic as well as clinical experience in the program. Equipment includes three large field scintillation cameras, three small field scintillation cameras, the PhoCon tomographic scanner, a solid state scanning tomographic camera, a proportional wire chamber, a fluorescent scanner, a portable camera and five computer systems. The clinical experience includes a complete spectrum of all imaging procedures for adults as well as the pediatric population. Particular emphasis is placed on nuclear cardiology, renal evaluation, pulmonary function studies and tumor evaluation. The program includes rotations through CT and ultrasound and has heavy emphasis on correlation between these two modalities and nuclear medicine procedures. A complete experience in a large radioimmunoassay laboratory and radiopharmacy is included. Requests for further information should be directed to F. David Rollo, M.D., Ph.D., Director, Division of Nuclear Medicine, Department of Radiology and Radiological Sciences, Vanderbilt University Hospital, Nashville, Tennessee 37232.

NUCLEAR MEDICINE PHYSICIAN TO join ABNM certified physician at 700+ bed community hospital on Florida West Coast. Over 6000 imaging procedures per year. Nuclear Cardiology with Ohio Nuclear LFOV, Searle Pho Gamma IV, GE Maxicamera II, and DEC GAMMA 11. Contact Ben I. Friedman, M.D., Morton F. Plant Hospital, Box 210, Clearwater, Florida 33517. (813) 441-5248 or evenings (813) 461-3857.

TECHNOLOGISTS WANTED! CHARlotte Memorial Hospital and Medical Center, located in the Piedmont of North Carolina, is looking for registered or registry eligible Nuclear Medicine Technologists. Immediate openings are available for first and second shift positions. The department consists of Searle Imaging Equipment including two LFOV cameras, portable camera, Phocon Tomographic Scanner, Scintiview Computer and a Trinary MDS A^2 Computer. Performing a variety of Nuclear Medicine procedures with 50% being cardiovascular Nuclear Medicine, we feel we are one of the most up to date Nuclear Medicine Departments in the Southeast. Contact: Mike Floyd, Chief Nuclear Medicine Technologist, Charlotte Memorial Hospital and Medical Center, P.O. Box 32861, Charlotte, NC 32861. Phone collect: (704) 373-2276.

NUCLEAR MEDICINE SUPERVISOR Opportunity for Registered Nuclear Medicine Technologist with management or supervisory experience in an 800-bed medical center. This position will supervise the activities of a group of approximately 25 technicians and technologists. The department primarily utilizes five camera systems and an MDS computer system to enhance imaging. The department also operates a fully accredited school for Nuclear Medicine Technologists. This position offers an exciting challenge and growth opportunity due to the highly specialized procedures related to the heart, bone and other physiological organ systems. Excellent pay and benefits with salary negotiable, depending upon management or supervisory experience. For further information, contact: Mr. Ted Street, Administrative Assistant, Department of Laboratory Medicine, or Dr. George Mills, Director of Nuclear Medicine. Wesley Medical Center, 550 No. Hillside, Wichita, Ks. 67214. Equal Opportunity Employer M/F.

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

NUCLEAR RADIOLOGY RESIDENCY available July 1980. One year accredited program. Applicant must be board eligible for ABR. Training includes all aspects of nuclear radiology, including clinical imaging, nuclear cardiology, basic science, and research opportunities. Application letters should include a curriculum vitae and three letters of reference. For details contact Charles D. Teates, M.D., Chief, Imaging Division, Dept. of Radiology, University of Virginia School of Medicine, Charlottesville, Virginia 22908.

NUCLEAR MEDICINE TECHNOLOGIST Immediate opening for technologist in fully accredited 400-bed community and university-affiliated hospital, situated in scenic northcentral Pennsylvania. Proficiency required in radioimmunoassay work, imaging dynamic studies and computer applications. Department is equipped with cameras, rectilinear scanners, automated well counters, pipetter and a computer. Good salary and full benefits. Contact Ruth R. Hargrave, Assoc. Director of Perssonel, The Williamsport Hospital, 77 Rural Avenue, Williamsport, PA (717) 322-7861. Equal Opportunity Employer.

MANAGER'S POSITION AVAILABLE IN Department of Nuclear Medicine for individual who is a C.N.M.T. with proven background in management expertise. Department consists of a physician and seven (7) Nuclear Medicine Technologists. Salary negotiable. Excellent fringe benefits and Department Head Status. Our 370 bed Community General Hospital is situated in scenic Northcentral PA. Send resume to: Jack D. Cain, Director of Personnel, The Williamsport Hospital, 777 Rural Avenue, Williamsport, PA 17701, (717) 322-7861, Ext. 3826. Equal Opportunity Employer.

POSITIONS WANTED

RADIOLOGIST, ABR, University trained including fellowship nuclear medicine, seeks position. Reply Box 202, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.

NUCLEAR PHYSICIAN SEEKING POSITION as Dept. or Section Head East or West Coast Academic or Clinical. Presently Dept. head. Ph.D., M.D., ABNM certified, over 60 publications, strong hematology background, considerable administrative experience. Please write Box 203, Society of Nuclear Medicine, 475 Park Ave. So., NY, NY 10016.

NUCLEAR PHYSICIAN, CERTIFIED ABNM & Radiology seeks relocation preferably in Phila., N.J., Del. area. Medical school hospital, experience. Part time employment acceptable. Reply to Box 204 Society Nuclear Medicine, 475 Park Ave. South, NY, NY 10016.

RADIOCHEMIST, PH.D. SEEKS ASSOciation with R&D Group Industry Hospital. Experienced. Reply Box 200, Society of Nuclear Medicine, 475 Park Ave. South, New York, NY 10016.

NUCLEAR MEDICINE RADIOLOGIST ABNM 36 seeks private radiology group practice. Northeastern or western states. Reply Society of Nuclear Medicine, Box 201, 475 Park Ave. South, New York, NY 10016.

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BRATTLE PHYSIOLOGICAL SYNCHRONizer Model 202, New Condition. Contact Hans Tschersich, M.D., 1162 Willamette Street, Eugene, Oregon 97401. Phone (503) 687-6026.

PHO GAMMA III IN GOOD CONDITION with the following accessories: Nikon with Motor Drive Polaroid and 4 Collimators. No reasonable offer refused. Call collect St. Michael's Hospital, Toronto, Canada (416) 360-4050.

RESIDENCY IN NUCLEAR MEDICINE

Two-year approved program offering broad clinical experience including tertiary care and community hospitals, oncology and pediatrics; ultrasound and CT; strong basic science teaching; radiation safety; central radiopharmacy and RIA; opportunity for research; an integrated program at State University of New York at Buffalo School of Medicine; available July 1, 1980. Contact: M.A. Bender, M.D., Program Director, Dept. of Nuclear Medicine, 666 Elm St., Buffalo, NY 14263 or M. Blau, Ph.D., Chairman, Dept. of Nuclear Medicine, 3495 Bailey Ave., Buffalo, NY 14215.

NUCLEAR MEDICINE TECHNOLOGIST

Position open in an academic facility; work to be done within a research context, using non-human subjects. Graduation from a Nuclear Medical Technology Program or its equivalent required; knowledge of computerized systems helpful. Submit resume to:

Dr. J.E. Kaplan
Department of Physiology
Albany Medical College
47 New Scotland Avenue
Albany, New York 12208

Physicians - The Food and Drug Administration (an Equal Opportunity Employer) has Civil Service or Commissioned Corps (U.S. Public Health Service) openings for evaluation of new drug clinical testing and potential effects of drugs. The vacancies are for physicians qualified in nuclear medicine or with clinical pharmacology training/experience or research experience in development of new drugs.

The positions have no patient-care duties, are located in Rockville, Maryland, and require medical judgments, effective writing and speaking, and ability to organize work to meet deadlines. Grades GS-14 and GS-15 (salary range $42,812 to $50,112 per year, depending upon experience and qualifications). Comprehensive fringe benefits available.

Requirements: Medical degree (M.D. or Doctor of Osteopathy) and board eligibility in nuclear medicine or equivalent experience in clinical pharmacology or drug research. Civil Service regulations govern acceptability of degree source. U.S. citizenship required.

Send Resume or Curriculum Vitae to: **George H. Calvert, Food and Drug Administration, Division of Personnel Management, 5600 Fishers Lane, Rockville, Maryland 20857.**

BAYLOR COLLEGE OF MEDICINE, DEPARTMENT OF RADIOLOGY, NUCLEAR MEDICINE SECTION FELLOWSHIP AND RESIDENCY PROGRAM, 1980-81

Residency and fellowship positions are available in an AMA approved residency program which includes training in two large nuclear medicine laboratories; 1) St. Luke's Episcopal-Texas Children's Hospitals and The Texas Heart Institute joint facilities and 2) Ben Taub General Hospital.

Residency training encompasses the full spectrum of nuclear medicine procedures, both in vivo and in vitro, in pediatric and adult patients. A mobile nuclear medicine capability emphasizes critically ill patients. Because of a substantial commitment to education, including a bachelor's degree program in nuclear medicine technology, the faculty of the Nuclear Medicine Section is very broad based. Trainees attend lectures and laboratories in radiation physics, instrumentation, radiopharmacy, radioimmunoassay, radiobiology, and radiation health in addition to the usual clinical nuclear medicine courses and seminars.

Fellowships (2) with emphasis on cardiac and pulmonary disease are available in association with the Texas Heart Institute. With the mobile capabilities and a large population of critically ill patients (total hospital beds, 1000; intensive care beds, 100), participation in one of the most rapidly growing areas of clinical nuclear medicine is possible with potential for participation in several research projects related to cardiovascular, pulmonary, and critical care nuclear medicine.

Requests for further information should be directed to John A. Burdine, M.D., Chief, Nuclear Medicine Section, or Paul H. Murphy, Ph.D., Residency and Fellowship Coordinator, Department of Radiology, Baylor College of Medicine, Houston, Texas 77030.

ACKERMAN NUCLEAR, INC.

Now there's an economical agent

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

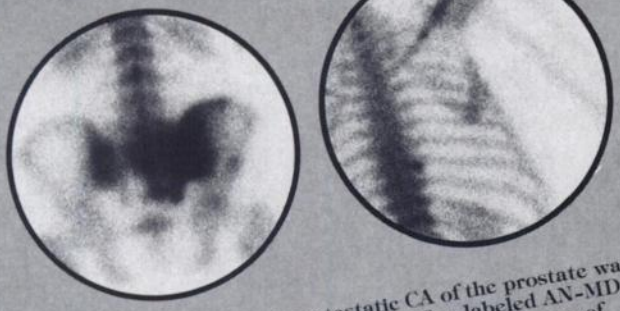
- When necessary, imaging may begin an hour after injection (optimal imaging time is 1 to 4 hours).
- AN-MDP is stored and used at room temperature (15–30°C).

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, consult the package insert, a summary of which follows.

AN-MDP™ Technetium Tc 99m Medronate Kit

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

Contraindications. None known.

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

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

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

Technetium Tc 99m Medronate should be formulated within six (6) hours prior to clinical use. Optimal imaging results are obtained 1–4 hours after administration.

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

for those famous "MDP" scans.

- CUT WASTE. You can choose either single-dose or multi-dose vials to match your department's volume.
- For greater savings, both single-dose and multidose AN-MDP come in 30-vial ECONO-PAKS.

Join the hundreds of nuclear medicine departments who already enjoy the benefits of "MDP" scans. To place your order today, just call us collect: (213) 240-8555.

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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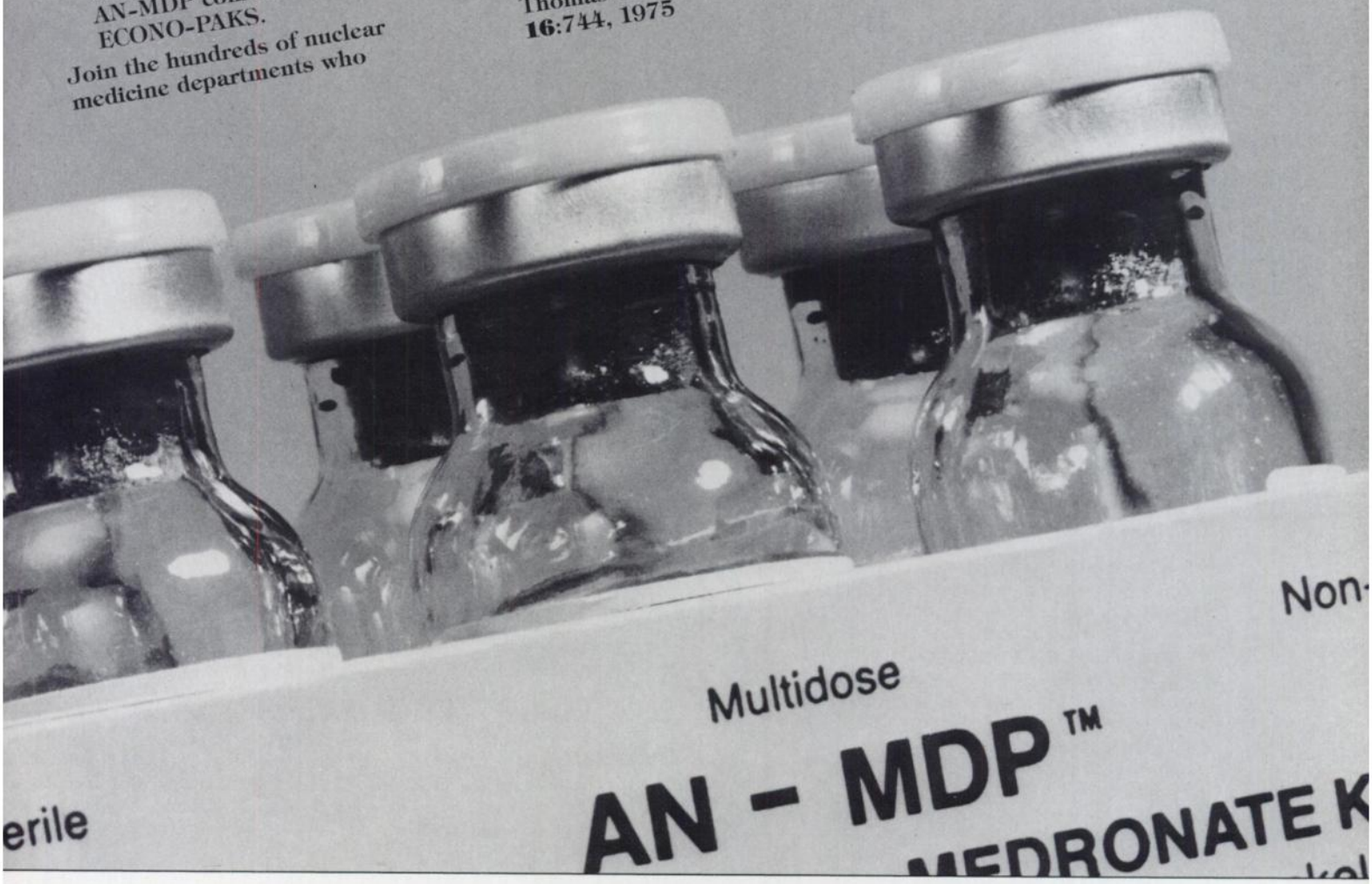

Pediatric use: Safety and effectiveness in children have not been established.

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.

PASQUA HOSPITAL
Regina, Saskatchewan, Canada
NUCLEAR MEDICINE PHYSICIAN

Applications are invited for the position of Head of the Department of Nuclear Medicine at Pasqua Hospital in Regina, Saskatchewan. This 400-bed general hospital provides a broad spectrum of medical and surgical services and serves as the cancer treatment centre for the southern half of the Province of Saskatchewan. The hospital is seeking an individual with the desire to participate in designing and equipping a new department in an area of approximately 5,200 sq. ft. The entire hospital is currently involved in the construction phase of an ambitious expansion program.

Applicants must possess or be eligible to sit the Canadian certification or U.S. Specialty Board Examination. The successful applicant will be offered a teaching appointment at an appropriate academic rank in the University of Saskatchewan.

Please reply in writing to:

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Administration Office,
PASQUA HOSPITAL
4101 Dewdney Avenue
Regina, Saskatchewan S4T 1A5
Canada

SOUTH SASKATCHEWAN HOSPITAL CENTRE

A position is available for a junior technologist.

■

The Nuclear Medicine Department is equipped with one of the largest generation of gamma cameras and performs a wide range of imaging and non-imaging studies.

Applicants must be eligible for registration with the Canadian Society of Radiological Technologists.

1979 salary range is $7.32, $7.55, and $7.81 per hour.

Fringe benefits are attractive.

■

For further information apply to:

Personnel Department
Pasqua Hospital
4101 Dewdney Avenue
Regina, Saskatchewan
Canada S4T 1A5

NUCLEAR MEDICINE TECHNOLOGIST

Veterans Administration Medical Center has an immediate full-time opening for Nuclear Medicine Technologist in large teaching Medical Center, with emphasis on nuclear imaging, including cardiovascular studies. No radioimmunoassay procedures. Certification as Nuclear Medicine Technologist desirable. Applicant must possess bachelor's degree and two (2) years professional experience or three (3) years academic study, plus one (1) year technology course and two (2) years experience to qualify for a beginning salary of $17,035 per annum. Fringe benefits include regular pay increases, 13 days sick leave each year which may be accrued without limit, 13-26 days annual vacation. generous retirement plan, and low-cost life and health insurance. Must be a U.S. Citizen. For information, contact:

Robert N. Class, M.D.
Chief, Nuclear Medicine Service
Veterans Administration Medical Center
10701 East Blvd.
Cleveland, Ohio 44106
PHONE: (216) 791-3800, Ext. 7511 or 7512

An Equal Opportunity Employer

INTERNATIONAL APPLICATIONS SPECIALIST

A world leader in the manufacture of Nuclear Medicine equipment is currently seeking an individual experienced in the operation of diagnostic imaging equipment and all clinical aspects of Nuclear Medicine. Position will offer a challenging opportunity for career growth and include the instruction and application of equipment throughout the world. Individual must be well versed in the use of Gamma Cameras and Data Systems, including Cardiology protocols. Position requires approximately 75% International travel, with a domestic relocation. Applicant must be ARRT or ASCP registered in Nuclear Medicine with a preferable Radiology background, and 3-5 years Clinical Nuclear Medicine experience; Supervisory experience preferred. Salary commensurate with experience.

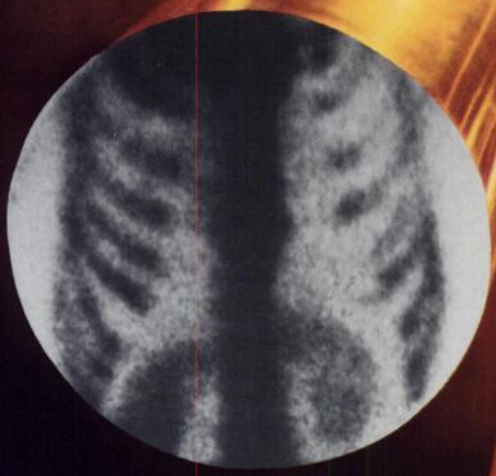
Please send complete resume to Box 205, Society of Nuclear Medicine, 475 Park Avenue South, New York, New York 10016.

There are three good reasons you should specify

TechneScan® MDP Kit

(Technetium Tc99m Medronate Sodium)

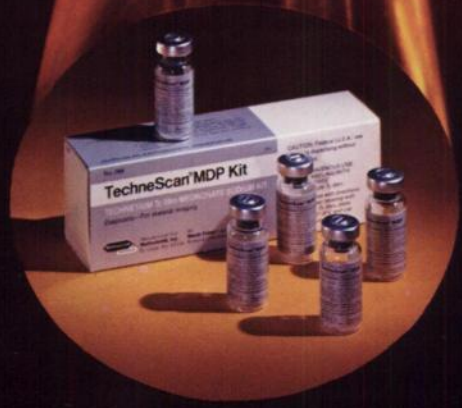
from Mallinckrodt/Nuclear



1 Latest advance in bone imaging capability.

After nearly a year of use, MDP was observed to have "...a 5%-10% greater deposition in bone and a more rapid blood clearance rate than HEDP. Furthermore, its use . . . has been accompanied by a noticeable improvement in the quality and consistency of the scans compared to the previously used HEDP."[1]

"The MDP complex produced images of superior quality as early as two hours after administration, attributable to its more rapid clearance from the blood and soft tissues. On the contrary, a longer interval of 3-4 hours after injection was usually needed for ^{99m}Tc-EHDP; pyrophosphate and polyphosphate complexes regularly required a waiting period of four hours."[2]



2 The TechneScan® Image: Consistent Quality—Reliable Performance.

Many clinicians have come to rely on—and prefer—the benefits associated with TechneScan kits. The Mallinckrodt *MDP Kit* is no exception; it offers users traditional TechneScan quality and convenience, with the added benefit of room temperature storage and long shelf life.

3 The Mallinckrodt commitment to customer service.

Your purchase of any imaging material from Mallinckrodt/Nuclear buys more than just the product. We back up our products with the best customer service/distribution system in the industry. This means fast, dependable delivery and personal attention to your individual needs and requirements.

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The IMAGE MAKER

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Please refer to brief summary on next page.

Mallinckrodt

TechneScan® MDP Kit

(Technetium Tc99m Medronate Sodium)

The latest advance in skeletal imaging.

References:
1. Davis MA, Jones AG: Comparison of ^{99m}Tc-Labeled Phosphate and Phosphonate Agents for Skeletal Imaging. *Sem. Nucl. Med. 6*:19, 1976.
2. Subramanian G, McAfee JG, Blair RJ, et al: Technetium-99m-methylene Diphosphonate—A Superior Agent for Skeletal Imaging: Comparison with Other Technetium Complexes. *J. Nucl. Med. 16*:744, 1975.

INDICATIONS AND USAGE

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

CONTRAINDICATIONS

None known at present.

WARNINGS

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

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

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).

PRECAUTIONS

General

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

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

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

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

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

Carcinogenesis

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

Pregnancy

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. There have been no studies in pregnant women. *Technetium Tc 99m Medronate Sodium* should be used in pregnant women only when clearly needed.

Nursing Mothers

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

Pediatric Use

Safety and effectiveness in children have not been established.

ADVERSE REACTIONS

At present adverse reactions have not been reported that are specifically attributable to the use of *Technetium Tc 99m Medronate Sodium.*

DOSAGE AND ADMINISTRATION

The recommended adult dose is 10 to 20 mCi (200 uCi/kg) by slow intravenous injection over a period of 30 seconds. Optimum scanning time is 1 to 4 hours post-injection.

The patient should be encouraged to drink fluids before and after the examination and to void immediately before imaging is started. This is to minimize the contribution of the bladder content to the image.

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

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

TechneScan MDP Kit-Technetium Tc 99m Medronate Sodium Kit

Product No. 088

Each kit consists of 5 reaction vials, each vial containing, in lyophilized form, sterile and non-pyrogenic:

Medronic Acid	10 mg
Stannous Chloride	1 mg

The pH is adjusted to 6.5 to 7.5 with HCl or NaOH prior to lyophilization. The vials are sealed under an atmosphere of nitrogen.

Labels with radiation warning symbols and directions are supplied with each kit.

Manufactured for:
MALLINCKRODT, INC., St. Louis, Missouri 63134

By: MERCK FROSST LABORATORIES Kirkland (Montreal), Canada

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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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MaxiCamera 535

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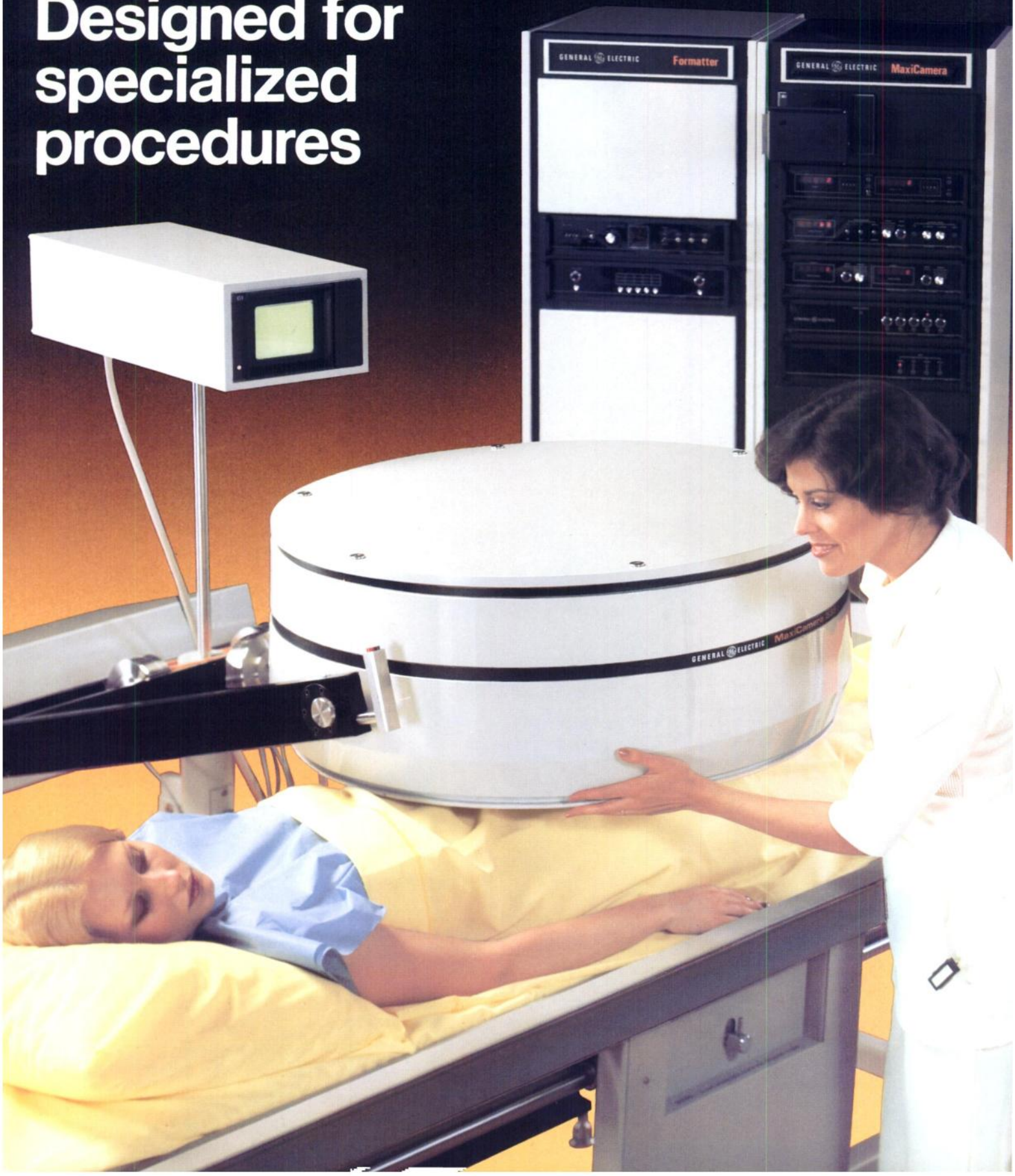
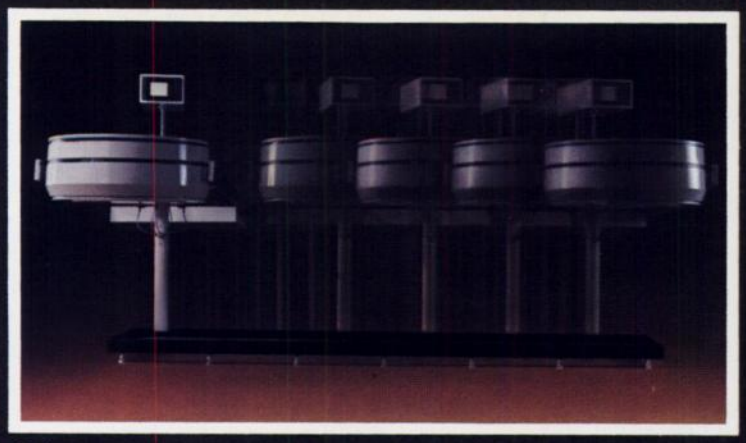
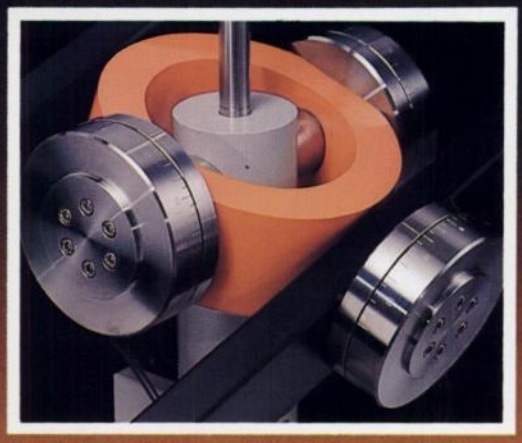




Selectascan system allows whole-body, one-pass scanning for bone or Gallium images and faster throughput.

61 hexagonal "teacup" photomultiplier tubes produce superior resolution and linearity.

The largest field-of-view available, 530 mm (21 inches) covers more anatomy than 400 mm cameras.



Gimbal suspension allows precise, swift and secure manual positioning of detector.

MaxiCamera™ 535 system, the newest GE nuclear diagnostic system, answers the need for greater throughput and improved anatomical detail. It's the first nuclear camera system designed for specialized procedures: whole-body bone imaging, Gallium studies, simultaneous lung/liver imaging, and venography.

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61 hexagonal "teacup" photomultiplier tubes are selected and matched for high sensitivity and uniformity. Preamplifiers are integral to the tube assembly. Combined with a unique light coupling system, tubes produce superior resolution and linearity. MaxiCamera 535 system offers the proven performance features of the MaxiCamera series...counter-balanced positioning, modular electronics and human-engineered components.

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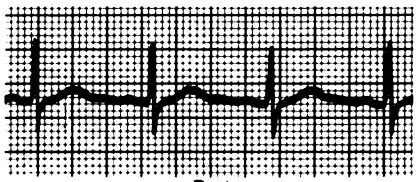
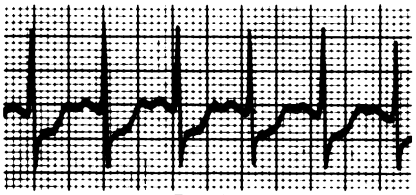
GENERAL ELECTRIC

To help rule out, confirm or evaluate

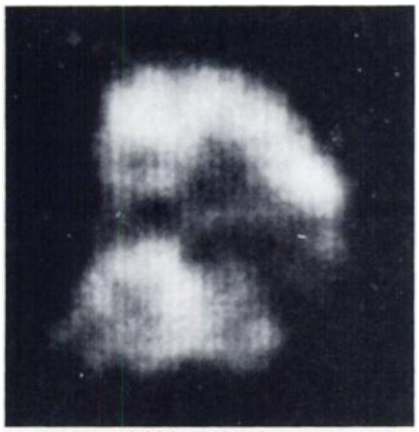
Coronary artery disease



Rest



Exercise



Initial anterior view

Delayed anterior view

Positive stress ECG without angina

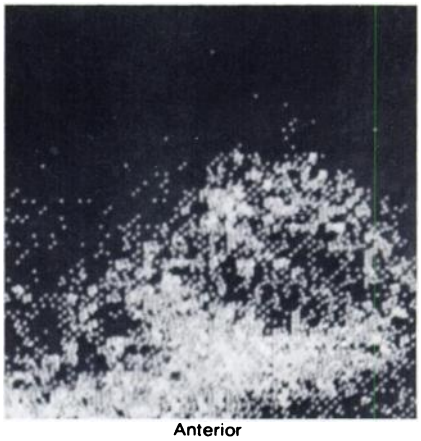
History
A.C., 50-year-old accountant, asymptomatic, required to undergo exercise ECG as part of "executive physical."

ECG findings
Normal at rest, 2.5-3 mm ST-segment depression on exercise; denied accompanying angina.

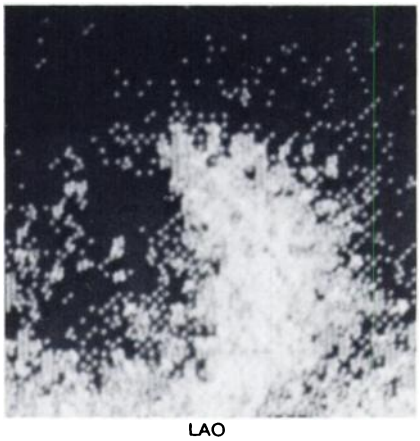
Thallium-201 imaging
Large apical defect on immediate post-exercise anterior view; defect filled in on delayed images.

Working diagnosis
Coronary artery disease, confirmed on preoperative angiography.

Acute myocardial infarction



Anterior



LAO

Early diagnosis

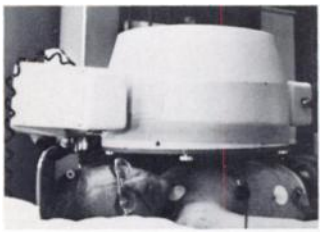
History
J.B., 54-year-old construction worker, admitted to CCU following episode of severe chest pain, diaphoresis, dizziness. Patient fell to ground upon onset of symptoms, severely bruising left thigh, chest wall. No history of angina pectoris or prior MI; ECG documented left bundle branch block.

Serum enzymes, ECG
Elevated shortly following admission; isoenzyme analysis unavailable to differentiate elevation secondary to trauma from possible elevation secondary to acute MI; ECG nondiagnostic because of LBBB.

Thallium-201 imaging
Images made upon admission displayed anterior wall defect (anterior view), large septal defect (LAO view).

Working diagnosis
Extensive anteroseptal MI.

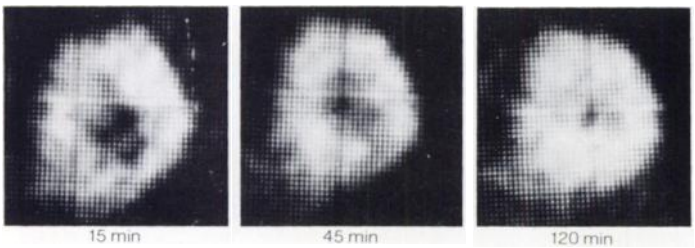
To start using thallium-201 in your department, you'll need



A recent model 37 photomultiplier tube camera
with all-purpose collimator, capable of resolving 1 cm line separations on an Au 195 line phantom

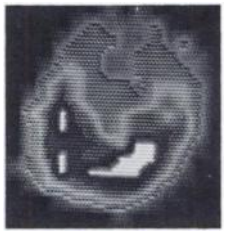
Treadmill or bicycle ergometer and ECG recorder,
to perform maximal stress testing in accordance with good clinical practice

Ability to begin imaging promptly
(within 3–5 minutes) following thallous chloride Tl 201 injection and termination of stress



To get the most out of thallium-201's total diagnostic capability, you'll want

Clinical training in scan interpretation
at an institution experienced in thallium-201 imaging*



Electronic image acquisition and processing,
to help resolve ambiguous studies

Mobile imaging/acquisition instrumentation,
to facilitate acute MI thallium-201 studies when patients cannot be transported to the nuclear medicine department

Continuing medical education on thallium-201,
for your staff and for your referring physicians*

*Your NEN representative may help recommend an institution in your area. For continuing medical education programming, ask your NEN representative or write: Teaching Program Administrator, New England Nuclear, 549 Albany Street, Boston, Mass. 02118.

Thallous Chloride Tl 201

NEN New England Nuclear

See following page for full prescribing information.

Thallous Chloride Tl 201

November 1977

FOR DIAGNOSTIC USE

DESCRIPTION: Thallous Chloride Tl 201 is supplied in isotonic solution as a sterile, nonpyrogenic diagnostic radiopharmaceutical for intravenous administration. The aqueous solution at calibration time contains 1mCi/ml Thallous Chloride Tl 201, adjusted to pH 4.5-6.5 by the addition of hydrochloric acid and/or sodium hydroxide solution. It is made isotonic with 0.9% sodium chloride and is preserved with 0.9% benzyl alcohol. Thallium Tl 201 has a half-life of 73.1 hours and is cyclotron-produced. It is essentially carrier-free, and contains less than 0.25% lead Pb 203 and less than 1.9% Thallium Tl 202.

PHYSICAL CHARACTERISTICS

Thallium Tl 201 decays by electron capture to Mercury Hg 201 with a physical half-life of 73.1 hours.[1] Photons that are useful for detection and imaging are listed in Table 1. The lower energy X-rays obtained from the Mercury Hg 201 daughter of Tl 201 are recommended for myocardial imaging, because the mean %/disintegration at 68-80.3 keV is much greater than the combination of gamma-4 and gamma-6 mean %/disintegration.

Table 1. Principal Radiation Emission Data

Radiation	Mean %/Disintegration	Mean Energy (keV)
Gamma-4	2.65	135.3
Gamma-6	10.0	167.4
Mercury X-rays	94.5	68-80.3

Martin, M.J. Nuclear Data Project, ORNL, January 1977

EXTERNAL RADIATION

The specific gamma ray constant for Thallium Tl 201 is 0.47R/mCi-hr. at 1 cm. The first half-value layer is 0.23mm of lead. A range of values for the relative attenuation of the radiation emitted by this radionuclide that results from the interposition of various thicknesses of lead (Pb) is shown in Table 2. For example, the use of 4.4mm of lead will decrease the external radiation exposure by a factor of about 10,000.

Table 2. Radiation Attenuation By Lead Shielding

mm of Lead (Pb)	Coefficient of Attenuation
0.23	0.5
0.83	10^{-1}
1.9	10^{-2}
3.1	10^{-3}
4.4	10^{-4}
5.7	10^{-5}

To correct for physical decay of this radionuclide, the fractions that remain at selected intervals before and after calibration are shown in Table 3.

Table 3. Thallium Tl 201 Decay Chart: Half-Life 73.1 Hours

Hours	Fraction Remaining	Hours	Fraction Remaining	Hours	Fraction Remaining
-72	1.98	18	0.84	72	0.51
-60	1.77	24	0.80	78	0.48
-48	1.58	30	0.75	84	0.45
-36	1.41	36	0.71	90	0.43
-12	1.12	42	0.67	96	0.40
-6	1.06	48	0.63	108	0.36
0*	1.00	54	0.60	120	0.32
6	0.95	60	0.57	132	0.29
12	0.89	66	0.54	144	0.26

*Calibration Time

CLINICAL PHARMACOLOGY: Carrier-free Thallous Chloride Tl 201 has been found to accumulate in viable myocardium in a manner analogous to potassium. Experiments employing labeled microspheres in human volunteers have shown that the myocardial distribution of Thallous Chloride Tl 201 correlates well with regional perfusion.

In clinical studies, thallium images have been found to visualize areas of infarction confirmed by electrocardiographic and enzyme changes. Regions of transient myocardial ischemia corresponding to areas perfused by coronary arteries with partial stenoses have been visualized when thallium was administered in conjunction with an exercise stress test. It is usually not possible to differentiate recent from old myocardial infarction, and no exact differentiation can be made between recent myocardial infarction and ischemia.

After intravenous administration, Thallous Chloride Tl 201 clears rapidly from the blood with maximal concentration by normal myocardium occurring at about ten minutes.

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.

RADIATION DOSIMETRY

The estimated absorbed radiation dose[2] to an average patient (70kg) from an intravenous injection of a maximum dose of 1.5 millicuries of Tl 201 is shown in Table 4.

Table 4. Radiation Dose Estimates of Thallous Chloride Tl 201: Absorbed Dose/1.5mCi Thallium Tl 201 Administered

	Rads/1.5mCi
Heart	0.51
Small Intestines	0.97
Kidneys	2.2
Liver	0.93
Red Marrow	0.51
Ovaries	0.85
Testes	0.81
Thyroid	1.12
Total Body	0.36

*Values listed include a maximum correction of 13% to the radiation doses from Tl 201 due to the radiocontaminants Pb 203 and Tl 202.

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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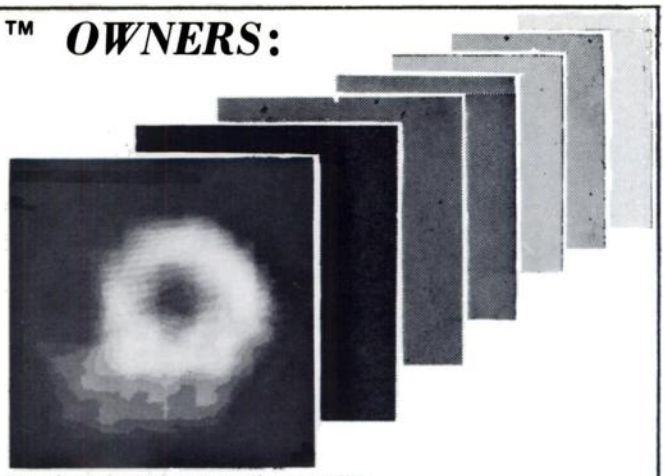

One plane through myocardium parallel to collimator.

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The GAMMECAT Package was developed by the pioneers of 7-pinhole tomography. It features the fastest and most accurate software available today. We combined the technology of 7-pinhole tomography with the advances of GAMMECAT software.

Consider the following:

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- increases sensitivity without any loss of specificity in thallium myocardial perfusion studies.[1,2]
- images the heart in true-to-life 3 dimensions.
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- speed, by reconstructing multiple images into 10 planes in 60 seconds.
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- economy and simplicity, by utilizing your existing camera and computer system.

. . . . . In a word, 7-pinhole tomography is a breakthrough; GAMMECAT is the most advanced application package available.

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Birdcage representation of the surface of the blood pool inside the left ventricle.

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[1]Vogel RA, Kirch DL, Lefree MT, Rainwater JO, Steele PP: Thallium-201 myocardial perfusion scintigraphy: Results of standard and multi-pinhole tomographic techniques. *The American Journal of Cardiology* 43:787-793, 1979

[2]Francisco D, Raymundo G, Van Kirk O, Erhardt J, Marcus M: Tomographic thallium-201 perfusion scintigrams following maximal coronary vasodilation with dipyridamole: Circulation 60 (suppl. II): II-174, 1979.

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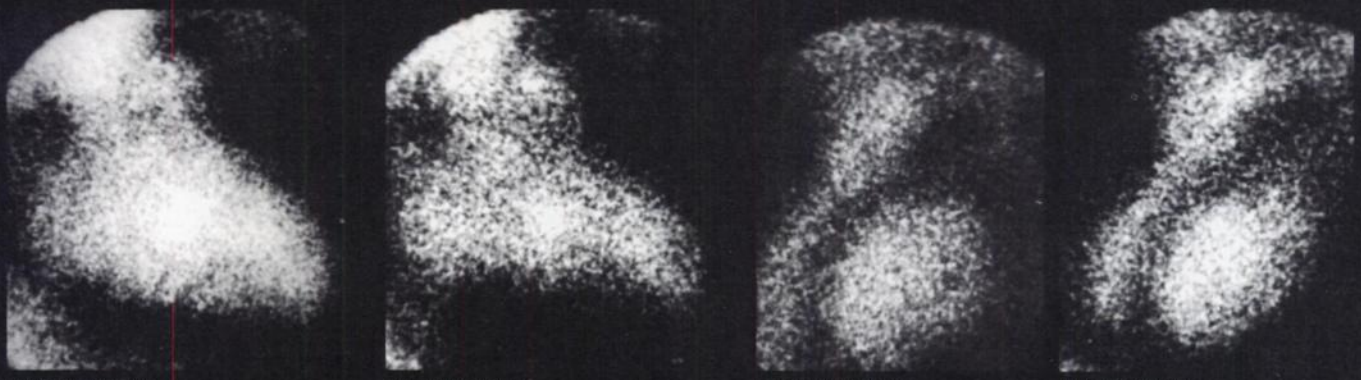
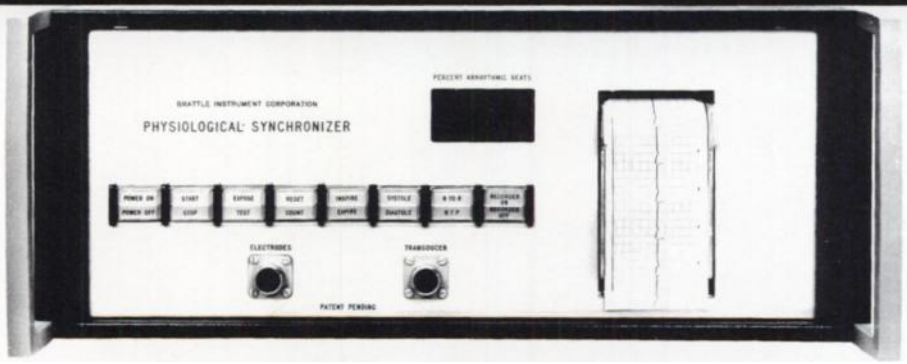


RAO, DIASTOLE | RAO, SYSTOLE | LAO, DIASTOLE | LAO, SYSTOLE

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



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

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

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

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

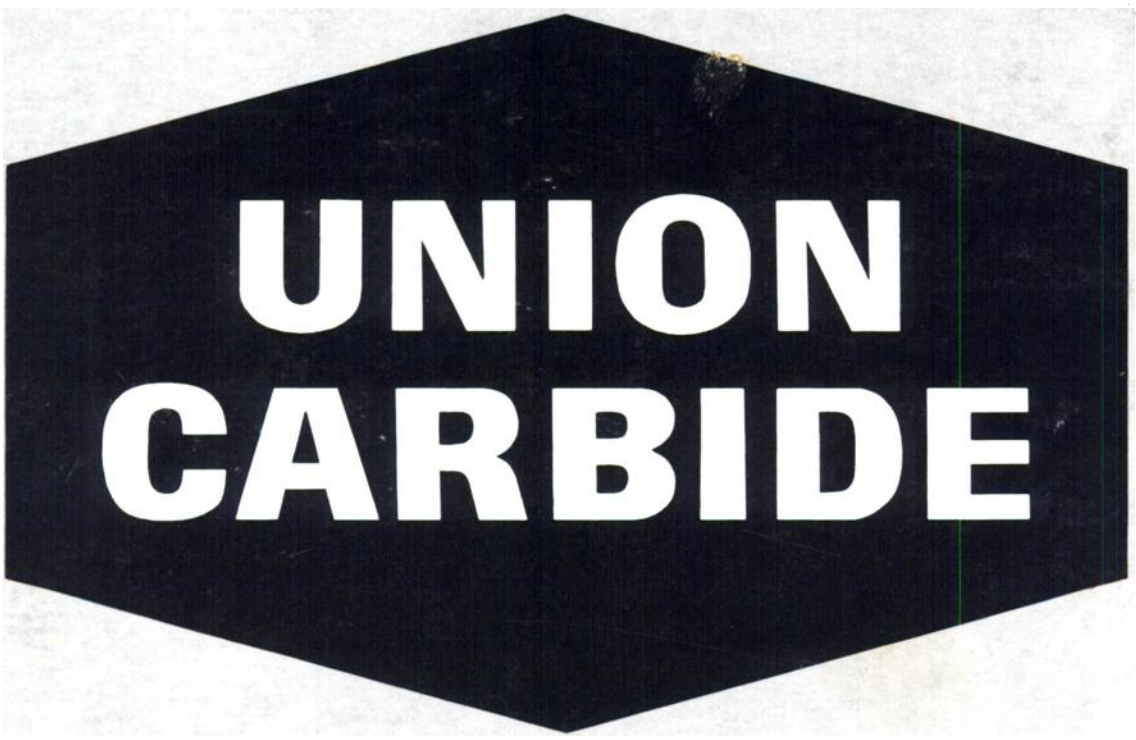
A single pair of axillary electrodes captures both heart and breath
It's easy. And we supply disposable, pre-filled electrodes.

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

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

Brattle Instrument Corporation

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



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