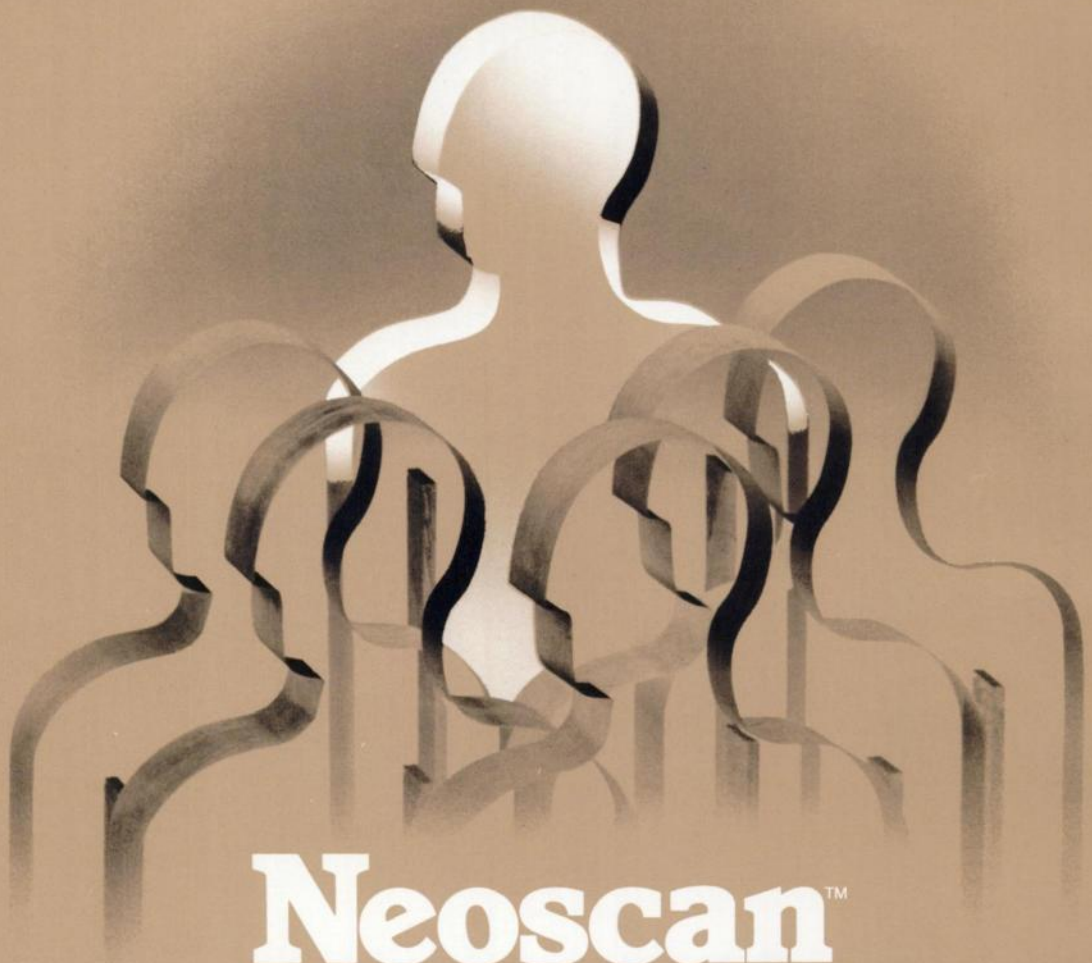
When nuclear medicine discusses gallium imaging, one name will keep coming up...



Neoscan™
gallium citrate Ga 67

from medi+physics™

NEOSCAN MEANS gallium citrate Ga 67 from Medi-Physics, Inc. Neoscan can aid in demonstrating the presence and extent of Hodgkin's disease, lymphoma *and* bronchogenic carcinoma. Positive uptake in the absence of prior symptoms warrants follow-up as an indication of a potential disease state.

NEOSCAN MEANS a gallium citrate Ga 67 that is produced by MPI on both the East and West Coasts and is available from 6 locations across the country for easy access when you need it. Neoscan is calibrated twice weekly in two convenient sizes: 3.0mCi and 13.2mCi.

NEOSCAN MEANS a gallium citrate Ga 67 that MPI will send to you with no additional delivery charge along with your supply of Sodium Iodide I 123, Technetium Prepared Products or Xenon 133-V.S.S. (xenon Xe 133).

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Neoscan™
gallium citrate Ga 67

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

DESCRIPTION: Neoscan for diagnostic use is supplied as a sterile, apyrogenic aqueous solution for intravenous injection. Each milliliter of the solution contains 2 millicuries of gallium Ga 67 at calibration time, no-carrier-added, 2.5% sodium citrate, and 1% benzyl alcohol as a preservative. The pH is between 4.5-7.5. Gallium Ga 67, with a half-life of 78.1 hours, is cyclotron produced by the proton irradiation of zinc Zn 68-enriched zinc oxide. The radionuclidic composition, at calibration time, is not less than 98.9% of the total activity from gallium 67 with less than 1% of the total radioactivity due to gallium 66 and with zinc 65 and other radiocontaminants contributing less than 0.1% of the total activity.

INDICATIONS AND USAGE: Neoscan may be useful to demonstrate the presence and extent of Hodgkin's disease, lymphomas, and bronchogenic carcinoma. Positive gallium Ga 67 uptake in the absence of prior symptoms warrants follow-up as an indication of a potential disease state.

CONTRAINDICATIONS: None known.

WARNINGS: This radiopharmaceutical should not be administered to children or to patients who are pregnant or to nursing mothers unless the information to be gained outweighs the potential hazards. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, in women of child-bearing capability should be performed during the first few (approximately 10) 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 finding 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. Neoscan is intended for use as an adjunct in the diagnosis of certain neoplasms. Negative results do not preclude the presence of disease.

Gallium citrate Ga 67 as well as other radioactive drugs, must be handled with care. Appropriate safety measures should be used to minimize radiation exposure to clinical personnel and 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.

ADVERSE REACTIONS: No adverse reactions have been reported with the use of Neoscan at this time.

DOSAGE AND ADMINISTRATION: The recommended adult (70 kg) dose is 2-5 millicuries. Neoscan is intended for intravenous administration only. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.

Studies indicate the optimal tumor-to-background concentration ratios are often obtained about 48 hours after administration. 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.

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 first 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.

Radiopharmaceuticals should be used only by persons 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: Neoscan is supplied as a no-carrier-added sterile apyrogenic aqueous solution for intravenous use. Each milliliter contains 2 mCi ± 10% gallium Ga 67 at the time of calibration with 2.5% sodium citrate. Benzyl alcohol 1% is present as a preservative. The pH is between 4.5-7.5.

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

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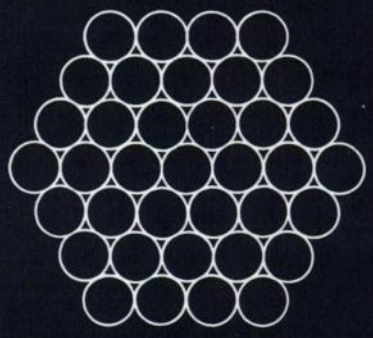

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Sealed flood sources

Supplied as ^{57}Co (2 and 3mCi) and ^{133}Ba (0.5 and 1.0mCi) in two sizes, to check the uniformity and resolution of conventional and wide field-of-view gamma cameras, and for transmission imaging. The maximum acceptable variation in activity over the entire active area, is ±1% of the mean value. Each uniformly active plastic component is surrounded by inactive plastic and enclosed in an anodized aluminium casing. A shielded storage case is supplied with each source.

Anatomical marker sources

Spot sources are available as a 1mm bead of ^{57}Co or ^{133}Ba (10 and 100μCi). Features include a welded plastic capsule, point source geometry with a visible active bead, and colour coding for quick identification of nuclide and activity. They are packed in sets of three in shielded boxes; replacements are available separately.

Pen point tracers have a 1mm diameter bead of ^{57}Co (100μCi) sealed in the tip of a ball-point pen shaped holder with a brass shield for the active end.

Flexible sources are 50cm x 4mm diameter; ^{57}Co (100μCi) is dispersed in an inner core of active plastic, sealed in an inactive PVC tube, and closed by aluminium caps.

^{129}I rod sources for γ counters

^{129}I (0.1μCi) gamma/X-ray spectrum is virtually identical to ^{125}I, and has a half-life of 1.57×10^7 years. Calibration in terms of ^{125}I is available. The length is 100mm, maximum diameter 15mm—suitable for most manual and automatic counters. Active material is sealed in a plastic capsule attached to a handling rod. Other nuclides ^{241}Am, ^{133}Ba, ^{57}Co, ^{60}Co, ^{137}Cs, ^{54}Mn, ^{22}Na, ^{75}Se, ^{123m}Te, ^{88}Y and mock ^{131}I.

The Radiochemical Centre Amersham

For further information please write or phone
The Radiochemical Centre Limited, Amersham, England. Telephone: 024-04-4444
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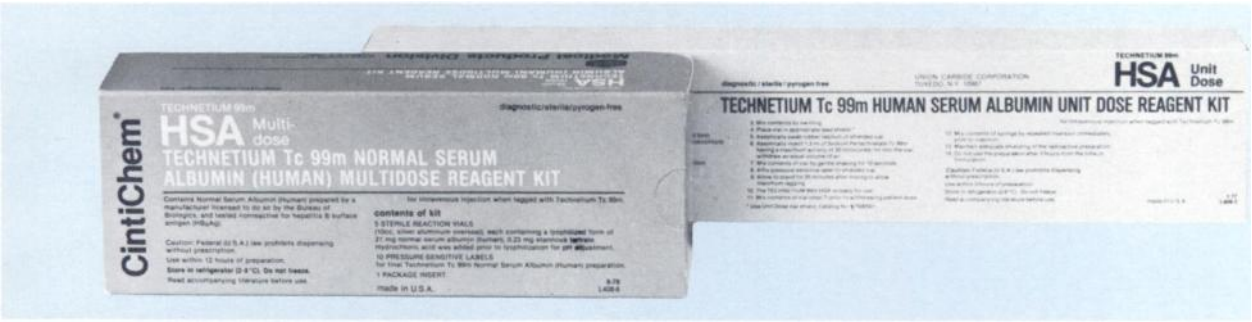

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Technetium Tc 99m Normal Serum Albumin (Human) Reagent Kit
DIAGNOSTIC-FOR INTRAVENOUS USE **HSA**

BRIEF SUMMARY OF PRESCRIBING INFORMATION

Indications and usage
Technetium Tc 99m Human Serum Albumin is used as an agent for imaging the heart blood pool and to assist in the detection of pericardial effusion and ventricular aneurysm.

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

warnings
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 to nursing mothers unless the expected benefits to be gained outweigh the potential hazards.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of women 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 radiodiagnostic.

Technetium Tc 99m Human Serum Albumin must not be used after three hours from the time of formulation.

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 Human Serum Albumin should be used in pregnant women only when clearly needed.

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

Safety and effectiveness in children have not been established.

Technetium Tc 99m Human Serum Albumin, 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.

The labeling reactions involved in preparing the agent depend on maintaining the tin in the reduced state. Any oxidant present in the Sodium Pertechnetate Tc 99m supply may thus adversely affect the quality of the prepared agent. Hence, Sodium Pertechnetate Tc 99m containing oxidants, or other additives, should not be employed without first demonstrating that it is without adverse effect on the properties of the resulting agent.

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

how supplied
unit dose kit
The kit consists of 10 unit dose reaction vials each containing a lyophilized mixture of 7 mg human serum albumin and 0.08 mg stannous tartrate. Hydrochloric acid was added prior to lyophilization for pH adjustment.

multidose kit
The kit consists of 5 multidose reaction vials each containing a lyophilized mixture of 21 mg human serum albumin and 0.23 mg stannous tartrate. Hydrochloric acid was added prior to lyophilization for pH adjustment.

FOR FULL PREPARATION AND PRESCRIBING INFORMATION, SEE PACKAGE INSERTS.

Notes: [1]Refer to package insert for full preparation and prescribing information. [2]Data on file at Union Carbide Corporation, Tuxedo, New York

UNION CARBIDE FROM ATOM TO IMAGE

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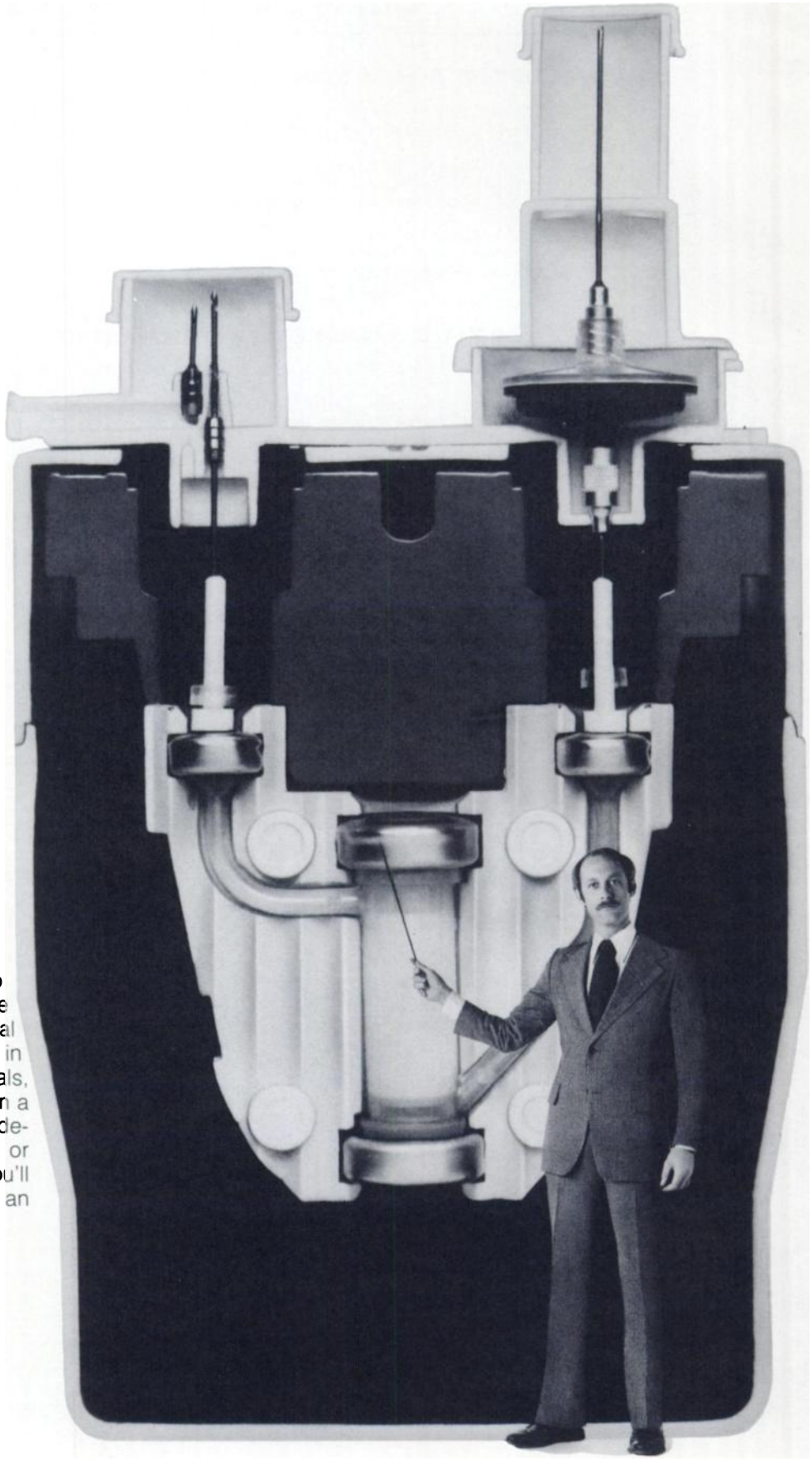

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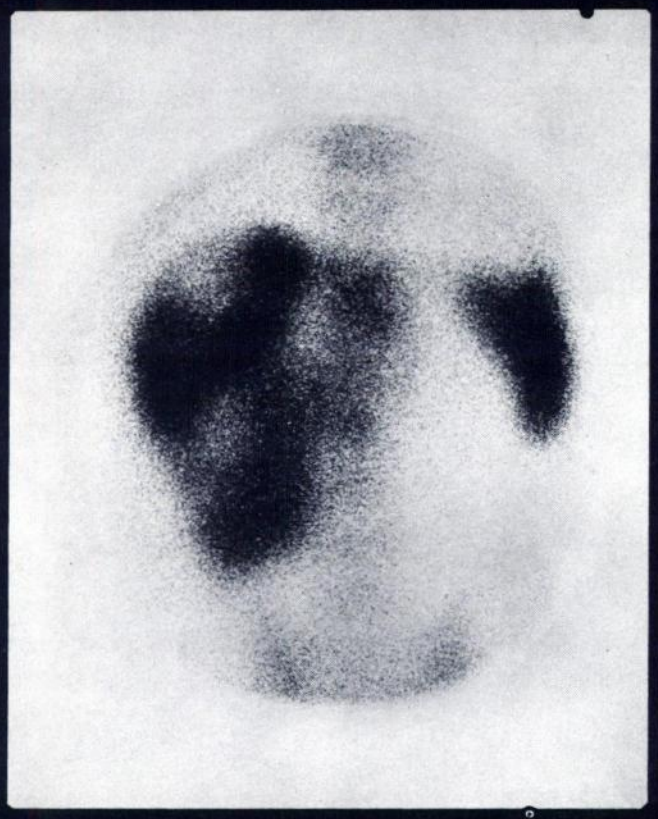

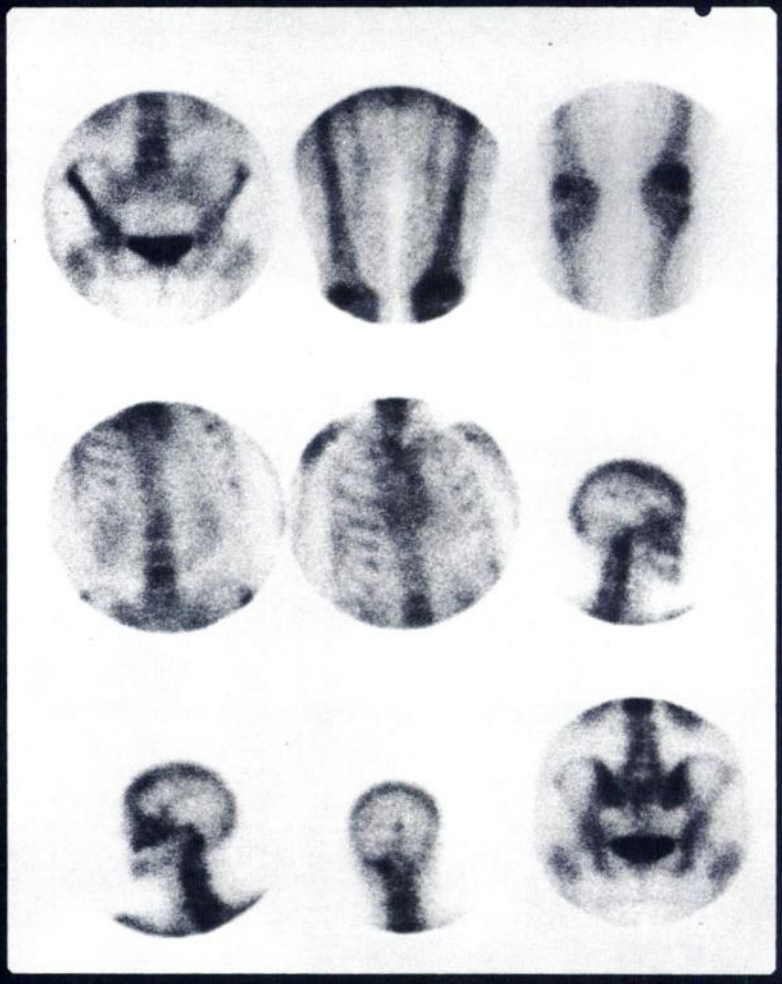

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Kodak NMB and NMC films can be processed in 90 seconds and are available in a variety of sheet film sizes. If you would like to know more about these and other Kodak films for nuclear medicine, ask your Kodak Technical Sales Representative, or write: Eastman Kodak Company, Health Sciences Markets Division, Dept. 740-B, Rochester, New York 14650.

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The answer lies in the particle size of the Millimicrospheres which reflects the strict quality control by Sorin Biomedica.

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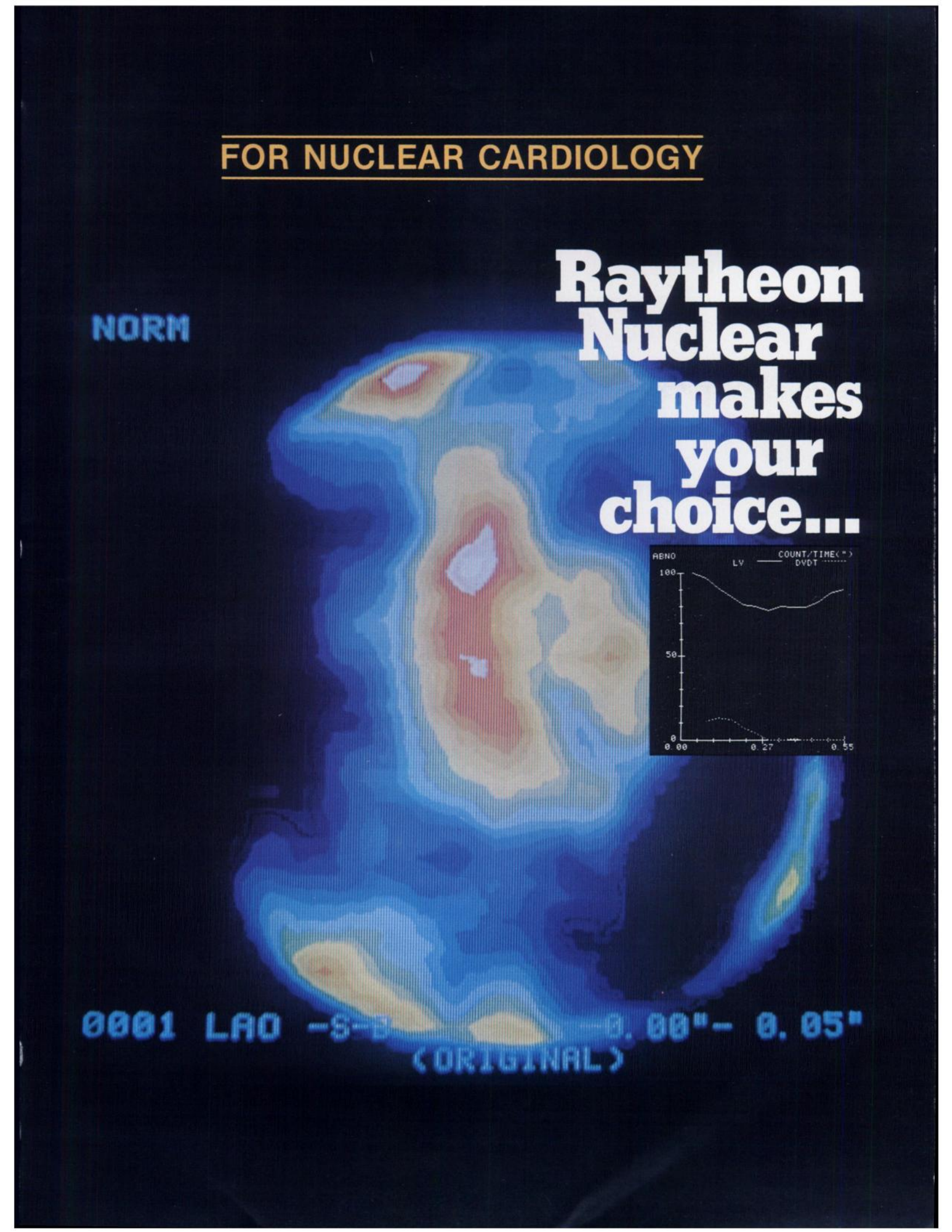

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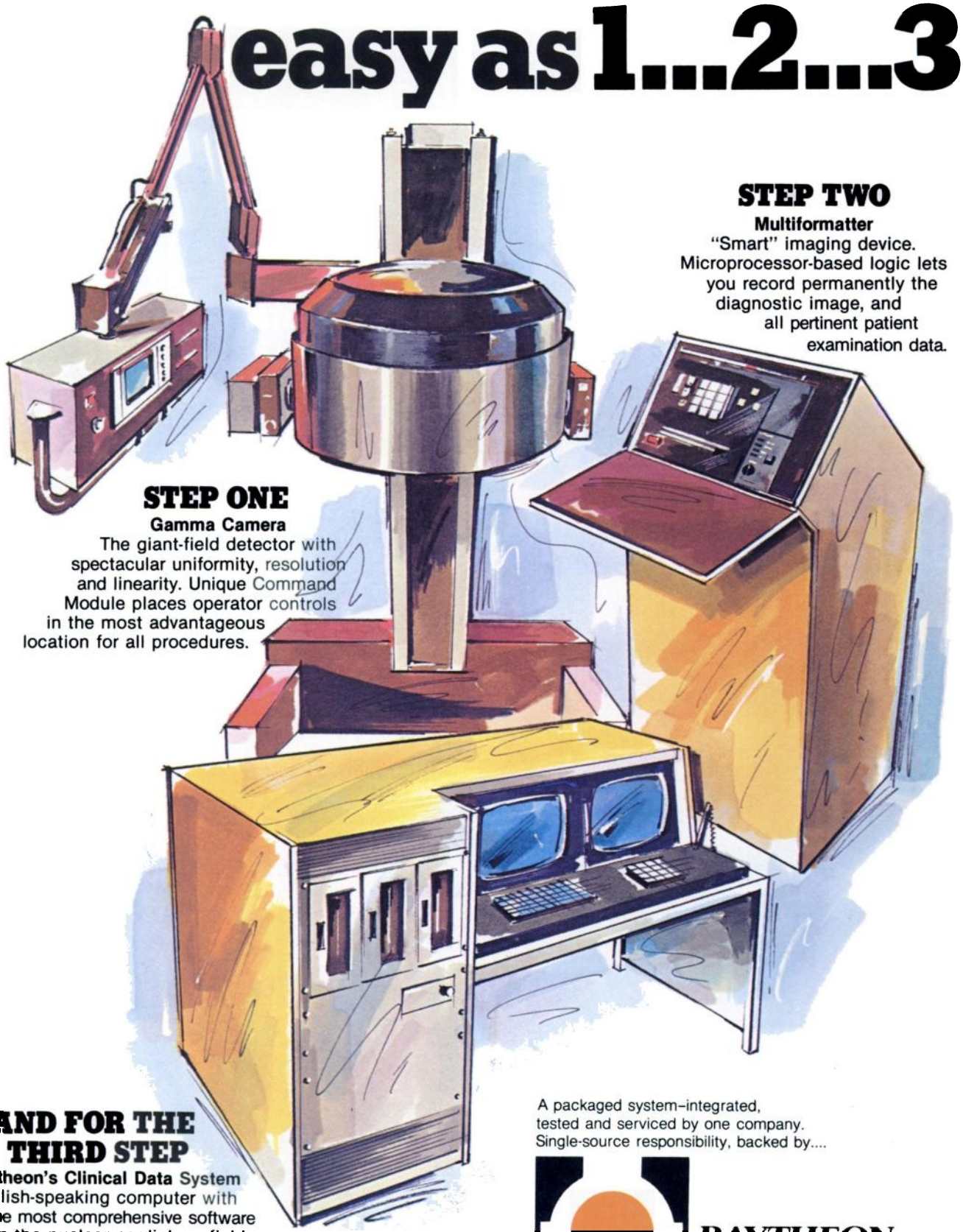

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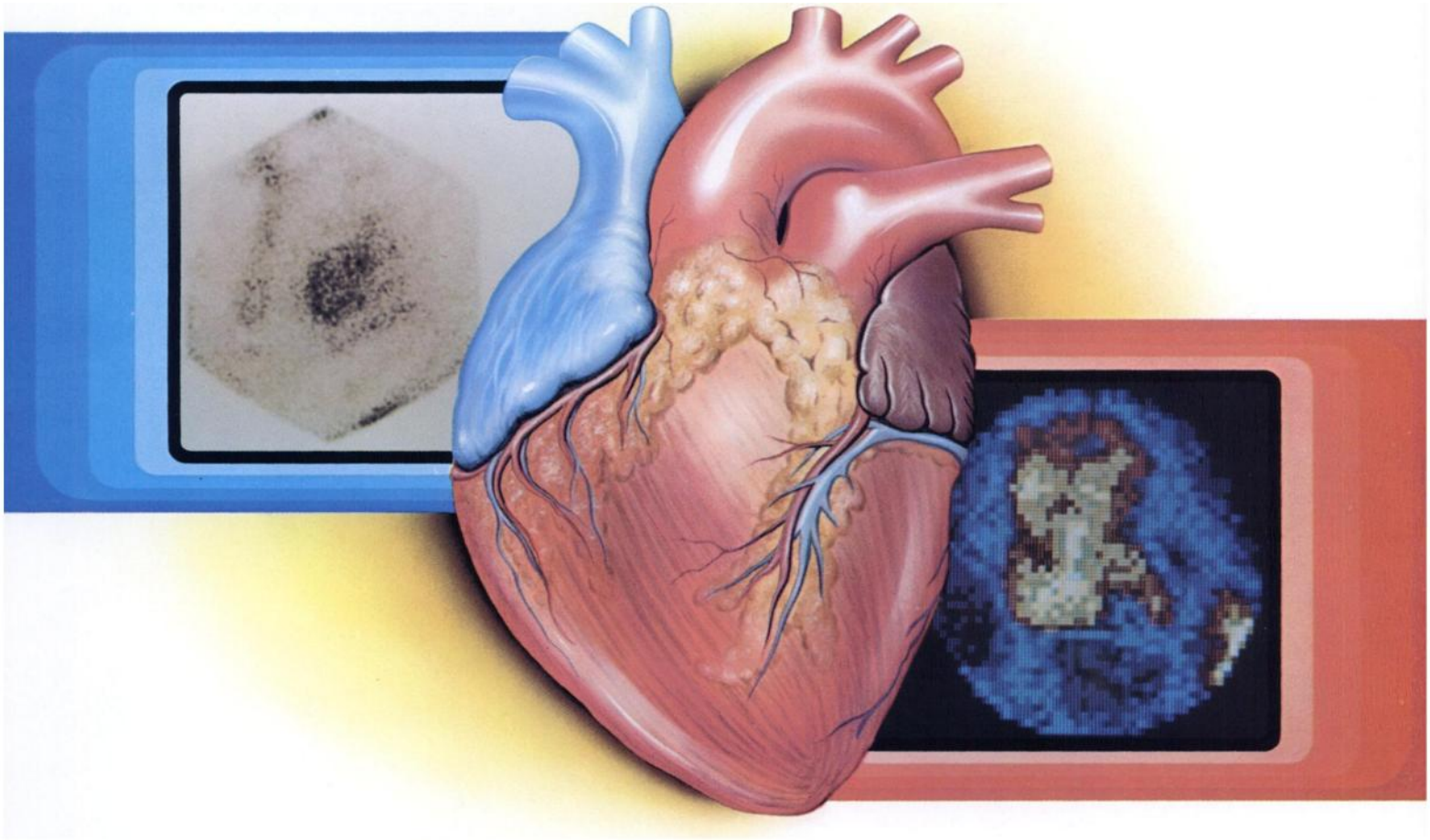

TechneScan® PYP™ Kit (Stannous Pyrophosphate) for preparation of Technetium Tc–99m Stannous Pyrophosphate.

A consistent agent for skeletal imaging, *TechneScan PYP* is now available for use as an adjunct in the diagnosis of acute myocardial infarction, and for gated cardiac blood-pool imaging.

Investigators have found the technetium-99m pyrophosphate scintigraphic study to be a highly useful diagnostic technique for evaluating chest pain of uncertain origin.[1]

"The gated cardiac blood pool scan permits the calculation of both ejection and regional wall motion from a single examination."[2]

Mallinckrodt's *TechneScan PYP*...a preferred way to detect acute myocardial infarction...an advanced method to dynamically assess cardiac function.

References:

1. Berman, DS, et al: New Approach to Interpretation of Technetium-99m Pyrophosphate Scintigraphy in Detection of Acute Myocardial Infarction: Clinical Assessment of Diagnostic Accuracy. *Am. J. Cardiol.* 39:341-346, (March) 1977.

2. Strauss, HW, Pitt, B: Cardiovascular Nuclear Medicine: Its Role in Patients with Coronary Heart Disease. *CVP Journal:* (November/December), 1974.

Mallinckrodt® NUCLEAR **The IMAGE MAKER**

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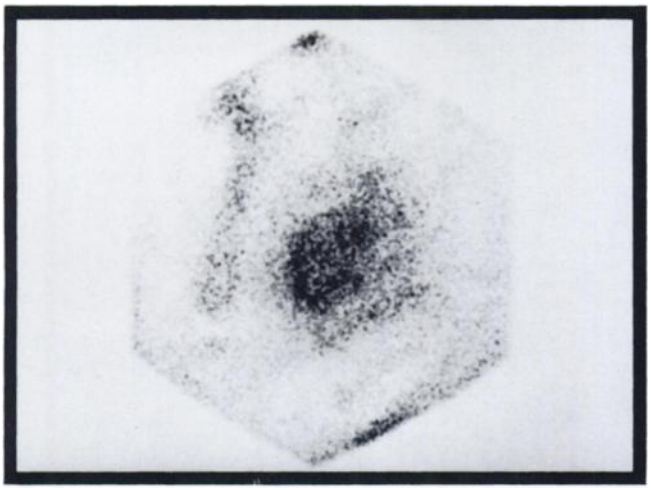
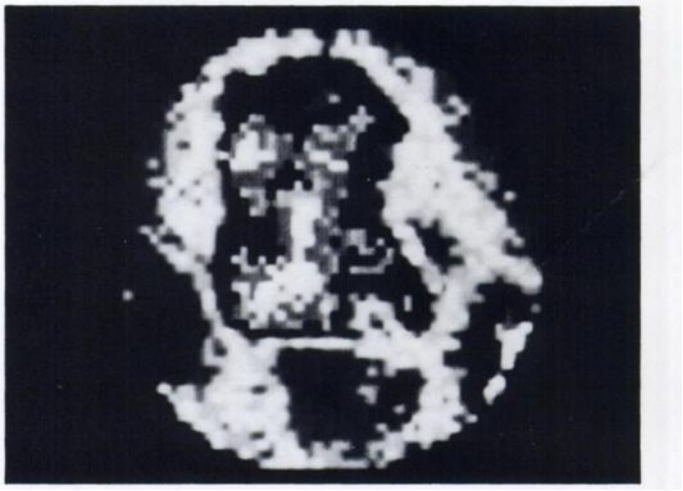
See reverse side for brief summary of complete prescribing information.

An advance from Mallinckrodt provides an excellent adjunct in the detection of myocardial infarction and the dynamic assessment of cardiac function.





TechneScan® PYP™ Kit (Stannous Pyrophosphate) for preparation of Technetium Tc-99m Stannous Pyrophosphate.

BRIEF SUMMARY

CLINICAL PHARMACOLOGY

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

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

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

INDICATIONS AND USAGE

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

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

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

CONTRAINDICATIONS

None.

WARNINGS

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

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

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

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

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

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

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

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

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

PRECAUTIONS

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

Bone Imaging

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

Cardiac Imaging

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

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

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

Blood Pool Imaging

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

ADVERSE REACTIONS

None.

HOW SUPPLIED

Catalog Number—*094* **TechneScan PYP Kit**

Kit Contains:

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Reaction Vial Contains:

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Inner-View No. 2

A continuing educational series in Nuclear Cardiology

The interview excerpted here was conducted with Glen W. Hamilton, M.D., Chief, Nuclear Medicine Section, Veteran's Administration Hospital, Seattle, Washington. Dr. Hamilton is also an Associate Professor of Medicine, University of Washington School of Medicine.

Q. Of the nuclear cardiology studies available in clinical practice today, which are the most difficult to interpret?

A. Thallium images are probably the most difficult to interpret, and pyrophosphate are probably the next. In about 60% of all abnormal studies, the abnormality is quite obvious. The remaining 40% are quite difficult to read. As the physician gains experience, he will be able to read about half of those with confidence, but about 20% of all thallium studies remain difficult to interpret. Experienced observers will have legitimate disagreement as to whether a given study is normal or abnormal.

Q. Which of these tests are generally the best in the assessment of left ventricular function? Is this also the best study for assessing wall motion?

A. The multiple gated blood pool study yields the greatest clinical information compared to the difficulty of performing the test and, therefore, is the one we use in our clinical practice when we wish to assess a patient's ventricular function. The best study for assessing wall motion is probably the multiple gated study. It is not perfect, in that the right ventricle and the left ventricle overlap in all but the LAO view... but for most laboratories it is the most practical way to assess wall motion.

Q. What studies would you recommend to a nuclear physician or cardiologist beginning nuclear cardiology in a community hospital?

A. I would recommend two studies: multiple gated blood pool studies, and thallium imaging. The ventricular function measurements obtained from multiple gated studies are useful not only in patients who have suspected coronary disease, but also in a wide variety of other patients, such as people with lung disease, older patients who have undetected ventricular dysfunction, or presurgical patients. Clearly, this is going to be the largest volume study, and that's the place where they should start. After doing resting ventricular function studies, they should progress to thallium imaging. Six months from now, there should be enough data available on rest/exercise ventricular function studies using multiple gated imaging to indicate whether this technique is of general usefulness.

Q. Which studies are the most difficult to perform?

A. Pyrophosphate studies are obviously the simplest to perform. The multiple gated blood pool study is performed quite simply. However, the equipment required is not present in every laboratory at the present time. Thallium, being a less ideal isotope, is probably the most difficult study, in terms of the technique required to achieve good diagnostic results.

Q. What may be the single most important use of these nuclear cardiology studies in five years?

A. First, I'm confident we will be noninvasively measuring ventricular function in a wide range of patients with various disease states — coronary artery disease, cardiomyopathy, chronic lung disease, valvular heart disease and many others. We will be able to follow these patients, correctly select the optimal time for surgical intervention, and alter medical therapy so that treatment is optimal. There's no question that this will happen. Secondly, if these tests turn out to be quite sensitive for the detection of coronary artery disease in its early presymptomatic stages, it may be possible to alter that disease by various interventions. This could become a very important national endeavor which could have far-ranging effects on health in this country.

Q. How widespread do you see these techniques becoming?

A. The need for studies of ventricular function will be comparable to the need for lung or bone scans. I really expect that most existing nuclear medicine laboratories, and, generally any hospital of two or three hundred beds, will be able to perform ventricular function studies within the next several years.

For the complete transcript of this interview with Dr. Hamilton, write Inner-View, General Electric Company, Medical Systems Division, P.O. Box 414 (Mail Code W-504), Milwaukee, WI 53201.

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*IEEE Transactions on Nuclear Science, Volume NS-25 No. 1, February 1978.

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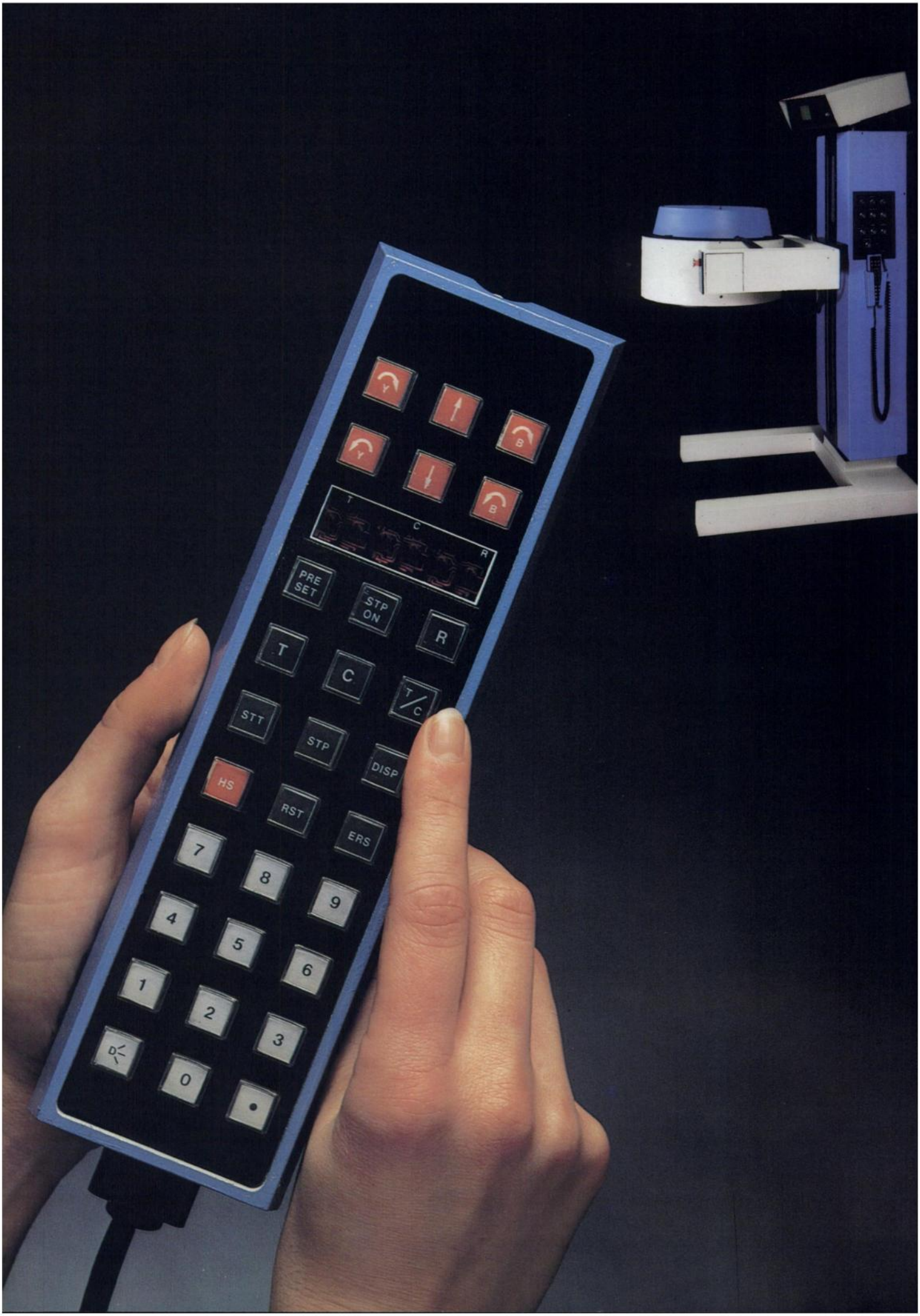
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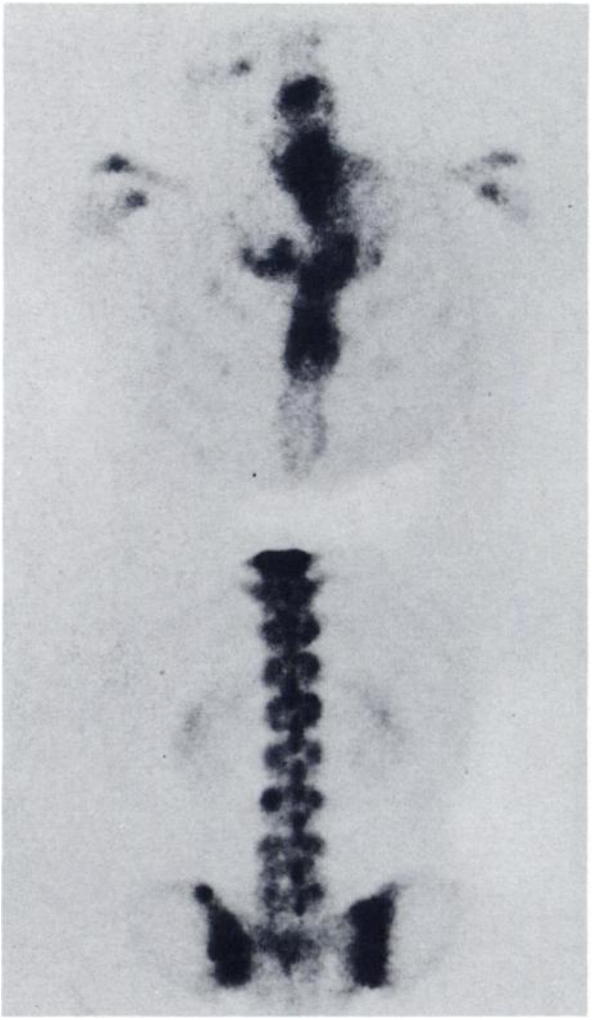

***Above** – Diffuse metastatic disease throughout torso and limbs.*

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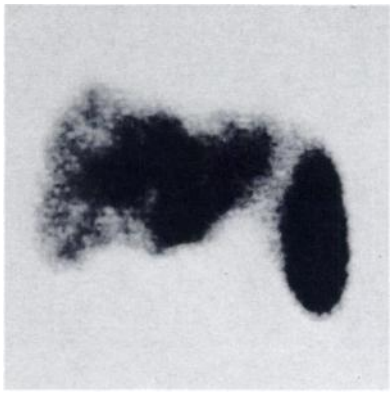
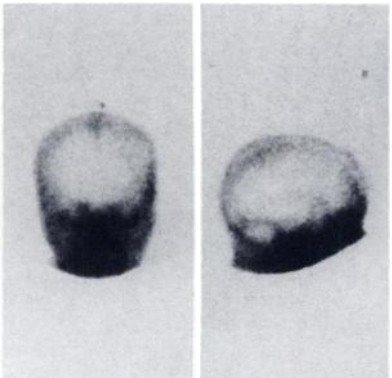
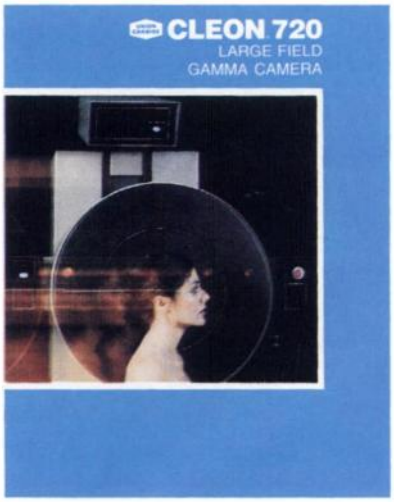




***Top** – Hepatoma in 31-year-old female with 3.5 mCi Tc^{99m} Sulfur Colloid.*

***Bottom** – Subdural hematoma on left, seen in 76-year-old male with 20 mCi D.T.P.A.*



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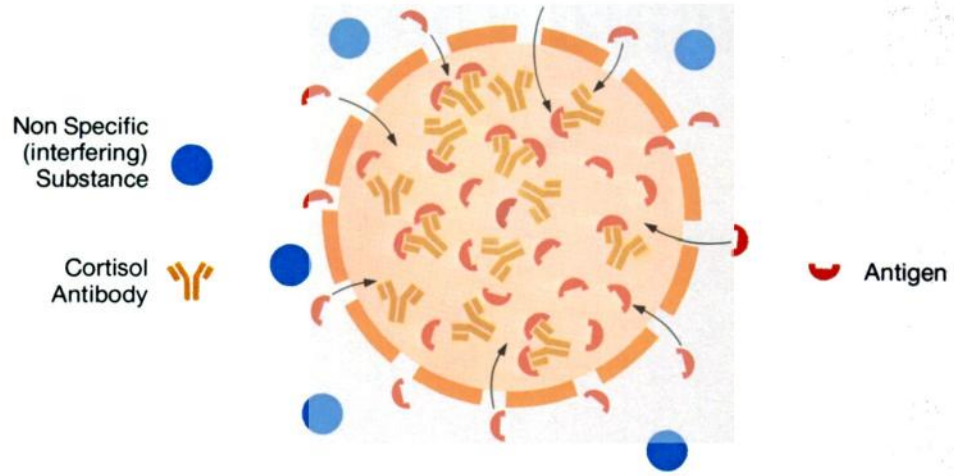

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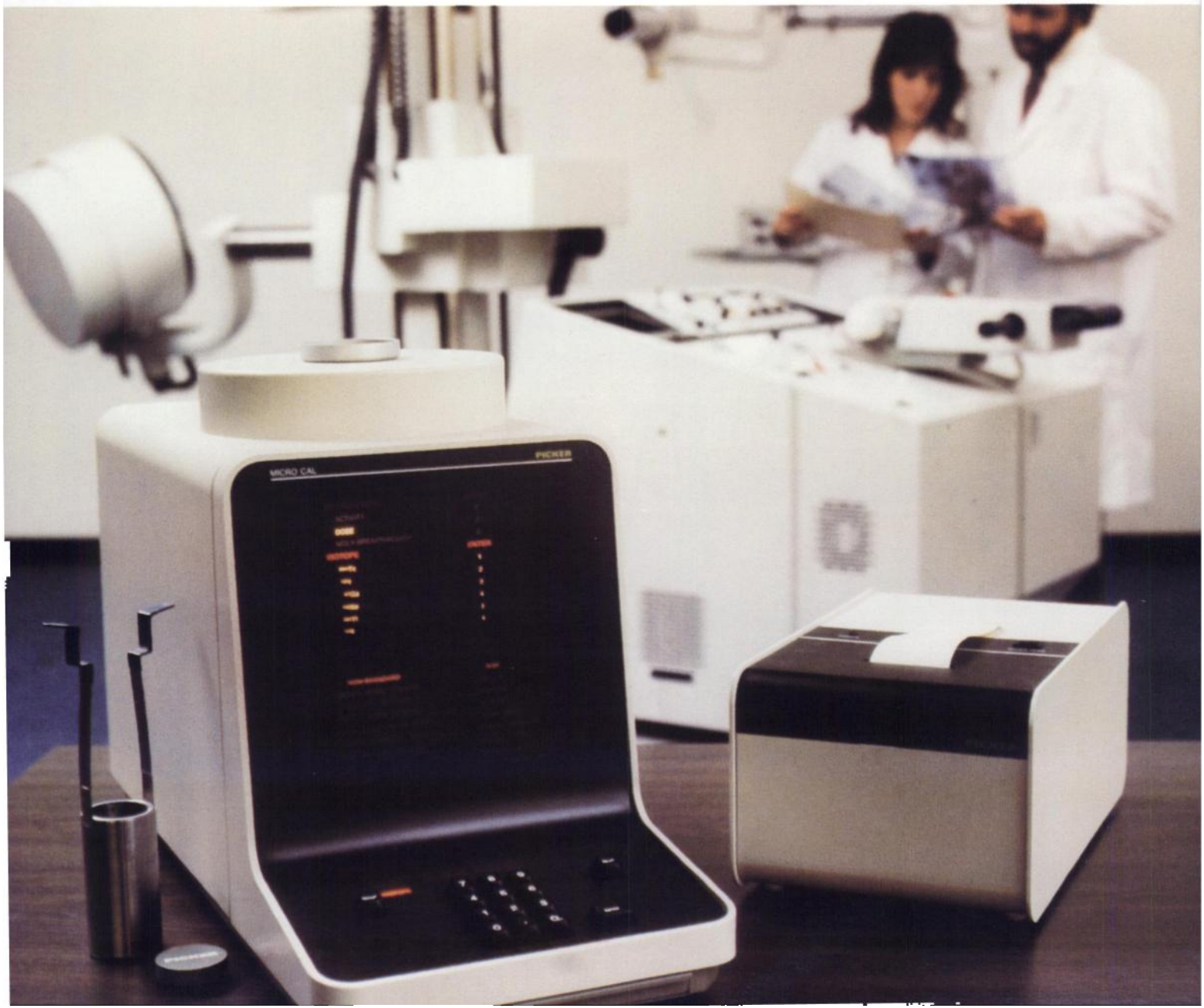

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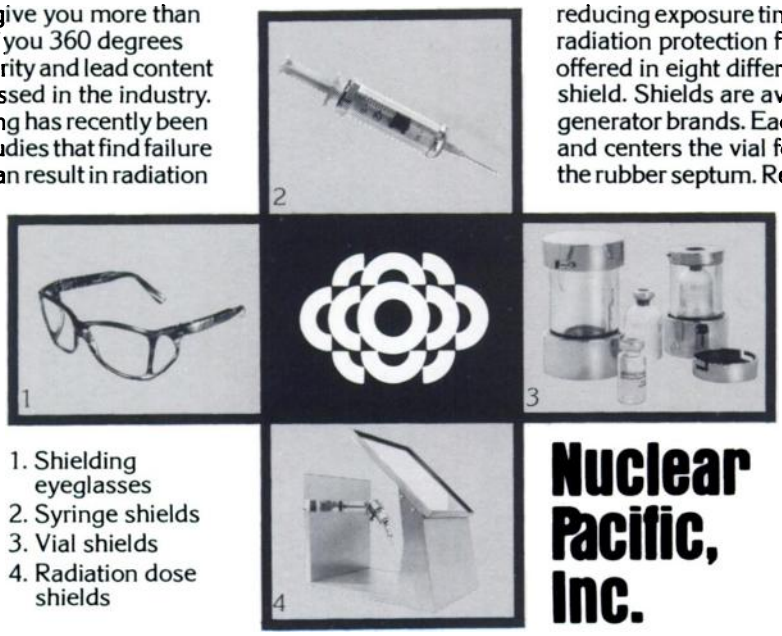

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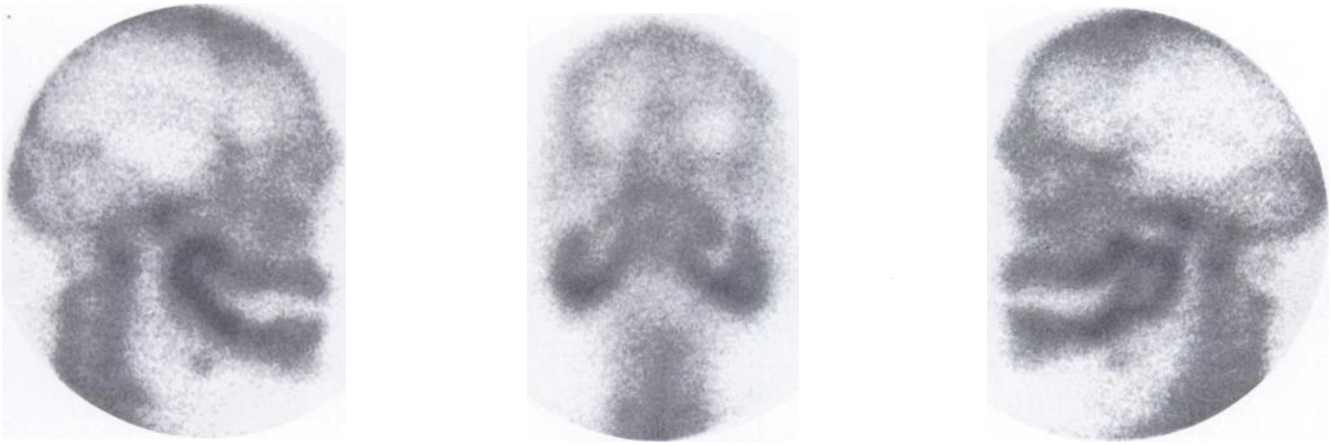
"Perhaps the greatest contribution of bone imaging is its superiority over conventional radiography in the detection of metastatic bone tumors."[1]

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



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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

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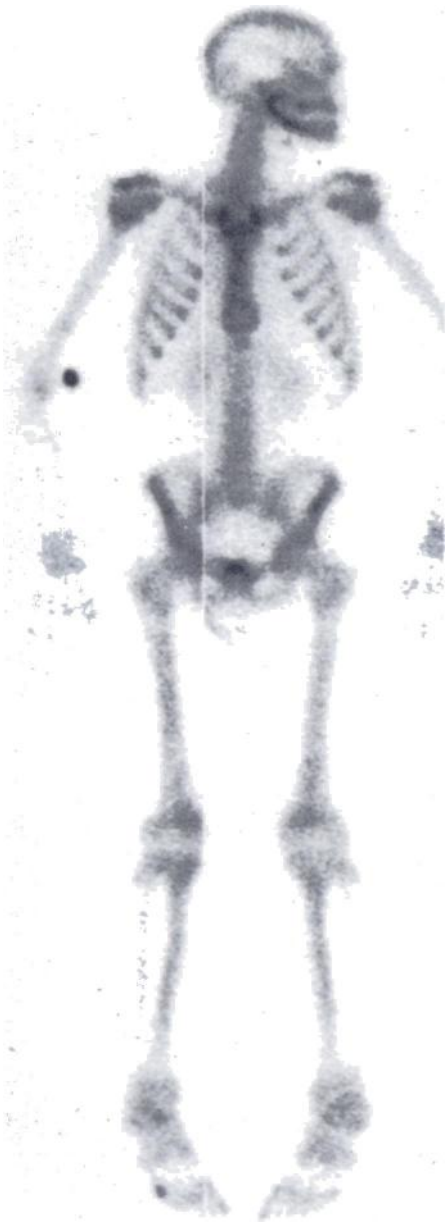
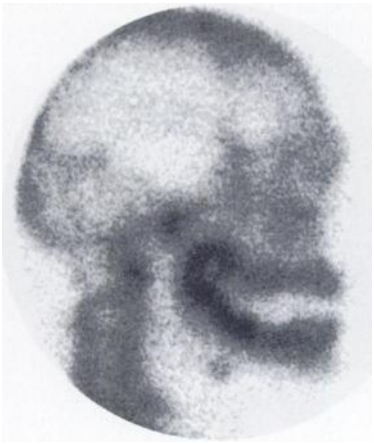
Technetium Tc 99m Medronate Sodium Kit (MDP)





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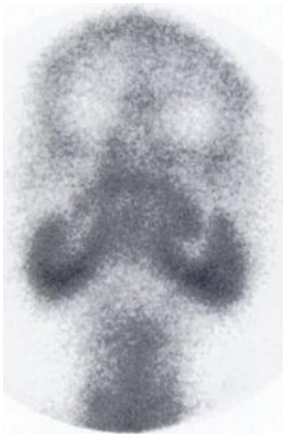

Base view

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

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

Organ		Technetium Tc 99m Medronate Sodium (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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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)

Canada: NEN Canada, 2453 46th Avenue, Lachine, Que. H8T 3C9
Tel: 514-636-4971
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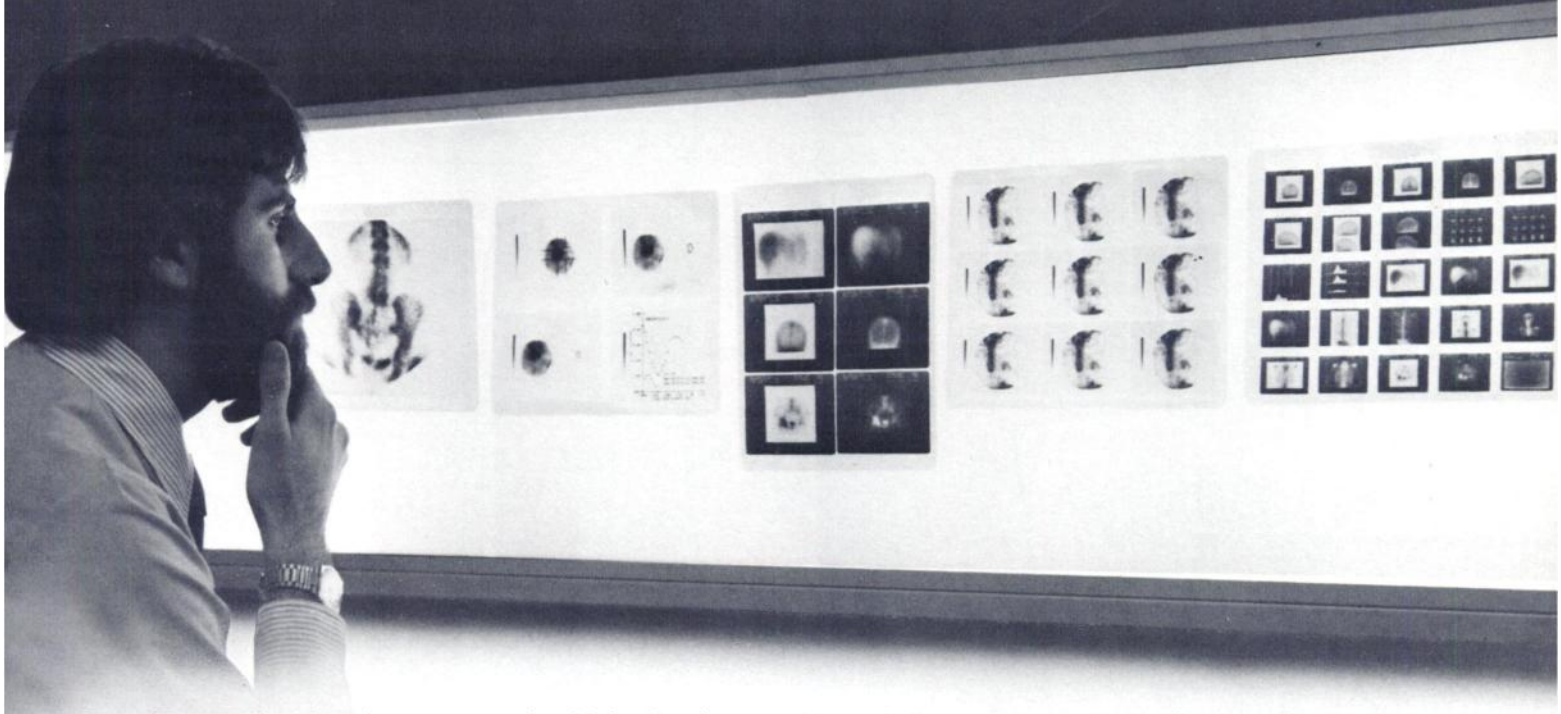
Postfach 401240 Tel: (06103) 85034 Order Entry: (06103) 81013

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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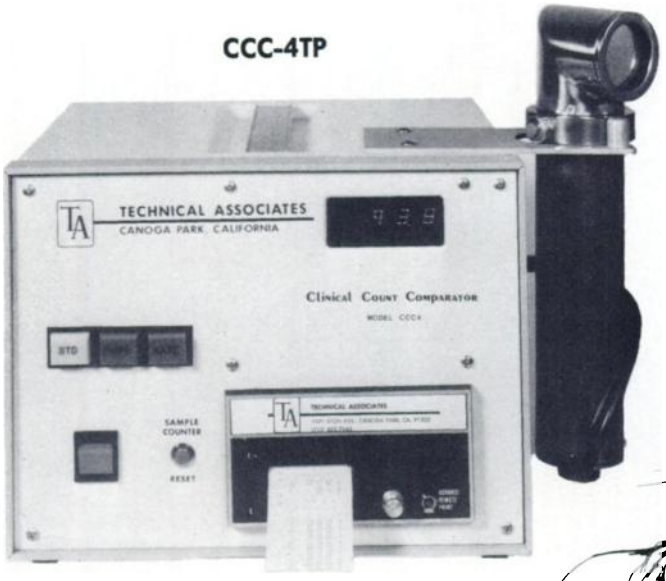
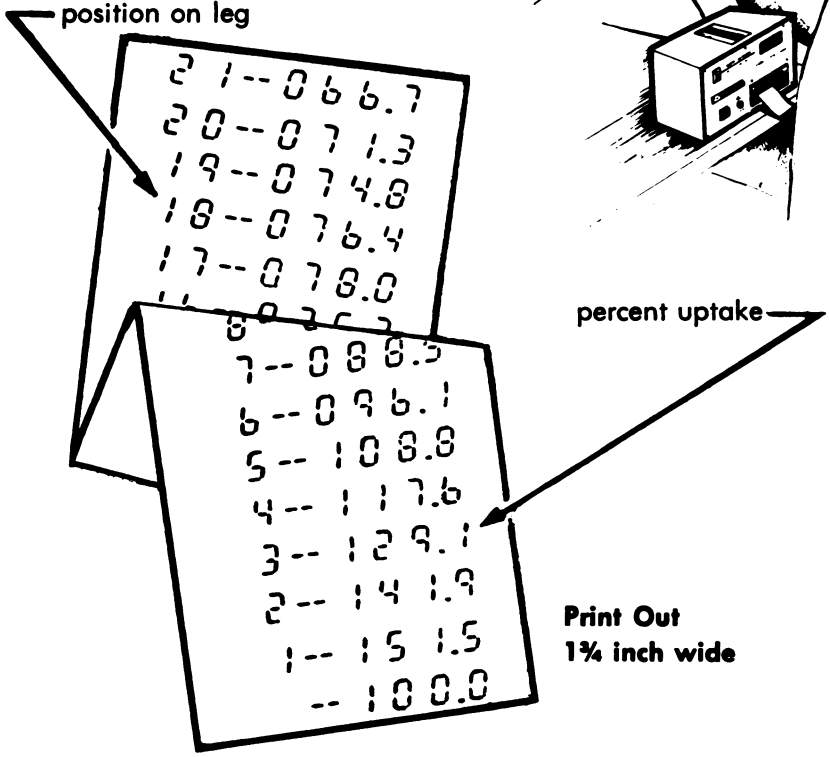
thrombosis

detection of DVT using I-125 fibrinogen





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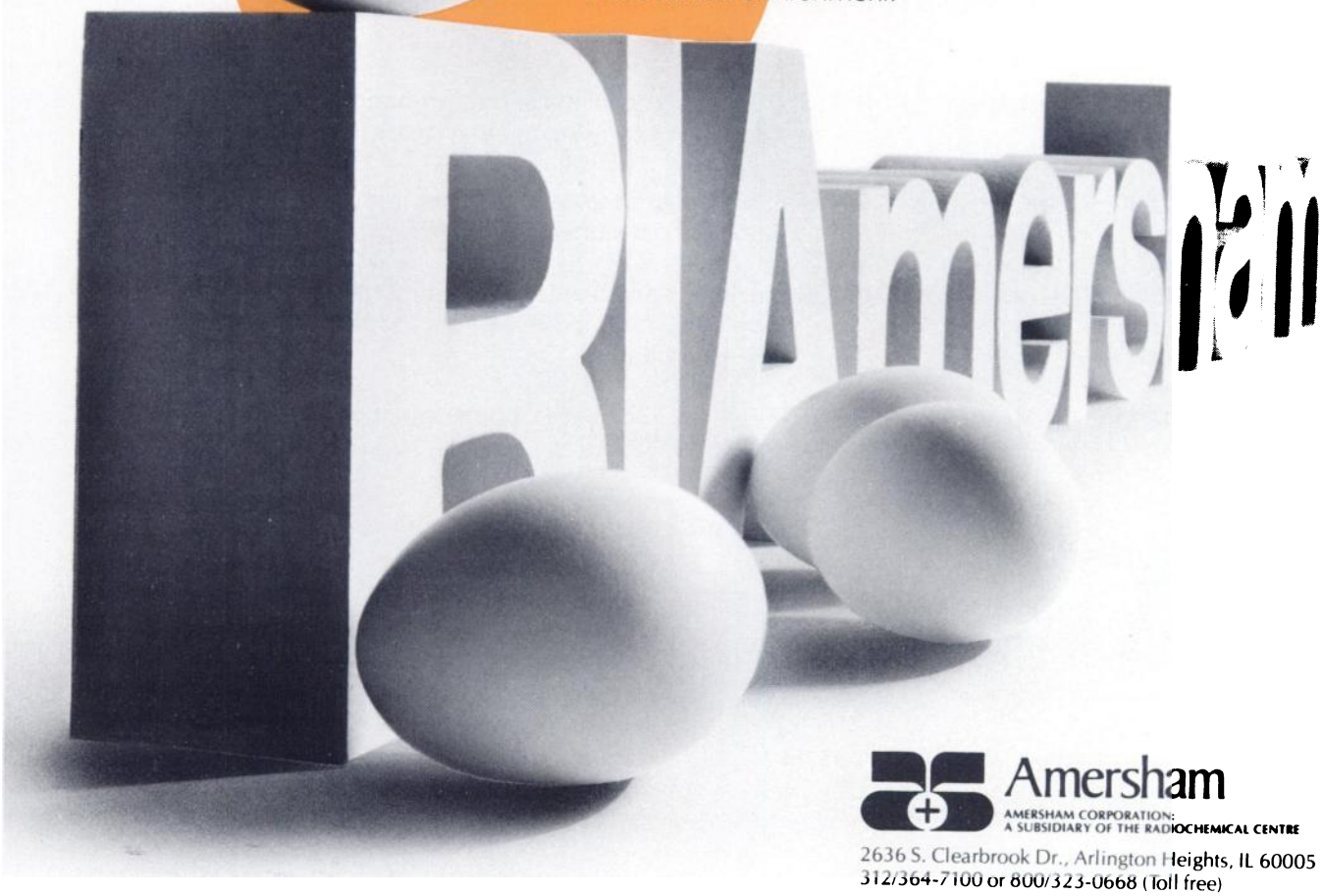
All the kits are supported by Amersham's clinical investigations. The data obtained in these investigations is published in the package insert and underlines the Amersham advantages of these kits performing optimally in the clinical environment.



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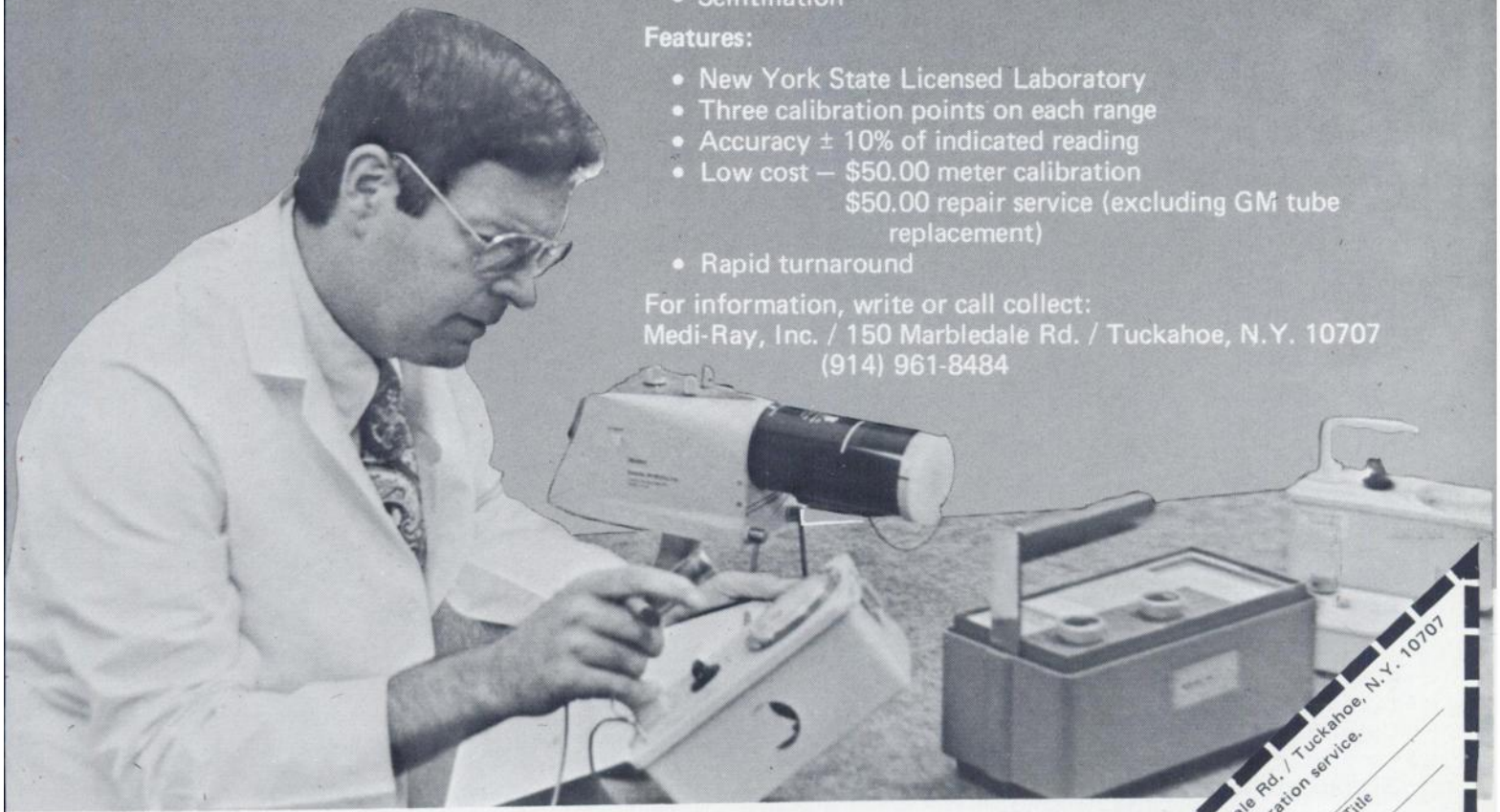

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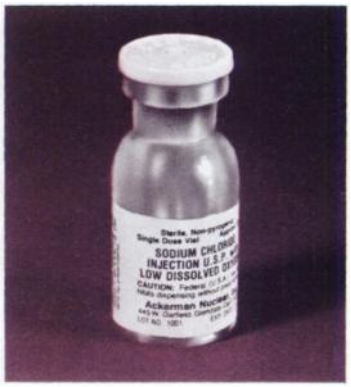
Designed with Nuclear Medicine in mind, Low Dissolved Oxygen, non-preservative, normal saline for routine use is now available from Ackerman Nuclear, Inc.



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

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

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

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

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

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

HOW SUPPLIED:

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

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

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

1/78

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

*less than 5 ppm

For additional information call or write to:

ACKERMAN NUCLEAR, INC.
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(213) 240-8555

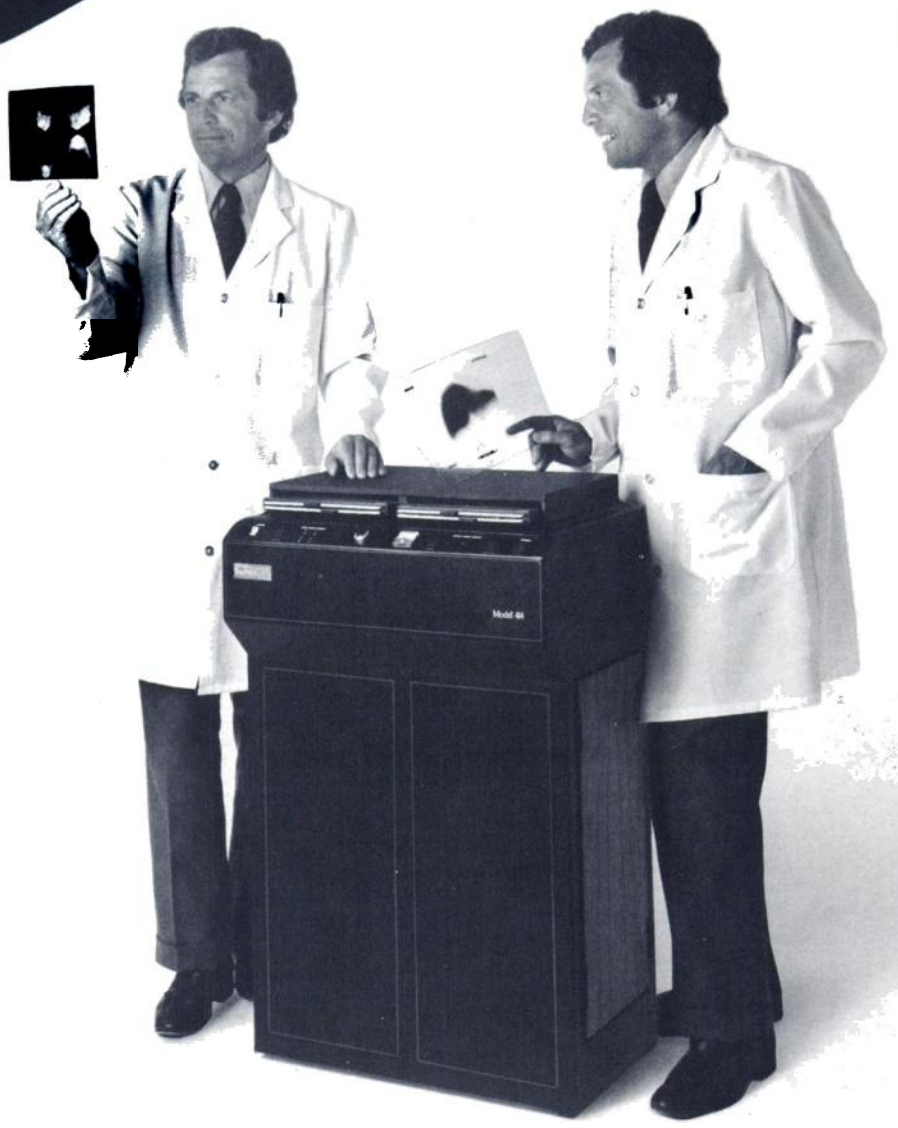
4x1 by Dunn

The applications for high quality, single frame photographs from your multi-image camera are many: therapy planning, teaching files, surgical reference, group viewing and display. The ways to get this added capability are two. The complicated way is to try to make a single-film camera do double duty. Then you have to change films when you want to change formats, losing your place in mid-sequence, coping with dark slides and cassettes, upsetting video calibration...

The elegant way is to combine two cameras in one. Like the Model 414 Dual Format Camera, which provides uninterrupted four-image and single-image operation. Two sheets of film in tandem cassettes. Two fine, on-axis Schneider lenses. Both photographing from the extraordinary new flat-faced Tektronix 634 video monitor with 1400 lines resolution. All fully automated by microprocessor control electronics.

Superb simplicity. From the originators of multi-image camera design. Dunn Instruments, Inc., 544 Second Street, San Francisco, California 94107. (415) 957-1600.

The Model 414 Dual Format Camera by Dunn Instruments



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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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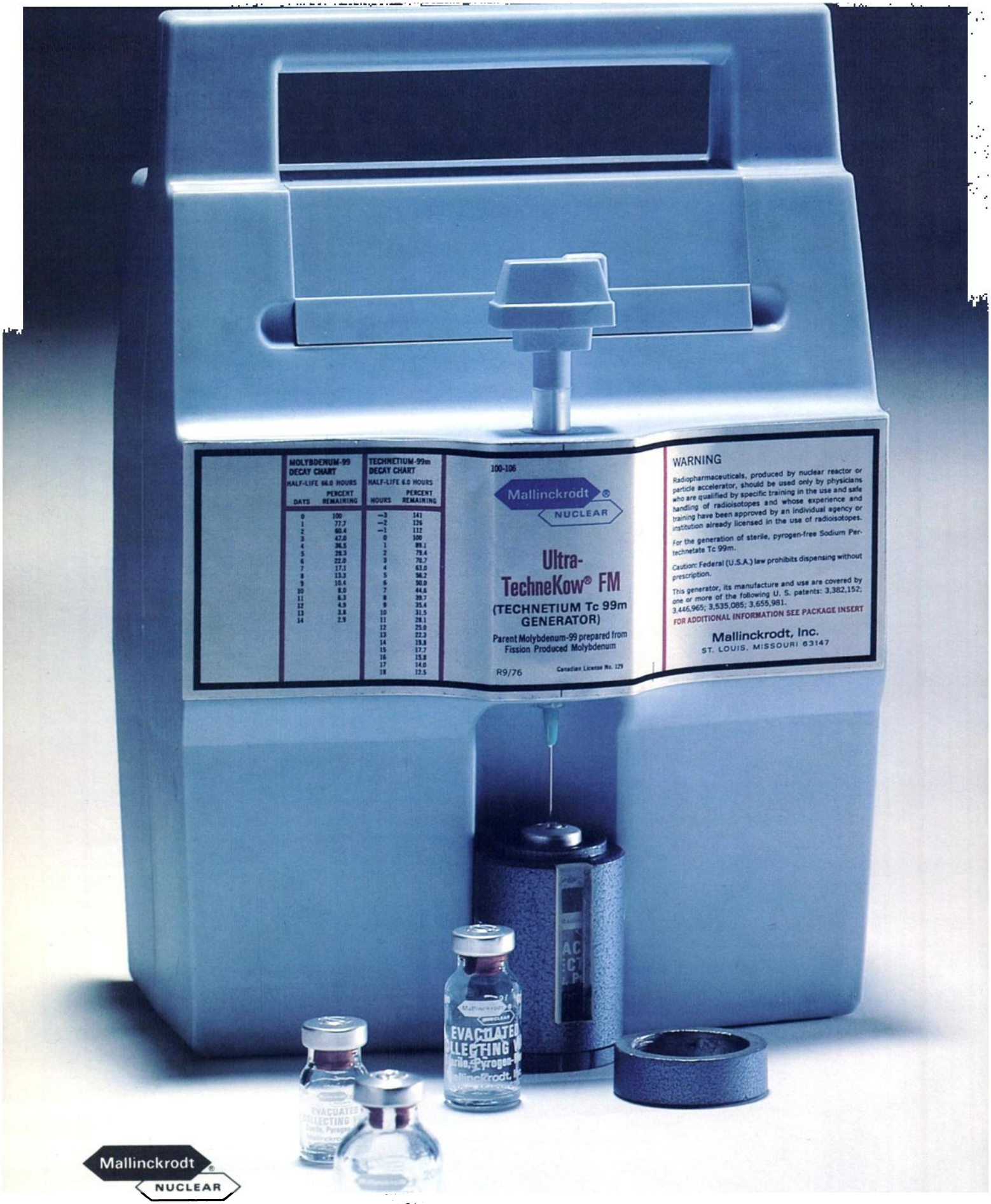

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P.O. Box 5840
St. Louis, MO 63134

INTRODUCING...

Our latest Evolutionary Technetium delivery system.

As nuclear medicine has matured and progressed so has the development of the **Ultra-TechneKow® FM** Tc99m Generator. In keeping pace with the changing needs of the nuclear medicine community, we have redesigned the **Ultra-TechneKow** system and further refined those features that have, through the years, made the **Ultra-TechneKow** Generators among the safest, easiest-to-operate, and most reliable performing technetium delivery systems in the world.

An important part of the total system is our commitment to provide the best overall, on-time-delivery record in the industry. The Customer Service people have established a reputation for solving some of the most difficult routing problems imaginable.

We invite you to evaluate our evolutionary system and challenge the people in Customer Service to demonstrate why they're the best, at what they do, in the industry. Contact your local Mallinckrodt representative or call Don Burkhead at 314-895-0247.

Mallinckrodt's Ultra-TechneKow® FM (TECHNETIUM Tc 99m) Generator.

Here are a few of the changes that make the latest Ultra-TechneKow easier to use and more reliable than ever:

- **Redesigned canister:**

For easier lifting and maneuverability, the canister has a large firm top handle. Change in design simplifies engaging and removing the Luer-lock needle on a daily basis; an important feature in maintaining sterile elution technique.

- **New valve system:**

Provides positive protection against accidental elution or leakage.

- **Better shielding:**

To reduce radiation levels during elution, an additional lead plate has been inserted inside between the tubing and the canister.

A redesigned auxiliary shield is available that provides added reduction in surface radiation levels on all sides and the top.

- **Reduced weight (smaller units):**

A change in the configuration of the internal column shield allows weight reduction of our smaller generators.

See following page for brief summary.

INTRODUCING...
Our latest Evolutionary Technetium delivery system.

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 and 30 milliliter sizes.

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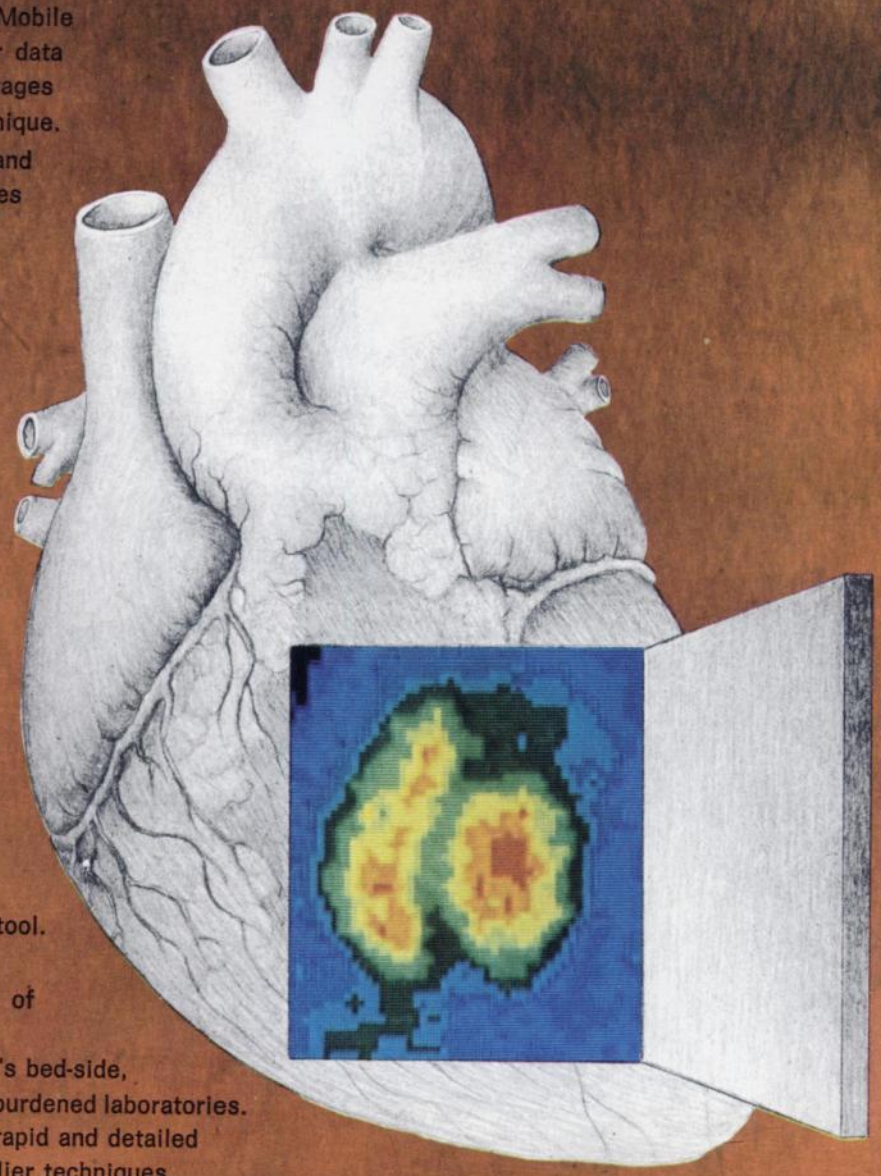
Results obtained using the DYMAX-MB Mobile Camera with its powerful minicomputer data processor, clearly demonstrate the advantages of radiocardiology as a diagnostic technique. DYMAX-MB is compact, fully mobile and simple to operate. The camera produces studies with excellent resolution and uniformity at both low and high countrates, while the self-contained processor provides instant clinical analysis of the data. Among the heart functions which can be studied "live" are wall motion, ejection fraction, cardiac output, interventricular shunts and other parameters of major importance.



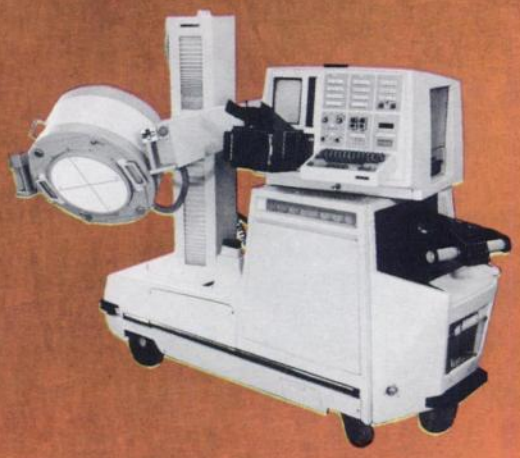
Analytical procedures are speeded by automatic repeat of previously established protocols. On-the-spot analysis enables the attending physician to immediately evaluate results, eliminating the delays of batch processing at a central installation, thus maximising the efficacy of the DYMAX-MB.

Check for yourself the significant advantages of this highly efficient clinical tool.

You can :

- Spare your patient the trauma of catheterization.
- Complete the diagnosis at the patient's bed-side, sparing him exhausting movement to overburdened laboratories.
- Receive pre-processed data for more rapid and detailed interpretation than was possible with earlier techniques.

Until you examine the performance of this outstanding unit, you haven't heard the last word. Call us or write for more information or demonstration.



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You've got it mixed and ready to use!

Unless you're in the business, this tongue-twister may tie you up for some time. However, it only takes one minute of mixing time to prepare Diagnostic Isotopes' one-step Technetium Tc 99m DTPA agent for injection.

DTPA becomes Technetium Tc 99m DTPA after adding sodium pertechnetate Tc 99m. Technetium Tc 99m DTPA may be used to perform kidney imaging, brain imaging, to assess renal perfusion and to estimate glomerular filtration rate.

Each DTPA kit contains 10 vials. The product is sterile, pyrogen-free, has a labeling efficiency of over 90% and a shelf life of one year . . . all good reasons for ordering now.

See opposite page for a brief summary of the package insert.

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Wherever your mobile camera goes — ICU, CCU, Cath Lab, Surgery, Orthopedics — throughout the hospital — our CRC®-30's data ticket goes right along.

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RADIONUCLIDE DOSE COMPUTATION AND MEASUREMENT RECORD ®

PATIENT'S NAME: John Doe

I.D.: 049-267-8412

STUDIES: MI

NUCLIDE: THALLIUM-201

FORM: Thallous Chloride SAMPLE NO. 12

LOT NO. T029496 KIT NO. _____

DATE: 4 APRIL 79 14:10

CONCENTRATION: 970 uCi/ml

DOSE DESIRED: 1.5 mCi

VOLUME REQUIRED: 1.54 ml

ACTIVITY MEAS'D: 1.49 mCi

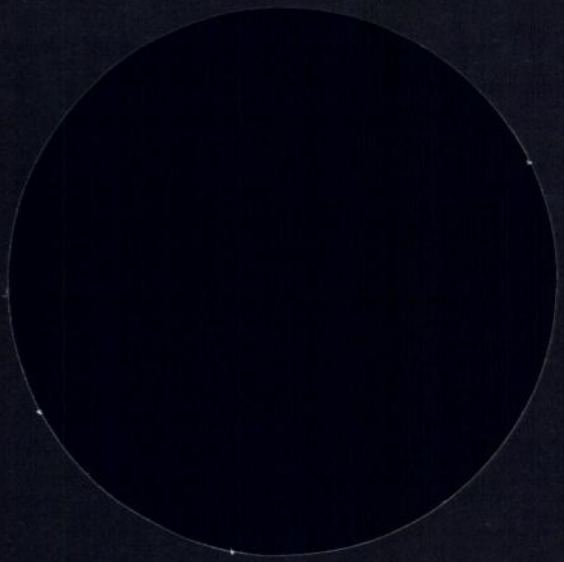
TIME OF ADMINISTRATION: 2:30 AM PM

SIGNATURE(S): Jane Smith

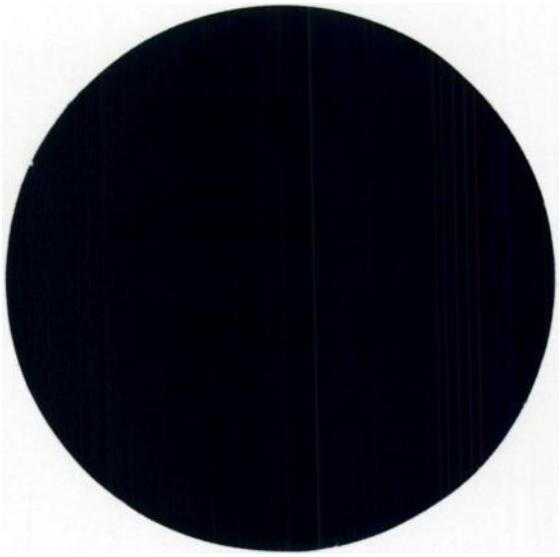
CAPINTEC, INC.

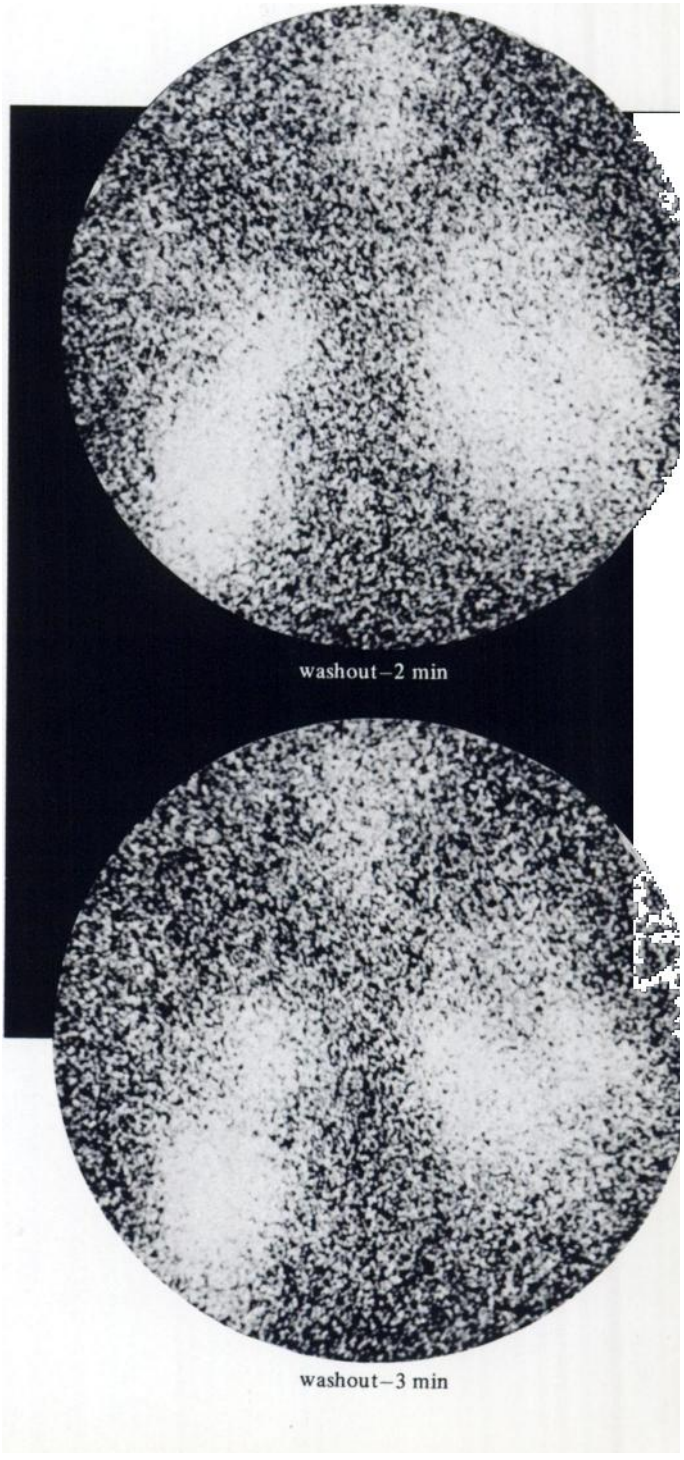
136 SUMMIT AVENUE • MONTVALE, NEW JERSEY 07645
(201) 391-3930

If you ordered only a perfusion lung scan on this patient...



..you could have missed the diagnosis.





The new definition of "lung scan"

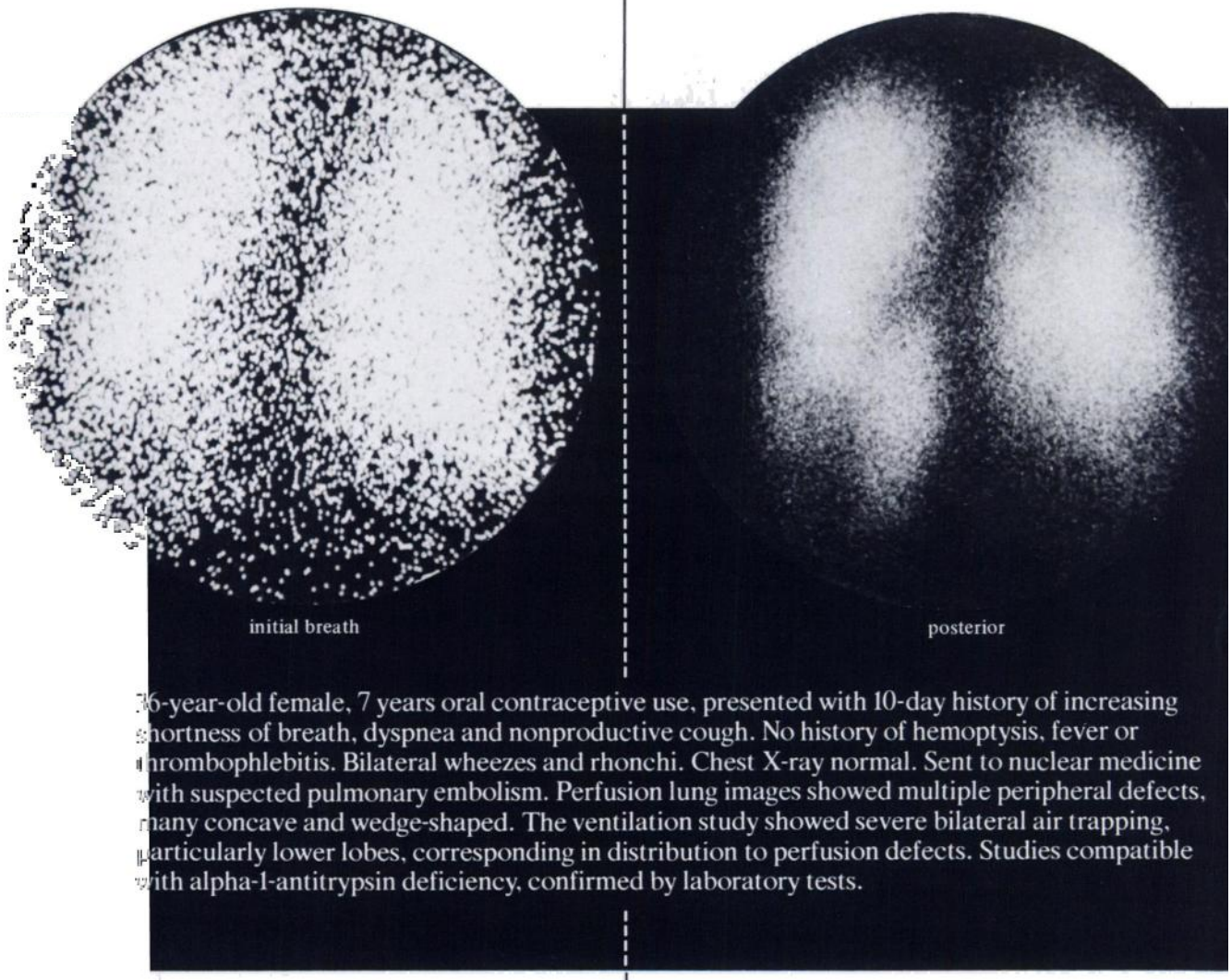
Ventilation+Perfusion

(SPECIFICITY)

Xenon-133 ventilation lung imaging reliably increases the specificity of the perfusion study by demonstrating regions of abnormal perfusion–normal ventilation (strongly suggesting PE) or of abnormal perfusion–abnormal ventilation (COPD, effusion or infiltrate).

(SENSITIVITY)

Perfusion lung imaging is recognized as the most sensitive noninvasive means of detecting pulmonary embolism (PE). Almost every patient with PE will have an abnormal study—while a normal study virtually rules out PE. But perfusion defects are nonspecific, since both vascular disorders, such as PE, and parenchymal disease or effusion alter pulmonary perfusion.



6-year-old female, 7 years oral contraceptive use, presented with 10-day history of increasing shortness of breath, dyspnea and nonproductive cough. No history of hemoptysis, fever or thrombophlebitis. Bilateral wheezes and rhonchi. Chest X-ray normal. Sent to nuclear medicine with suspected pulmonary embolism. Perfusion lung images showed multiple peripheral defects, many concave and wedge-shaped. The ventilation study showed severe bilateral air trapping, particularly lower lobes, corresponding in distribution to perfusion defects. Studies compatible with alpha-1-antitrypsin deficiency, confirmed by laboratory tests.

For convenient, safe ventilation imaging

Xenon Xe 133 Gas (CALIDOSE) Dispensing System

For high-quality perfusion lung imaging

PULMOLITE™ Technetium Tc 99m Aggregated Albumin Kit

NEN New England Nuclear®

Please see following page for full prescribing information.

Xenon Xe 133 Gas†

DESCRIPTION: Xenon Xe 133 for diagnostic use is available as 5% gas in carbon dioxide diluent 95%.

ACTIONS: Xenon Xe 133 is a readily diffusible gas which is neither utilized nor produced by the body. It passes through cell membranes and freely exchanges between blood and tissue. It tends to concentrate more in body fat than in blood, plasma, water or protein solutions. In the concentrations used for diagnostic purposes it is physiologically inactive. Inhaled xenon Xe 133 gas will enter the alveolar wall and enter the pulmonary venous circulation via the capillaries. Most of the xenon Xe 133 that enters the circulation from a single breath is returned to the lungs and exhaled after a single pass through the peripheral circulation.

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

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

WARNINGS: This radiopharmaceutical should not be administered to pregnant or lactating women unless the benefits to be gained outweigh the potential hazards.

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

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

PRECAUTIONS: As in the use of any other radioactive material care should be taken to insure minimum radiation exposure to the patient, consistent with proper patient management, and to insure minimum radiation exposure to occupational workers. Expired xenon Xe 133 gas should be controlled in a manner that is in compliance with the appropriate governmental agency regulations.

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

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

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

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

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

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

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

PHYSICAL CHARACTERISTICS: Xenon Xe 133 decays by beta and gamma emissions with a physical half-life of 5.27 days (1). Photons that are useful for imaging studies are listed in Table 1.

Table 1. Principal Radiation Emission Data Xenon Xe 133

Radiation	Mean % per Disintegration	Mean Energy (keV)
Beta-2	99.30	100.6
Gamma-2	34.99	81.0
K int. con. electrons,-2	47.24	45.0
L int. con. electrons,-2	7.87	75.7
M int. con. electrons,-2	9.84	80.0
K x-rays	34.70	30.8
K x-rays	7.67	35.2

(1) Dillman, L.T., Radionuclide Decay Schemes and Nuclear Parameters for Use in Radiation-Dose Estimation, Part 2, Supplement No. 4, MIRD pamphlet No. 6, J. Nucl. Med., p. 28, 1970.

The specific gamma ray constant for xenon Xe 133 is 0.44 R/mCi-hr. at 1 cm. The half value layer is 1 mm of Pb.

To correct for physical decay of this radionuclide, the fractions that remain at selected time intervals before and after the date of calibration are shown in Table 2.

Table 2. Xenon Xe 133 Physical Decay Chart (Half-life 5.27 days)

Day	Fraction Remaining	Day	Fraction Remaining
-5	1.930	8	.349
-4	1.693	9	.302
-3	1.483	10	.268
-2	1.300	11	.235
-1	1.140	12	.206
0*	1.000	13	.181
1	.877	14	.159
2	.769	15	.139
3	.674	16	.122
4	.591	17	.107
5	.518	18	.094
6	.454	19	.082
7	.398	20	.072

*Calibration Day

RADIATION DOSIMETRY: The estimated absorbed radiation doses (2) to an average patient (70 kg) for pulmonary perfusion and cerebral blood flow studies from a maximum dose of 30 millicuries of xenon Xe 133 in 3 liters of air are shown in Table 3.

Table 3. Radiation Doses

	Effective Half-time	Lungs*	Brain	Whole Body
		rads/30 mCi		
Pulmonary Perfusion	2 min.	0.25	0.0014	0.0027
Cerebral Blood Flow	5 min.	0.63	0.0035	0.0068

*99% of activity is in lungs

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

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

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

*Patent Pending †JO 127 July 1975, Rev 1

PULMOLITE™

Technetium Tc 99m Aggregated Albumin Kit

August 1976

DIAGNOSTIC—FOR INTRAVENOUS USE

DESCRIPTION: Each vial of PULMOLITE™ Technetium Tc 99m Aggregated Albumin Kit contains a sterile, pyrogen-free, lyophilized mixture of 1.0mg of aggregated albumin (Human), 10mg of normal serum albumin, 10mg of sodium chloride, and 0.07mg (maximum) of stannous chloride dihydrate. PULMOLITE is prepared from albumin that was nonreactive when tested for hepatitis B antigen (HB_sAg) by radioimmunoassay. Each vial contains 3.6-6.5 x 10^6 aggregated albumin particles. The particle size distribution of the aggregated albumin is such that not less than 85% are within the range of 15-90 microns in size. There are no aggregated albumin particles greater than 150 microns in size. Reconstitution of PULMOLITE with sodium pertechnetate Tc 99m provides an aqueous suspension of technetium Tc 99m aggregated albumin, with a labeling efficiency of >90%.

PHYSICAL CHARACTERISTICS

Technetium Tc 99m decays by isomeric transition with a physical half life of 6.03 hours (1). Photons that are useful for detection and imaging are listed in Table 1.

Table 1. Principle Radiation Emission Data

Radiation	Mean %/ Disintegration	Mean Energy (keV)
Gamma-2	87.9	140.5

(1) Dillman, L.T. and Van der Lage, F.C. Radionuclide Decay Schemes and Nuclear Parameters for Use in Radiation-Dose Estimation, MIRD Pamphlet No. 10, p. 62. (1975).

EXTERNAL RADIATION

The specific gamma ray constant for Tc 99m is 0.8R/mCi-hr at 1cm. The first half value thickness of lead (Pb) for Tc 99m is 0.2mm. 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 2. For example, the use of 2.7mm of Pb will decrease the external radiation exposure by a factor of about 1,000.

Table 2. 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}

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

Table 3. Physical Decay Chart: Tc 99m Half-Life 6.03 Hours

Hours	Fraction Remaining	Hours	Fraction Remaining
0*	1.000	8	.399
1	.891	9	.355
2	.795	10	.317
3	.708	11	.282
4	.631	12	.252
5	.563		
6	.502		
7	.447		

*Calibration Time

CLINICAL PHARMACOLOGY: Within 5-10 minutes of intravenous injection, over 90% of Tc 99m aggregated albumin is trapped in the arterioles and capillaries of the lung.

Organ selectivity is a direct result of particle size. Below 1-10 microns the aggregates are taken up by the reticuloendothelial system. Above 10-15 microns the aggregates become lodged in the lung capillaries by a purely mechanical process. Distribution of particles in the lungs is a function of regional pulmonary blood flow.

Lung to liver ratios of about 19:1 are obtained within the first few minutes. Elimination of the Tc 99m aggregated albumin from the lungs occurs with a half-life of about 5.6 hours. Cumulative urinary excretion studies show an average of 20% elimination of the injected Tc 99m dose 24 hours post administration.

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

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

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

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

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

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

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

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

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

The labeling reactions involved in preparing the agent depend on maintaining tin in the reduced state. Any oxidant present in the sodium pertechnetate Tc 99m supply may thus adversely affect the quality of the prepared agent. Hence, sodium pertechnetate Tc 99m containing oxidants, or other additives, should not be employed without first demonstrating that it is without adverse effect on the properties of the resulting agent.

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

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

It is also recommended that, because of the increasing probability of agglomeration with aging, a batch of Technetium Tc 99m aggregated albumin not be used after eight hours from the time of reconstitution. Refrigerate at 2° to 8°C after reconstitution. If blood is withdrawn into the syringe, unnecessary delay prior to injection may result in clot formation in situ.

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

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

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

Safety and effectiveness in children have not been established.

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

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

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

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

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

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

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

Table 4. Particles/Dose x 10^{6*} ($\bar{x} = 5 \times 10^6$ particles/vial)

Reconstitution Activity (mCi)	Dose 1mCi	2mCi	3mCi	4mCi
20	0.25	0.50	0.75	1.0
30	0.17	0.33	0.50	0.67
40	0.13	0.25	0.38	0.50
50	0.10	0.20	0.30	0.40

*The particles per millicurie dose will increase in relation to the physical decay of Tc 99m such that at six hours (one half-life) after preparation, the values in the table will increase by a factor of two.

In case of right-to-left cardiac shunt the number of aggregated albumin particles administered per dose should be reduced to the minimum feasible.

The patient dose should be measured by a suitable radioactivity calibration system immediately prior to patient administration. Re-suspend particles by repeated inversion of the syringe immediately prior to injection. (If blood is drawn into syringe, any unnecessary delay prior to injection may lead to clot formation in situ). Do not backflush the syringe, slow injection is recommended, and for optimum results, imaging should begin as soon as possible after injection.

RADIATION DOSIMETRY

The estimated absorbed radiation doses (1) to an average patient (70kg) from an intravenous injection of 4 millicuries of Tc 99m aggregated albumin are shown in Table 5.

Table 5. Radiation Doses

Tissue	Radiation Absorbed Dose (rads/4mCi)
Lungs	1.04
Whole Body	0.06
Liver	0.12
Spleen	0.11
Bladder Wall 2 hour void	0.08
4.8 hour void	0.11
Ovaries	0.08
Testes	0.07

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

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

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

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

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

DIRECTIONS

Aseptically inject approximately 8ml of sodium pertechnetate Tc 99m, containing about 20 to 50 millicuries (pre-diluted with sterile, preservative-free saline as necessary) into a shielded vial of PULMOLITE.

NOTE: Enter the vial septum with the needle at an oblique angle and add the pertechnetate solution in such a way that it first strikes the vial wall. Shake vigorously for at least 30 seconds before use. Complete the Radiation Label provided and apply to shield. Prior to withdrawing an aliquot, re-suspend the particles by repeatedly inverting the shielded vial for 15 seconds. After reconstitution, store at 2° to 8°C and use the preparation within eight hours.

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

511188 **Catalog Number NRP-415** Printed in U.S.A.

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Bronchogenic Carcinoma

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Gallium-67 has been shown to be useful as an adjunct in the diagnosis of focal areas of infection, such as abdominal (retroperitoneal, subphrenic) and thoracic abscesses, osteomyelitis, and surgical wounds.

A positive gallium-67 study usually indicates the presence of pathology. However, care must be taken to distinguish malignant from benign lesions. A negative study cannot be definitely interpreted as ruling out the presence of disease; therefore, a negative finding should always be supported by negative clinical findings and other diagnostic procedures.

Put Mallinckrodt Gallium Citrate Ga 67 in your active file... a good resource for diagnostic imaging.

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St. Louis, MO 63134

Please see next page for brief summary

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Injection
Diagnostic
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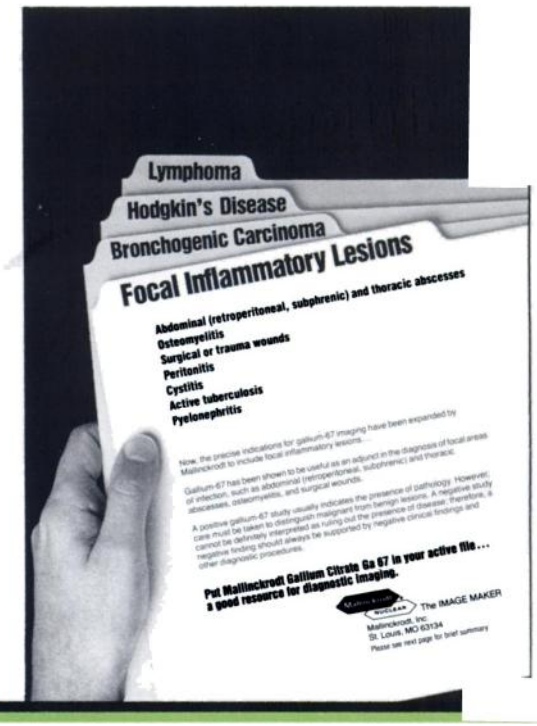
ADDS A NEW INDICATION



Brief Summary:

INDICATIONS AND USAGE

Gallium Citrate Ga 67 may be useful to demonstrate the presence and extent of Hodgkin's Disease, lymphoma, bronchogenic carcinoma, and focal inflammatory lesions. Positive Gallium Ga-67 uptake in the absence of prior symptoms warrants follow-up as an indication of a potential disease state.

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. If this drug is administered to nursing mothers, artificial feeding should be temporarily substituted for the mother's milk. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of women 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 intravenous administered Gallium Citrate Ga 67 is essential in order to accurately interpret pathologic states. The finding of an abnormal Gallium Ga-67 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 as well as focal areas of infection. Certain pathologic conditions may yield up to 40 percent false negative Gallium Ga-67 studies. Therefore, a negative study cannot be definitely interpreted as ruling out the presence of disease.

Adequate reproduction studies have not been performed in animals to determine whether the 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.

Safety and effectiveness in children have not been established. As in the use of any radioactive material, care should be taken to minimize radiation exposure to the patient consistent with proper management and to insure minimum radiation exposure to occupational workers.

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

ADVERSE REACTIONS

None have been reported.

DOSAGE AND ADMINISTRATION

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

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

HOW SUPPLIED

Gallium Citrate Ga 67 sterile solution is available in 3 mCi, 6 mCi and 12 mCi vials on calibration date. Each ml contains 2 mCi of Gallium Ga-67 on the calibration date, as a complex formed from 8.3 ng gallium chloride Ga-67, 1.9 mg of sodium citrate, 7.8 mg of sodium chloride, 0.9% benzyl alcohol v/v as preservative. The pH is adjusted to between 5.5-8.0 with hydrochloric acid and/or sodium hydroxide solution.

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RADIOLOGIST, BOARD CERTIFIED IN Nuclear Medicine, to join large multi-specialty pre-paid medical group. Opportunity to expand department and plan department for new hospital in 1982. Salary negotiable. Liberal Fringe Benefits. Contact: Hawaii Permanente Medical Group, Inc., 1697 Ala Moana Boulevard, Honolulu, Hawaii 98615. An Equal Opportunity Employer.

NUCLEAR MEDICINE PHYSICIAN. THE Division of Nuclear Medicine at the Hospital of the Univ. of Pennsylvania has as opening at the Asst. Prof. level. Strong background in both clinical and research nuclear medicine desirable. Well equipped Division with modern imaging instruments, computers and a cardiovascular Nuclear Medicine facility in ICU area. PETT scanner will be installed shortly. Excellent research opportunities. Contact Abass Alavi, M.D., Chief, Division of Nuclear Medicine, Hospital of the University of Pennsylvania, 3400 Spruce Street, Philadelphia, PA 19104.

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RADIOLOGIST, NUCLEAR MEDICINE, board certified eligible, university trained, with nuclear cardiology experience, to join 12-man private diagnostic radiology group in Southeastern United States. Prefer physician knowledgable in general diagnostic radiology, including computed tomography and ultrasound. Contact D. Mills, MD, Suite 100 Memorial Medical Bldg., Chattanooga, TN 37404, phone (615) 698-8751 ext 731.

CHIEF OF NUCLEAR MEDICINE Wanted. Nuclear medicine specialist to act as Chief of Nuclear Medicine Division at the University of Florida College of Michigan. A minimum of one year's training in nuclear medicine is required. Board certification in Radiology preferred but will consider candidates with training in Internal Medicine. Experience in nuclear cardiology is desirable. Rank and salary depending on qualifications and experience. Application deadline is August 24, 1979. Position available after July 1, 1979. Send curriculum vitae to Clyde M. Williams, Chairman, Department of Radiology, University of Florida College of Medicine, J. Hillis Millet Health Center, Gainesville, Florida, 32610. An Equal Employment Opportunity Affirmative Action Employer.

AS OF JULY 1, 1979 LOS ANGELES County Harbor-UCLA Medical Center, Division of Nuclear Medicine, in Torrance, Ca. will have the following openings: 1 Nuclear Medicine Technologist I, 2 Nuclear Medicine Technologist II. Please contact: Tony Olguin (213) 533-2842 or write to Tony at Harbor-UCLA Medical Center, Nuclear Medicine Division, 1000 W Carson Street, Torrance, CA 90509.

NUCLEAR MEDICINE RESIDENCY 830-bed VA general hospital offers AMA approved two year program. Two positions available July 1980. Located in San Fernando Valley 15 minutes from affiliated hospitals (UCLA and Wadsworth VA). Program covers isotope and ultrasound imaging, in vivo and in vitro procedures, including RIA, and all recent cardiology procedures. Prerequisite: one-two years post graduate training in medicine, radiology, or pathology. Minimum stipend: $20,000. Contact: Marvin B. Cohen, M.D. Chief, Nuclear Medicine Service. Non-discrimination in employment. VA Medical Center, 16111 Plummer Street, Sepulveda, CA 91343.

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NUCLEAR RADIOLOGIST, ABR CERTIFIED Diagnostic/Nuclear, University trained. Early 30's. Computer, Nuclear Cardiology, Angiography, CT, and Ultrasound experience. Reply Box 800, Society of Nuclear Medicine, 475 Park Avenue So., New York, NY 10016.

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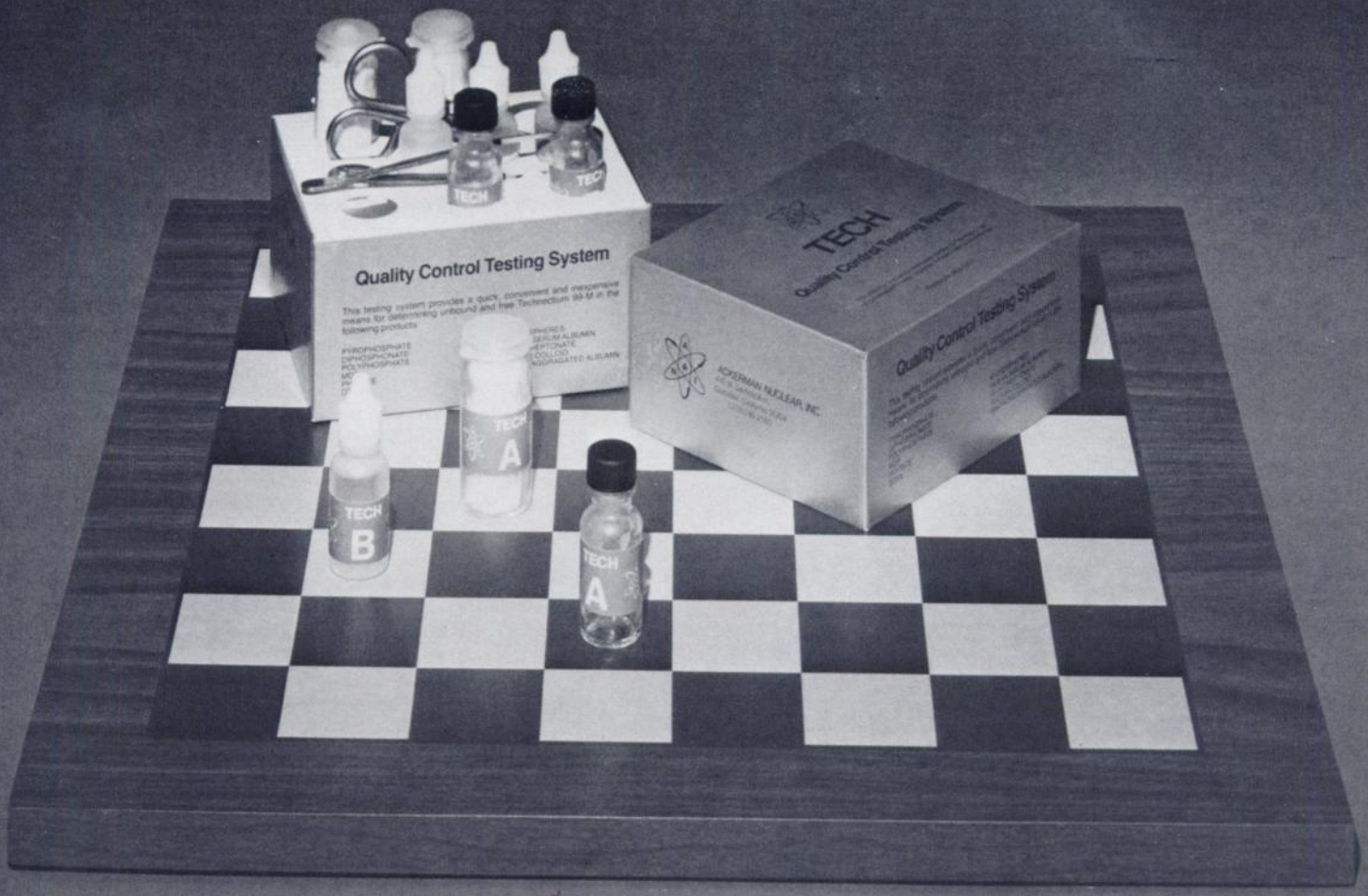

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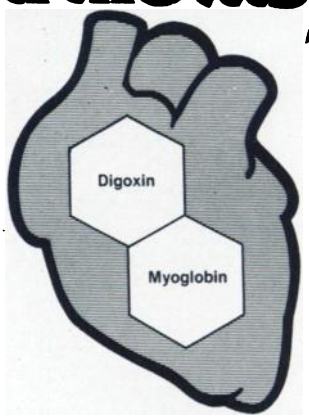

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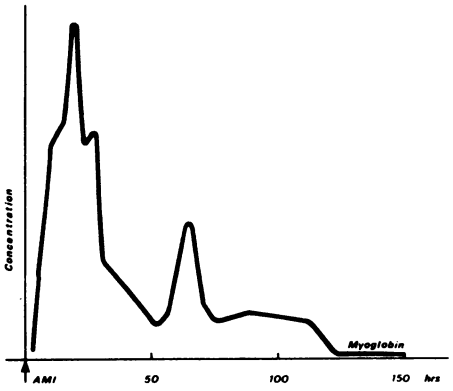

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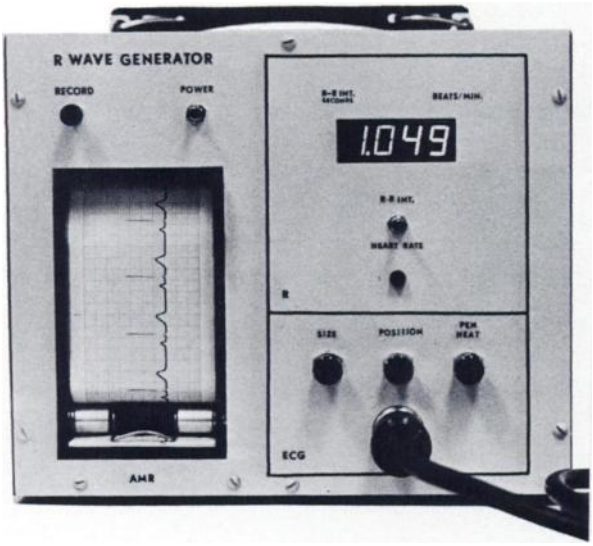

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Prerequisite for entry into program: 2 years prior training in AMA-approved program in internal medicine, radiology, pathology or pediatrics.

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Requests for further information (include C.V. and reference list) should be directed to:

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The Toronto General Hospital (a teaching hospital of the University of Toronto) has an opening for a suitably qualified Radio Pharmacist in the departments of Pharmaceutical Services and Nuclear Medicine. The position is supervisory in nature and calls for experience in all aspects of radio pharmacy, including quality control, assay and calibration, chromatography, record-keeping and research.

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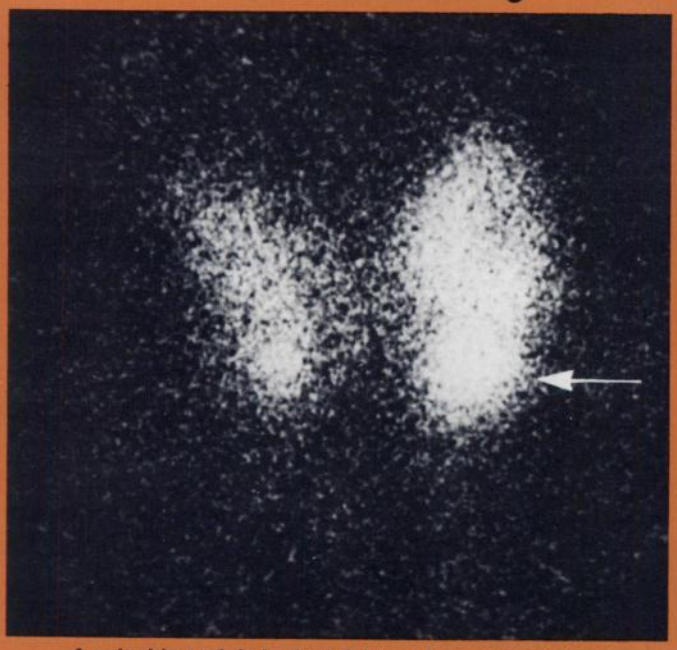
---

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

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

[3] Arnold, JE, Pinsky, S: Comparison of ^{99m}Tc and ^{123}I for Thyroid Imaging. *J. Nucl. Med.*, 17:261,1976.

Organification is Imperative to Thyroid Studies



A palpable nodule in the left lower lobe present for at least six years considered to be "functioning" on the $^{99m}TcO_4^-$ image.

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

SODIUM IODIDE I 123
CAPSULES AND SOLUTION FOR ORAL ADMINISTRATION

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

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

CONTRAINDICATIONS: None known.

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

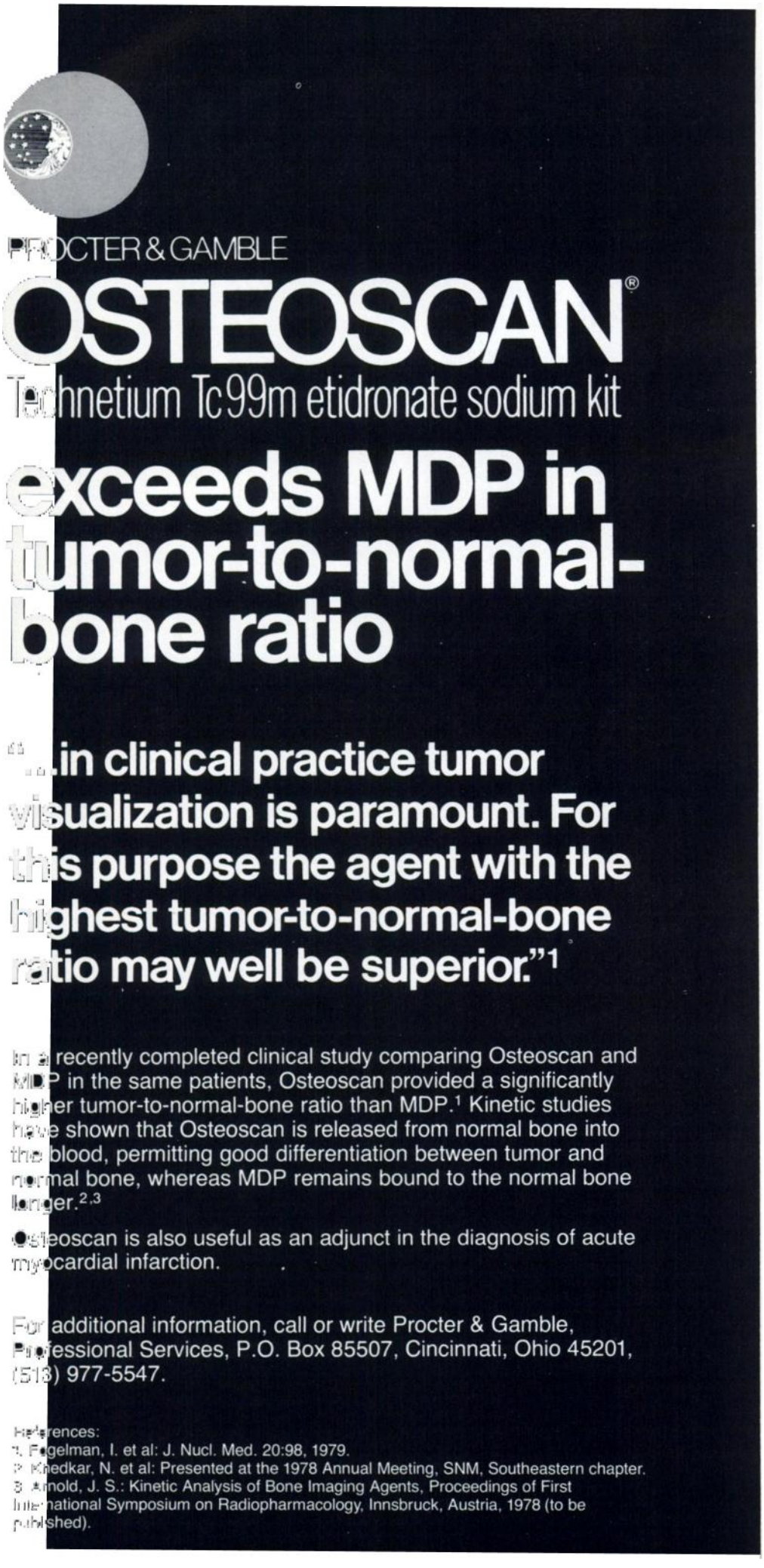
PRECAUTIONS: Sodium iodide I 123 as well as other radioactive drugs must be handled with care. Appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Care should also be taken to minimize radiation exposure to the patient consistent with proper patient management.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

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

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

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

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



Brief summary of Package Insert. Before using, please consult the full Package Insert included in each kit.

Description: Each vial of OSTEOSCAN contains 5.9 mg etidronate disodium, 0.16 mg stannous chloride and 0.56 mg sodium ascorbate as active ingredients. Upon addition of ADDITIVE-FREE sodium pertechnetate Tc99m the etidronate disodium and stannous chloride combine with Tc99m to form a stable soluble complex.

Clinical pharmacology: When injected intravenously, Tc99m-labeled OSTEOSCAN has a specific affinity for areas of altered osteogenesis. Areas of bone which are undergoing neoplastic invasion often have an unusually high turnover rate which may be imaged with Tc99m-labeled OSTEOSCAN. Three hours after intravenous injection of Tc99m-labeled OSTEOSCAN, an estimated 40-50% of the injected dose has been taken up by the skeleton. At this time approximately 50% has been excreted in the urine and 6% remains in the blood. A small amount is retained by the soft tissue. The level of Tc99m-labeled OSTEOSCAN excreted in the feces is below the level detectable by routine laboratory techniques. Tc99m-labeled OSTEOSCAN is also taken up in areas of necrosis and severely injured myocardial cells. Approximately 1.5 hours following intravenous injection 0.01-0.02 percent of the administered dose per gram of tissue is taken up by an acutely infarcted myocardium.

Indications: OSTEOSCAN is a skeletal imaging agent used to demonstrate areas of altered osteogenesis and a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction. When used as an adjunct in the diagnosis of myocardial infarction the incidence of false negatives has been found to be approximately 14% and false positives about 16%. False negatives may result from failure to observe temporal requirements for good myocardial imaging; false positives may be related to coronary heart disease, left ventricular aneurysms, trauma, repeated cardioversion following coronary by-pass surgery or old myocardial infarcts.

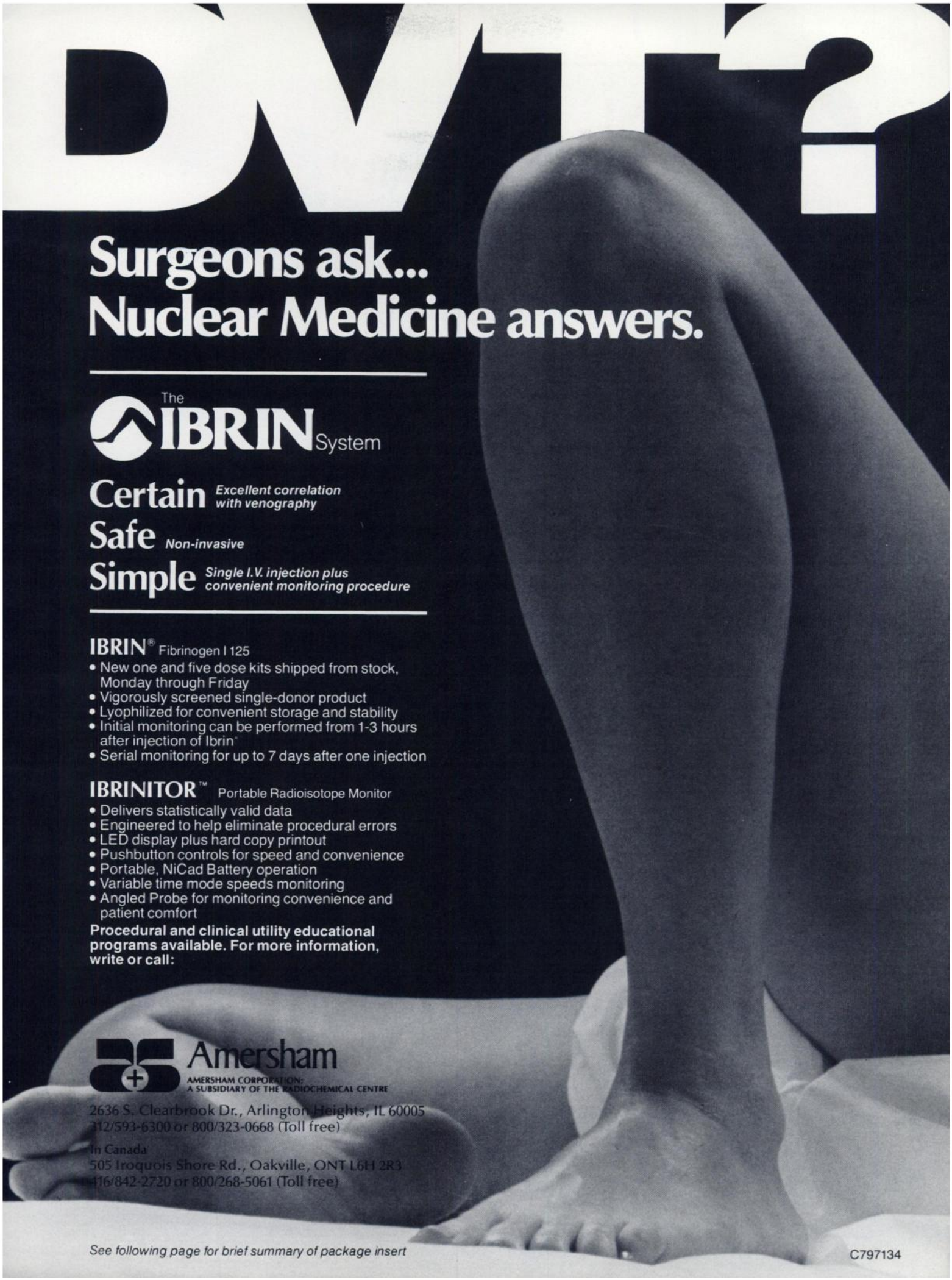
Contraindications: None known.

Warnings: This radiopharmaceutical should not be administered to patients who are pregnant or lactating unless the information to be gained outweighs the potential hazards. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses. The technetium used to tag the product should be routinely tested for molybdenum and aluminum; if an unacceptable level of either is found, the technetium should not be used. 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. Bone Imaging: Both prior to and following Tc99m-labeled OSTEOSCAN administration, patients should be encouraged to drink fluids. Patients should void as often as possible after the Tc99m-labeled OSTEOSCAN injection to minimize background interference from accumulation in the bladder and unnecessary exposure to radiation. Cardiac Imaging: Patient's cardiac condition should be stable before beginning the cardiac imaging procedure. If not contraindicated by the cardiac status, patients should be encouraged to ingest fluids and to void frequently in order to reduce unnecessary radiation exposure. Interference from chest wall lesions such as breast tumors and healing rib fractures can be minimized by employing the three recommended projections.

Adverse reactions: None known.

Dosage and administration: The recommended adult dose of Tc99m-labeled OSTEOSCAN is 10-15 mCi. The activity of each dose should be measured by a suitable radiation calibration system just prior to administration. The dose should be given intravenously by slow injection. For optimal results bone imaging should be done 2-4 hours post injection and cardiac imaging 1-1½ hours post injection. The acute myocardial infarct can be visualized from 1-9 days following onset of symptoms with maximum uptake at 2-3 days. It is recommended that three projections of the heart be made (anterior, left anterior oblique and left lateral).



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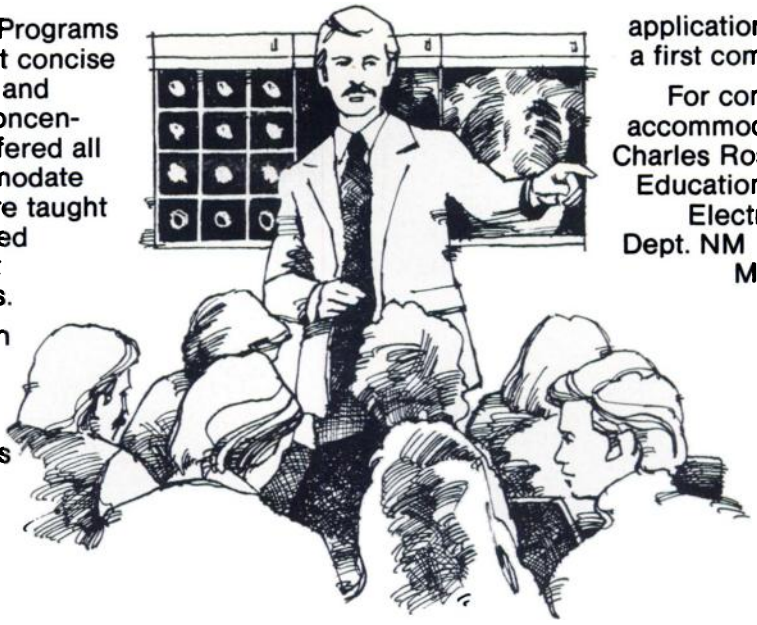

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1. Bonadonna, G. et al: Phase I and preliminary Phase II evaluation of adriamycin (NSC 123127), Cancer Res. *30*, 2572, 1970
2. Middleman, E. et al: Clinical trials with adriamycin. Cancer, *28*, 844, 1971
3. Wang, J. et al: Therapeutic effect and toxicity of adriamycin in patients with neoplastic diseases. Cancer, *28*, 837, 1971

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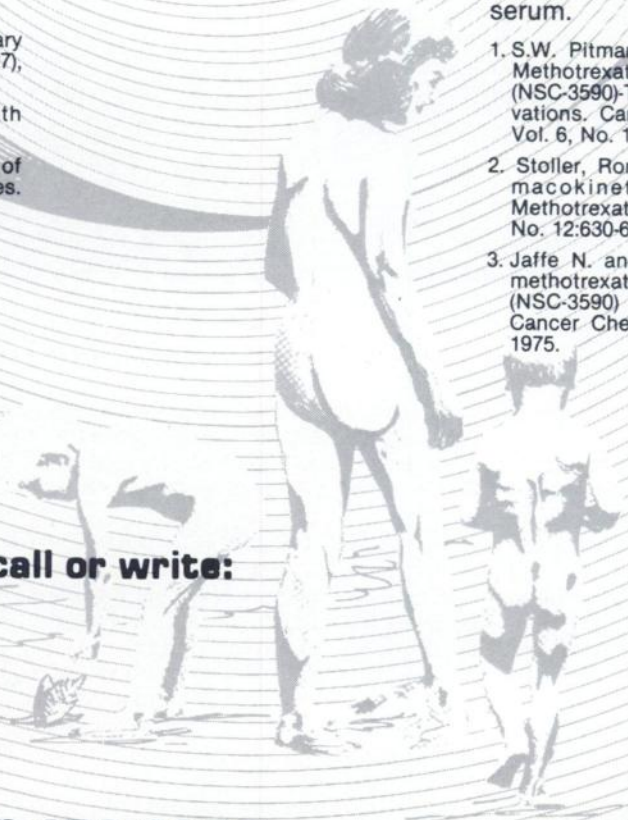
1. S.W. Pitman et al: Clinical Trial of High-Dose Methotrexate (NSC-740). With Citrovorum Factor (NSC-3590)-Toxicologic and Therapeutic Observations. Cancer Chemotherapy Reports Part 3 Vol. 6, No. 1, July 1975.
2. Stoller, Ronald G. et al: Use of Plasma Pharmacokinetics to Predict and Prevent Methotrexate Toxicity. N.E. Jr. of Med. Vol. 297 No. 12:630-634, Sept. 22, 1977.
3. Jaffe N. and Traggis D. Toxicity of high-dose methotrexate (NSC- 740) and citrovorum factor (NSC-3590) rescue in osteogenic sarcoma. Cancer Chemother. Rep. Part 3, Vol.6(1):31-36, 1975.



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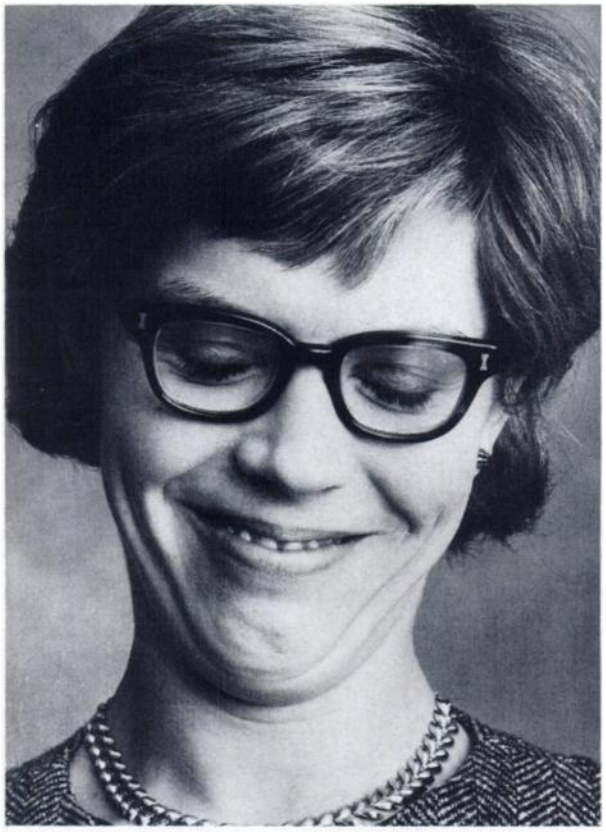

If you think computers are infallible, you should know Madge Fossi. Her task is to catch that rare error — to the benefit of everyone who wears a Nuclibadge II radiation dosimeter.

Madge marvels at the computer's speed and accuracy, but that never stops her from checking and rechecking its work before personnel radiation exposure reports are sent to hospitals and other facilities using Nuclibadge II Radiation Monitoring Service.

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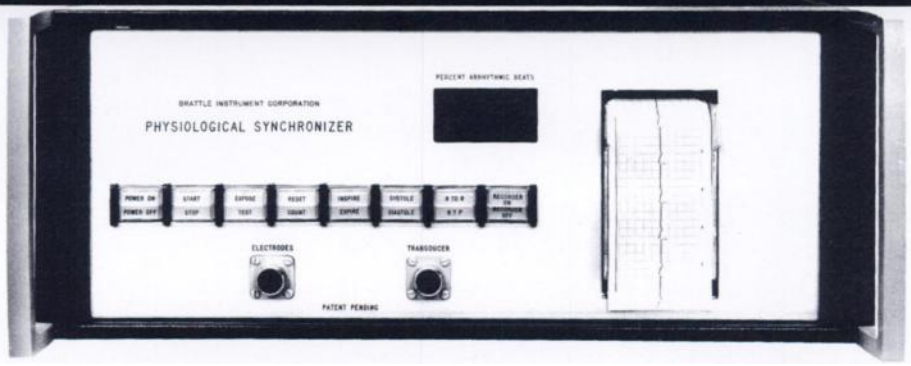
The RAO view shows akinesis of the lower antero-lateral wall and apex; and contraction of the inferior wall and high up the antero-lateral wall. The LAO view shows good contraction posteriorly and akinesis of the septal aspect of the chamber. Patient was injected IV with 20mCi of ^{99m}Tc-labelled Human 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.

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

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More than half of our instruments are in community hospitals and the list is growing rapidly. Upon request, we'll supply names of happy users in your area.

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

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