A versatile, disposable system

Xenon 133-V.S.S. includes everything you need for a xenon Xe 133 ventilation study. The completely disposable system includes the xenon Xe 133 contained in a valve-shield, a CO₂ absorber and bag for rebreathing and collection of expired xenon Xe 133, and a mouthpiece.

One system can be used for single-breath, rebreathing and wash-out studies.

The valve-shield can deliver either a concentrated or a dispersed dose.

Safe, convenient assembly

Xenon 133-V.S.S. can be assembled in less than a minute. Radiation exposure is minimized because there is no need to dilute the xenon gas or transfer it to a delivery system. After assembly, the ventilation study may begin immediately.

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

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

Xenon Xe 133 Diagnostic

DESCRIPTION: The Xenon Xe 133-Ventilation Study System (V.S.S.) consists of a sealed plastic tube containing 10 milli-curies +/− 20% of Xenon 133 gas at calibration time and date with less than 1% carrier Xenon in air.

INDICATIONS AND USAGE: Study of pulmonary ventilation.

CONTRAINDICATIONS: None known.

WARNINGS: Xenon Xe 133 should not be administered to children or to patients who are pregnant, or to nursing mothers unless the benefits to be gained outweigh the potential hazards. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses.

Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Xenon Xe 133 should be used in pregnant women only when clearly needed.
CONSIDER MPI's XENON 133-V.S.S. (VENTILATION STUDY SYSTEM)
Xenon Xe 133 diagnostic

True, single-unit dose
The MPI Xenon 133-V.S.S. contains enough xenon Xe 133 for one ventilation study. You only use what you need and are not “locked into” an expensive delivery system that requires daily use to justify costs. Another advantage of single-unit dosage is that the risk of cross infection via reusable apparatus is significantly reduced.

Reduced radiation exposure
The xenon Xe 133 is supplied in a sealed plastic container. The valve-shield is designed to prevent radiation leaks during transport and use. Additionally, a shield to reduce radiation exposure to patient and attending personnel and a valve assembly to minimize the escape of exhaled xenon during washout studies are available as accessory components.

PRECAUTIONS: Xenon Xe 133 as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize radiation exposure to clinical personnel and to the patients consistent with proper patient management.
Exhaled Xenon Xe 133 gas should be controlled in a manner that is in compliance with the appropriate regulations of the government agency authorized to license the use of radionuclides.
Xenon Xe 133 gas delivery systems, i.e., respirators or spirometers, and associated tubing assemblies must be leak-proof to avoid loss of radioactivity into the laboratory environment not specifically protected by exhaust systems.
Xenon Xe 133 adheres to some plastics and rubber and should not be allowed to stand in tubing or respirator containers for such unrecognized loss of radioactivity from the dose for administration may render the study non-diagnostic.
ADVERSE REACTIONS: Adverse reactions specifically attributable to Xenon Xe 133 have not been reported.

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

HOW SUPPLIED: Each Ventilation Study System (V.S.S.) contains Xenon 133 in a sealed plastic tube containing 10 millicuries ±20% at calibration time and date stated on the label.
The sealed plastic tube is enclosed in a metal valve-shield which is sealed with a plastic shrink band to prevent accidental loss of Xenon 133 during shipping. A key is provided to remove the end plugs of the valve-shield and to turn the valve fitting which breaks the sealed plastic tube. The V.S.S. also includes a disposable mouthpiece and a breathing-collection bag with an attached CO2 absorber canister.

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- $^{125}$I T-4 RIA
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- $^{125}$I TSH
- $^{125}$I Tobramycin
- DPC Controls I, II, III
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Abington Memorial chose a camera for maximum image quality and convenience.

The choice: The Raytheon XL-91

The 520-bed Abington Memorial Hospital in Abington, PA, outside Philadelphia, has added a new Raytheon XL-91 gamma camera to its new wing. And right from start-up the XL-91 has been producing images of superior resolution, with much greater patient accessibility and operator convenience than other equipment.

The reasons for the XL-91's success at Abington are clear. At 16½ inches the XL-91 provides the widest undistorted field of view of any gamma camera. The XL-91's exclusive Autocomp circuitry achieves ±2% uniformity and — with as many as four memories — permits users to calibrate to four different isotopes or collimators.

Patient comfort, operator convenience, superior high resolution images. No wonder Abington Memorial had the XL-91 working a full patient schedule just days after delivery. And outstanding customer acceptance of the XL-91 — such as at Abington Memorial — is the reason Raytheon has had to expand its sales and service coverage greatly. From coast to coast, wherever you are, Raytheon is now near you.

If you'd like more information on the XL-91, write or phone Raytheon Company, Medical Electronics, 70 Ryan Street, Stamford, CT 06907. Telephone: 800-243-9058. We will put you in touch with your nearest Raytheon sales engineer.

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Two 24" wide scanning assemblies with multiple detectors move in one smooth, noiseless sweep to produce images up to 76" long – as fast as ten minutes.

Each increment of travel of the detector assemblies causes a trace of the distribution of activity across the patient's body to be displayed on the TV monitor and recorded on floppy diskette. Polaroid and/or x-ray film are available for hardcopy. Patient identification, date, isotope and other pertinent information are permanently recorded on the film with the simultaneously obtained anterior and posterior images.

The system requires minimal setup – just the establishment of focal depth and PHA window settings.

Fail-safe operation includes warning signals against improper technique or patient contact.

All raw data are recorded on diskette and available for rapid retrieval and manipulation.

The silence and relative absence of machine motion reduce patient anxiety and involvement, while the rapid setup and scan time combine to increase patient throughput.

The result: rapid, high resolution, simultaneous anterior and posterior images – with no patient repositioning – for fast, accurate diagnoses.

Ask Union Carbide for the Facts

Imaging Systems products from Union Carbide are designed to enhance diagnosis and research, produce a return on investment, and create better health care at lower patient cost.

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The UNION CARBIDE Large Field Gamma Camera:

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The CLEON 720 Large Field Gamma Camera is a high resolution imaging system designed for exacting, contemporary clinical nuclear medicine.

It can be installed as a stand-alone camera or connected to the CLEON 110 Image Processor as an integrated imaging and data processing system.

The unique hand control lets the technologist remain with the patient at all times while setting up the complete imaging study. Bolus injection procedures can be easily accomplished with one technologist.

The optional CLEON 110 Image Processor provides a powerful microcomputer system complete with specialized Nuclear Medicine software to permit a full range of functional analyses including automatic calculation of cardiac ejection fractions, cerebral perfusion determiniation, renal function analysis, pulmonary function analysis, and simultaneous end-systole and end-diastole data acquisition. The Image Processor is easy to use and requires no computer codes or terminology to operate.

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Radionuclide Brain Imager
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of brain tissue — through
the use of standard
radiopharmaceuticals — and
at accepted levels of
administered activity.

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automatically acquire,
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transaxial slices of the brain.
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processing of the scan data
provides target-to-
background images at a
ratio of approximately 1.5 to 1
with excellent functional
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sensitivity for quantitating
very small changes in the
regional distribution of
radiopharmaceuticals
enables early detection and
treatment of brain
abnormalities.

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performed simultaneously to
analyze brain perfusion and
the breakdown of the
"blood-brain barrier".

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A Powerful New Way to Look Into Life.

The CLEON 711 Radionuclide Body Function Imager utilizes accepted levels of conventional radiopharmaceuticals to produce computer-reconstructed, transaxial images of radioisotope concentrations in body sections. The system has been designed to provide clinical diagnostic information for early detection of organ function abnormalities and pathological changes, before anatomical changes are present.

The system can operate in a single or dual isotope mode. In the dual isotope mode there is independent data acquisition, reconstruction, and display for each isotope. There is also capability, using software options, to do array manipulations with the images from each isotope. Parameters are set for each slice – including slice thickness, scan time, radionuclide, and photon energy.

Both the Polaroid camera and sheet film can be exposed simultaneously, or the Polaroid camera can be inhibited. Up to four images can be recorded on each sheet film format.

Each slice is automatically recorded on diskette at the end of each scan and can be played back at the operator’s console. Once a slice is reconstructed, it can be further manipulated using various degrees of background subtraction, upper and lower cutoff, and contrast enhancement, and recorded on film. Meanwhile, the system continues to gather data from subsequent slices. Image data stored on diskette can be played back and further manipulated at the requesting physician’s convenience.

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Complete directions for use are provided with each product. These directions should be read and understood before use. Particular attention should be paid to all warnings and precautions. Additional performance data are available. Should you have any questions, contact your Clinical Assays representative.
Use Radx's NEW plastic film holder to organize, view and file Polaroid/100 mm images

Many CT, Ultrasound and Nuclear Medicine imaging devices use a Polaroid format for image reproduction. These images are the end result of a very significant investment of both time and money by the medical community, yet they present an interesting problem in viewing and storage.

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For maximum protection and the highest in optical clarity, specify Radx, the leader in quality film holders.

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**Real time diagnostics at a realistic price.**
Computing cardiac ejection fraction is a vital job. But, it's also an expensive and complicated one. Most hospitals cannot afford the luxury of a nuclear medicine system and the computer-trained personnel required to accomplish this time-consuming technical task. But, they can afford the efficiency of a Picker Nuclear Cardiology Module, which can quickly determine ejection fraction at a fraction of the cost of a computer.

**Complex cardiac assignments, simply performed.** Picker's new Cardiac Module, the first of its kind in the marketplace, is an easy, uncomplicated way to produce meaningful left ventricular function data. Now, without the services of a computer-trained technologist, you can obtain instant on-line, 30-second sequential ejection fraction, indicated on an LED display, with corroborative hard copy strip chart recordings. The Picker Cardiac Module, used with our Dyna® Camera, will

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produce the ejection fraction value six times faster than the first pass probe method at a third the cost.

In less than one minute after patient input has been completed, the Picker Cardiac Module will interrogate its own memory and calculate and display the on-line ejection fraction. It will print the left ventricular gated time ejection cycle images on 8 x 10" (20 x 25 cm) film, showing 12, 24, or 48-time integrated frames and print the left ventricle integrated time activity curve and its associated ECG on a strip chart at the same time. Not only will it perform these tasks in less than a minute, but it will take up a fraction of the space required for a nuclear medicine computer, without the complexities that call for elaborate training.
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Our range of radioassay kits for diagnosis or research keeps growing to meet your needs. What stays the same is the quality.
Our four latest kits are designed for simplicity, reliability and convenience, and maintain the high standards of manufacture and quality control our customers have come to expect.

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When Toshiba gave nuclear medicine the world's first jumbo gammacamera in 1973, the medical community was very impressed. But we were dedicated to giving you more, so we introduced the world's first jumbo gammacamera with high resolution, fine diagnostic detail over a large area. That was important, but we knew it still wasn't enough.

Now, we are introducing the latest in the state-of-the-art, the GCA-402. The world's first Super High Resolution, Large Field Gammacamera combining stability and exceptional workload capability in one instrument. Frankly, we're pleased.

Toshiba’s system approach allows for no compromise where clinical diagnostic values are concerned. The GCA-402 is a prime example. High resolution is the basis for obtaining useful diagnostic images. The intrinsic resolution and linearity of the GCA-402, combined with its range of ten collimators provides unsurpassed images of exceptional diagnostic value. The GCA-402 incorporates 61 photo-multiplier tubes to electronically smooth the image and eliminate the high-energy collimator hole patterns unavoidable in conventional systems. Its 35cm field of view combined with 17 preselected isotope ranges allows unobstructed views of large organs, or groups of organs, as well as whole body scanning.

Toshiba’s patented* delay line system and modern IC-technology provide long term stability, trouble free performance, and ease of operation. Of course, the GCA-402 has a wide range of accessories including special collimators, whole body scanning bed, video tape and film recorders, plus, the GCA-402 may be interfaced to any computer.

This combination of human engineering, fail-proof auto exposure and easy collimator changeover provides the highest efficiency while minimizing patient discomfort.

When you're ready to fill your nuclear medicine department's need for a large field gammacamera, remember Toshiba. We're the first.

*Patented Delay Line, U.S. Patent Number 3,717,763
Three peaks make a beautiful view

Searle's large field of view scintillation camera, in its standard configuration, is the only instrument of its type which allows you to set window width and energy level on 3 independent analyzers for unique isotopes and special studies... the only one which lets you take full advantage of the diagnostic potential in multi-peak nuclides such as Gallium 67. This is a great advantage in soft tissue studies where high sensitivity and superior resolution are vital.

LARGE SELECTION OF COLLIMATORS
To sharpen your images even more, the Pho/Gamma LFOV offers a large assortment of converging and parallel hole collimators designed and developed by Searle Radiographics. There is a significant improvement in the resolution of deep-seated structures with converging collimation. In renal studies, for example, the images possess such clarity that it is possible to obtain even oblique views of diagnostic quality. Converging collimation also brings enhanced sensitivity to the imaging of small organs.

The large field of view with parallel hole collimation can simultaneously image both kidneys or both lungs. Thus, where a standard field of view camera requires 2 studies, the Pho/Gamma LFOV routinely does the job with only one.

EASE OF OPERATION
The Pho/Gamma LFOV has eleven factory pre-set isotope windows for operator convenience. Automatic peaking assures remarkable reproducibility from study to study and from day to day.

IMPROVED ELECTRONIC DESIGN
New ratio correction circuitry allows wider window widths, shortens study times, reduces motion artifact and increases patient throughput. Other electronic innovations include pulse-pair pile-up rejection and event buffering circuitry. As a result, the Pho/Gamma LFOV is capable of count rates up to 200,000 cps, which is sufficient for even highly specialized techniques such as dynamic cardiac studies.

The introduction of the Pho/Gamma LFOV in 1975 was a milestone in nuclear imaging. Since then, this advanced instrument has earned a reputation as the finest, most versatile scintillation camera you can buy. Today, clinicians rely on the Pho/Gamma LFOV for improved diagnostic clarity, shortened study times and greater patient comfort in lung, brain, whole body bone, renal and abdominal (liver) blood flow studies.

INSTRUMENTATION BACKED BY SUPERIOR SERVICE
Searle Service is one of the largest, highly trained Service Organizations in the nation. This trained and knowledgeable group is dedicated to maintaining highest quality instrument performance in your laboratory.

For more information about the Pho/Gamma LFOV system, including the unique Micro Dot* Imager and Scintiscan* Whole Body Table, call your Searle representative or write: Searle Radiographics, Inc., 2000 Nuclear Drive, Des Plaines, IL 60018. Telephone: (312) 298-6600.

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IMAGING: The Living Art

Photo by Milton Goldstein
From the book MAGNIFICENT WEST: Yosemite
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Kodak has nearly a century of expertise with radiographic imaging products. Your Kodak Technical Sales Representative is your access to everything we know.

The experts shown above represent the Kodak skills that are available to help you in your pursuit of professional excellence.

They range from physical chemists who create the various emulsions, chemicals, and films to the quality control technicians whose word is law when it comes time to release a product to you.

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Your Kodak TSR can call on any of these experts as you work together to solve your problems.

Kodak offers you the broadest line of films for your diagnostic imaging—that is one expression of our commitment to your profession. But we do not consider our job done until you hold in your hand the quality image you need. That's why we back our films with so many people. At Kodak, we understand the importance of total commitment.
The ice is out at Mallinckrodt.

THE QUALITIES YOU LIKED IN OUR FROZEN PRODUCT ARE ALL HERE IN ITS LYOPHILIZED SUCCESSOR.

Mallinckrodt research has now developed a formula that combines the quality features of our frozen TechneScan MAA product with the convenience of lyophilization. Our goal was to match—as closely as possible—particle-size range and consistency specifications that had been established with the frozen process. In our search we were determined not to compromise current product performance or specifications of our frozen product for the sake of convenience.

The introduction of Mallinckrodt’s TechneScan MAA—Lyophilized—represents the successful conclusion of our search for a specially designed freeze dry process. No need to freeze. Simply refrigerate for these same quality features.

Safety . . .
TechneScan MAA is very well tolerated. Effective lung excretion half-life is approximately 3.8 hours—virtually complete biological excretion occurs in about 24 to 48 hours. Although the possibility exists, there is, to date, no evidence of antibody formation.

Increased Shelf Life . . .
The expiration date of each TechneScan MAA lyophilized kit is now one year after date of manufacture. This extended shelf life permits the convenience of larger inventories plus the cost savings of buying in quantity.

Reliable Consistency . . .
Reconstitution does not affect either particle quality or size distribution. The particle size does not change after the addition of pertechnetate solution. There is no tendency for the particles to hydrate and increase in size after labeling. WE ENCOURAGE MICROSCOPIC EVALUATION AND COMPARISON!

Controlled Particle-Size Range . . .
Specifications require that not less than 90% of the particles be 10 to 90 microns in size, with not more than 10% below 10 microns, and none greater than 150 microns. Our investigations indicate that, typically, 90% of the TechneScan MAA particles are in the 10-40 microns range. This controlled particle size range, plus the fact that there is no tendency to agglomerate, results in good images of lung perfusion.

High Tagging Efficiency . . .
The tagging efficiency experienced with the TechneScan MAA kit is remarkably consistent, always at or near 100% conversion of pertechnetate to labeled MAA, with no loss of the label for up to 24 hours.

Easy Preparation . . .
Preparation of TechneScan MAA Tc 99m is easy.
(1) Allow five minutes to reach room temperature.
(2) Add Tc-99m.
(3) Agitate gently.
(4) Wait fifteen minutes for high tagging efficiency.
That’s all!

Economy . . .
The TechneScan MAA Kit doesn’t need expensive accessory equipment. Up to 15 adult patients can be scintigraphed from the preparation of a single vial of TechneScan MAA. This helps reduce the procedure cost per patient.
For those who were acquainted with the frozen product, we give our assurance of continued satisfaction; for those who were unable to use frozen TechneScan MAA because of storage considerations, we invite your evaluation of our lyophilized formula. For further information contact your Mallinckrodt representative.

LYOPHILIZED
TechneScan® MAA
(AGGREGATED ALBUMIN (HUMAN))
LUNG SCAN KIT

Consult package insert for complete prescribing information, a summary of which follows the next page.
TechneScan® MAA KIT

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Catalog No. 093
Store at 2°C – 8°C
The ice is out at Mallinckrodt.

THE QUALITIES YOU LIKED IN OUR FROZEN PRODUCT ARE ALL HERE IN ITS LYOPHILIZED SUCCESSOR.

TechneScan MAA IYOPHILIZED
(AGGREGATED ALBUMIN (HUMAN))

Multi-Dose Kit for the Preparation of Technetated
(Tc 99m) Aggregated Albumin (Human)

Diagnostic—For Intravenous Use

DESCRIPTION
The TechneScan MAA 10-milliliter vial contains a sterile, pyrogen-free, lyophilized mixture of 2.0 milligrams of aggregated albumin (Human), 120 micrograms of stannous chloride dihydrate, 80 milligrams of lactose, 24 milligrams of succinic acid, and 1.4 milligrams of sodium acetate.

TechneScan MAA is prepared from albumin that was nonreactive when tested for hepatitis B antigen (HBsAg) by radioimmunoassay. Each vial contains approximately 8 + 2 x 10⁶ aggregated albumin. The particle size distribution of the aggregated albumin is such that not less than 90 percent are 10 to 90 microns in size. Typically, approximately 90 percent are within the 10 to 40 micron range. There are no aggregated albumin particles greater than 150 microns in size. Reconstitution of TechneScan MAA with sterile, non-pyrogenic sodium pertechnetate Tc 99m provides an aqueous suspension of technetium Tc 99m aggregated albumin, with a labeling efficiency of 90 percent or greater.

INDICATIONS AND USAGE
TechneScan MAA Tc 99m is indicated only for scintigraphic imaging of the lungs as an adjunct to other diagnostic procedures whenever information about pulmonary circulation is desired.

CONTRAINDICATIONS
TechneScan MAA Tc 99m should not be administered to patients with severe pulmonary hypertension.

The use of TechneScan MAA Tc 99m is contraindicated in persons with severe pulmonary hypertension.

WARNINGs
The possibility of allergic reactions should be considered in patients who receive multiple doses of TechneScan MAA Tc 99m.

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 persons under the age of 18, to pregnant women or to nursing mothers unless the expected benefits to be gained outweigh the potential risks.

Ideally, examination using radiopharmaceuticals, especially those effective in nature, of women 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 particles into the systemic circulation.

The contents of the TechneScan MAA 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 TechneScan MAA Tc 99m depend upon maintaining tin in the reduced state. Any oxidants present in the sodium pertechnetate Tc 99m may thus adversely affect the quality of the preparation. Hence, sodium pertechnetate Tc 99m containing oxidizing agents is not suitable for preparation of TechneScan MAA Tc 99m.

The contents of the TechneScan MAA vial are sterile and pyrogen free. It is essential that the user follow the directions carefully and adhere to strict aseptic procedures during preparation of the radiopharmaceutical.

TechneScan MAA Tc 99m is a suspension and as such the particles will settle with time. Failure to mix the vial contents adequately before use may result in a non-homogenous suspension with a resulting non-uniform distribution of radioactivity in the lung.

It is also recommended that, because of the increasing probability of agglomeration with aging, a batch of Technetium Tc 99m aggregated albumin will 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. On reconstitution with pertechnetate Tc 99m, the contents of the vial should be mixed by gentle swirling to avoid changes in particle size. 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 occupational workers.

Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the safe use and handling of radioactive nuclides 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 (70 kg) is 1 to 4 millicuries. The volume of the dose may vary from 0.4 to 1.0 ml.

The recommended number of aggregated albumin particles to be administered per dose is 200,000-1,200,000 with the suggested number being approximately 600,000.

HOW SUPPLIED
Catalog Number 093

TechneScan MAA Kit
(Lyophilized)

Kit Contains:
5—Aggregated Albumin (Human) Reaction Vials
(1 ml each)—for the preparation of
Technetated (Tc-99m) Aggregated Albumin (Human)

Reaction Vial Contains (in lyophilized form):
2.0 mg Aggregated Albumin (Human) (8 ± 2 x 10⁶ particles)
120 µg Stannous Chloride Dihydrate
80 mg Lactose
24 mg Succinic Acid
1.4 mg Sodium Acetate
Hydrochloric Acid or Sodium Hydroxide is added for pH adjustment.

Each vial contains 8 ± 2 x 10⁶ aggregated albumin particles.

TechneScan MAA contains no preservatives; after reconstitution, the shielded vial should be stored at 2° to 8°C.

Included in each package is one (1) package insert, 5 radiation labels and 5 radiocassette information string tags.
PRIAS: The Benchtop Automation System for General RIA Kits and Procedures

- Centrifuge-compatible pipetting station
- Gamma counter that gives answers
- Miniature vial liquid scintillation counter

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SUBSIDIARIES OF AMBAC INDUSTRIES, INC.
Proper Use of CEA-ROCHE

1. **Management checkpoint #1:** establish initial (pre-treatment) titer.
2. **Checkpoint #2:** post-surgical/post-treatment titer.
3. **Periodic checkpoints:** serial titers remain in “normal” range.
4. **Action checkpoint:** after successive significant titer increases, consider adjustment of therapy or complete diagnostic workup
5. **Periodic checkpoints:** “normal” readings– good prognosis
"The value of monitoring the patients with serial determinations of plasma CEA cannot be overemphasized. One may even argue that by doing so, we are likely to detect recurrent disease much earlier than if we were only to rely on the more conventional clinical methods of cancer detection..."*

The Most Extensive Clinical Trial of a Product in Diagnostic History
Investigators in over 100 leading medical centers, using standardized reagents and procedure, generated an extraordinary body of clinical data on more than 20,000 patients and 50,000 CEA-ROCHE assays. 2
The conclusion:

CEA-ROCHE is an extremely important dimension in the management of the cancer patient

Availability of CEA-ROCHE
As a Management Aid Provides Multiple Benefits for the Clinician and the Patient.

For the Clinician:
the opportunity to effectively chart the patient’s course; recurrence is indicated by rising titers, often months before symptoms appear

For the Patient:
the possibility of earlier detection of recurrence, earlier and more effective therapy, and potentially improved prognosis

CEA-ROCHE™
Carcinoembryonic Antigen assay
may be ordered from
• Roche Clinical Laboratories, Inc.
A complete reference laboratory
(201) 526-2400 (800)631-5250
• Major Hospital and Private Laboratories
Additional information may be obtained from
• Your Roche Representative
• the Professional Services Department
(201) 235-2355

Attn: JG
Please send more information on monitoring cancer patients with CEA-ROCHE™. I am particularly interested in:

☐ GI cancer  ☐ Breast cancer  ☐ GU cancer  ☐ Lung cancer

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Coming A

Preview at the Society of Nuclear Medicine Meeting.

We're about to take the wraps off three terrific new additions to our Clinical Data System.

We know they are terrific because each one is a clinically useful addition, inspired by suggestions from physicians who actually use our systems.

The Clinical Acquisition Module.
Or CAM for short. You can take this light-weight, portable unit anywhere you want to collect data—to mobile or stationary cameras, or in remote separate facilities. From there, the discs can be taken directly to the Clinical Data System. Or images can be transmitted on a standard telephone connection between the CAM and the system. With the CAM, you achieve great flexibility and convenience in meeting a variety of clinical situations.

The Image Transmission System.
This new unit—Modem for short—lets you transmit your data on the telephone. From a CAM to a Clinical Data System. From one system to another. Either way.
Anaheim, June 27-30.

Regardless of location. And the transmission of a 128 x 128 image takes only a minute. With the Modem, you get greatly increased coverage of several facilities by fewer physicians.

**The Added Memory Option.**

We can now add an extra 32K Video Memory to the Clinical Data System. So you can have up to 96K words (192K bytes) total. With the Added Memory Option, you can achieve gated cardiac acquisition of 32 64x64 images or 8 128x128 images.

Come see all this for yourself in our booth at the Anaheim show. You'll soon discover why the majority of physicians and technologists agree that the ADAC Clinical Data System is the finest all-around nuclear medicine computer available today.

If you can't make the show, we'll be glad to arrange an actual demonstration at a convenient location near you.

Just write or call collect. ADAC. 255 San Geronimo Way, Sunnyvale, California 94086. Phone (408) 736-1101.
THE OBVIOUS SOLUTION
Low* Dissolved Oxygen Non-preservative normal saline USP

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

**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/l, 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 hypokalemia and acidosis. Excessive amounts by the parenteral route may precipitate congestive heart failure and acute pulmonary edema, especially in patients with cardiovascular 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:**

<table>
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<th>Catalog No.</th>
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<td>S-25</td>
<td>SODIUM CHLORIDE INJECTION U.S.P. with LOW DISSOLVED OXYGEN</td>
<td>25/10 ml vials</td>
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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/l; 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

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

*less than 5 ppm

For additional information call or write to:

ACKERMAN NUCLEAR, INC.
Pharmaceuticals for Nuclear Medicine
445 W. Garfield Ave.
Glendale, CA 91204, USA
(213) 240-8555
The Emission Computerized Axial Tomographic (ECAT) scanner from EG&G Ortec is an operational, totally supported, user oriented system. It measures and reconstructs the cross sectional and rectilinear distribution of compounds labeled with positron emitting radio-nuclides.

Using an onboard computer, ECAT generates a tomographic image representing the activity present within a "slice" through the patient that coincides with the vertical plane through its banks of detectors. The brain, heart and liver are among the major organs for which ECAT is used to study functions.

ECAT's advantages are important. For example, compounds labeled with $^{11}$C, $^{13}$N, and $^{15}$O can be used as a means to measure a wide range of metabolic, transport and hemodynamic processes.

The basic ECAT system includes the scanning unit with bed, data acquisition system plus associate computer, displays and storage systems. Its 50 cm opening permits entrance of the whole body for physiological study of any organ.

For additional technical information or assistance contact Bill Cross, Program Manager, 615-482-4411.

Congratulations to the Society of Nuclear Medicine upon its 25th Anniversary

From The IMAGE MAKERS

Mallinckrodt®
NUCLEAR
RADIOPHARMACEUTICALS
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Eadweard Muybridge: Galloping Horse, 1876.
One hundred years ago our concept of how a horse ran was limited to what we thought we saw—the two front legs touching the ground in unison to propel the horse forward, followed by the two hind legs hitting the ground as the front legs recovered. But in 1878, Eadweard Muybridge altered our awareness of reality with 12 great pictures of a galloping horse—stopping the action with a very fast shutter speed. He not only successfully demonstrated that for an instant (panels 2 and 3) all four legs actually lose touch with the ground altogether, but also that horses only place one leg down at a time. Thus, he extended our vision and enabled men to see things that are not normally visible to the human eye.

Today, the concept of extending vision by utilizing more than one picture has been introduced into nuclear medicine by Searle’s PHO/CON Emission Tomographic Scanner. PHO/CON simultaneously provides 12 tomographic images for in-depth representation of the patient in 12 separate coronal planes; thus providing improved capability for locating lesions, as well as enhancing the interpretation of images in many difficult cases by generating additional information on depth, size, shape, and probable nature. PHO/CON also minimizes the need for multiple-view imaging due to its ability to differentiate between confusing overlapping activity and that of the target area of interest, and has often provided valuable clinical information in certain planes that was not evident in the one or two images offered by other nuclear cameras. And, because of a flexibility of format sizes, PHO/CON not only permits a wide variety of studies to be performed—from brain and soft tissue to whole body—but it is rapidly demonstrating its superiority for studies using Gallium-67.

For additional information on how the 12 great images of the PHO/CON Emission Tomographic Scanner can help you see things other nuclear systems may not, contact Searle Radiographics, a member of the Searle Imaging group.
Your partner in **Quality Control**

**SQUIBB**

**Q.C. ANALYZER**

**Accurate**
Displays percent of total radioactivity which appears as the bound or hydrolyzed fraction of radiopharmaceutical chromatographic separation. Measurement accuracy: ±0.3%. Self-contained, pre-programmed computer/counter designed to count, store, analyze and read out results digitally.

**Easy**
Simple-to-perform procedure. Isotope energy independent and can be used for the analysis of any radiisotope or radiopharmaceutical.

**Rapid**
Analysis completed in 5-15 minutes. Calculation of results automatically programmed internally, independently of operator.

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AUTOMATIC RADIONUCLIDE BOLUS INJECTOR

For dynamic nuclear angiographic procedures or any study requiring fast, uniform and repeatable bolus injections of diagnostic media.

- Dispenses up to 2 cc of bolus followed by 10 cc of saline flush.
- Constant flow rate—5 cc/second.
- Repeatability of injection rate better than 99%.
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Perfusion + Ventilation: The two together are diagnostically better.

The ventilation-perfusion ratio \( \frac{V}{Q} \) is the crucial factor determining the regional oxygen partial pressure. This can be evaluated by assessing the gas exchange occurring in any part of the lung. The single most sensitive non-invasive test for diagnosing Pulmonary Embolus is the perfusion lung image.\(^1\) However, pulmonary diseases, such as chronic obstructive lung disease, infectious diseases, and neoplasms are all characterized by altered arterial blood flow. Therefore the most reliable way to increase the specificity of perfusion lung imaging is to add a Xenon 133 ventilation study.\(^2\)

---


PULMOLITE™—Technetium Tc 99m Aggregated Albumin Kit

Diagnostic—For Intravenous Use

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.

Ideal examinations using radiopharmaceuticals, especially those effective 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 Tc 99m 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 vials 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 radiopharmaceutical.

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 vials 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, 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 ensure 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.

Precautions: As in the use of any other radioactive material care should be taken to ensure minimum radiation exposure to the patient, consistent with proper management, and to ensure 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 non-diagnostic. Xenon Xe 133 gas delivery systems, i.e., respirators or spirometers, and associated tubing assemblies must be leakproof to avoid loss of radioactivity into the laboratory enivrons 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: 3 liters of air.

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

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

How Supplied: The Xenon Xe 133 gas is supplied as part of the Calidose™ system, consisting of 2 ml unit dose vials and the Calidose dispenser.* For shielded dispensing.

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

*Patent Pending

Cat. No. NRP-186

Xenon Xe 133 Gas (CALIDOSE™) Dispensing System

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

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.

Ideal examinations using radiopharmaceuticals, especially those effective 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 ensure minimum radiation exposure to the patient, consistent with proper management, and to ensure 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 non-diagnostic. Xenon Xe 133 gas delivery systems, i.e., respirators or spirometers, and associated tubing assemblies must be leakproof to avoid loss of radioactivity into the laboratory enivrons not specifically protected by exhaust systems.

Adverse Reactions: To date, no adverse reactions based on the use of 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:

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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

Cat. No. NRP-186

New England Nuclear
Radio pharmaceutical Division

Atomlight Place, North Billerica, Mass. 01862
Telephone 617-667-9531
Los Angeles: 213-321-3311

Canada: NEN Canada Ltd., 2453 46th Avenue, Lachine, Que, H7T 3C9.
Telephone: 514-636-4971, Telex: 95-821868
Europe: NEN Chemicals GmbH, D-6072 Dreieh, W. Germany,
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Greatly simplified ordering procedures – permanently encoded unique numbering of film, which is independent of film darkening – new improved techniques for analyzing the film for anomalies that may affect the “meaning” of the exposure and new N.R.C. annual statistical summary reports available now, are just some of the ways our people are working hard to make it better for you.

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THE JOURNAL OF NUCLEAR MEDICINE

The EDC Stress Table can also be used for ultrasonic imaging of the heart simultaneously with exercise.

Now—with our new Cardiac Stress System, you can perform nuclear imaging or ultrasonic imaging during exercise. The EDC stress exercise table holds the patient securely in a supine position during exercise and imaging, allowing functional assessment of the heart during exercise and at rest. This technique provides considerably more information than rest study alone.

Typical Application:
Radionuclide imaging during exercise includes gated blood pool studies and first pass flow studies to obtain an evaluation of left and right ventricular functions, and Thallium myocardial imaging to evaluate perfusion abnormalities during exercise.

With the patient supine on the table during exercise, you can obtain immediate images of the heart after the Thallium injection, eliminating the normal delay between upright stress testing and subsequent imaging. Delays are unavoidable with conventional upright exercise machines such as bicycles or treadmills.

Other Applications:
The EDC Stress Table can also be used for ultrasonic imaging of the heart with exercise including standard M-Mode, Echo Cardiography and Sector Ultrasonic Scans of the heart.

Advantages:
Keeping the patient supine and motionless during exercise offers many advantages over vertical exercise methods. For example . . .

1. No delay between injection and imaging.
2. Emergencies such as erythema or defibrillation can be treated more easily by the physician with less equipment obstruction, as the patient is already supine.
3. Supine exercise eliminates the problems associated with radioactive contamination of equipment such as vertical bicycles or treadmills.
4. Blood pressure drops during exercise—which may lead to difficulties—are much less likely in supine exercise.

Major System Components Comprise:
Patient Positioning Table with adjustable, removable shoulder restraints and hand holds for use during exercise. For other nuclear diagnostic procedures, simply position camera either over or under the table, which is equipped with a low density top (attenuation—less than 1½ mm of aluminum).

Bicycle Exercise Unit, which can be attached to the table with quick release clamps or simply removed for non-stress examinations. Pedal adjusts up or down for maximum comfort. Unit has direct drive gear train and electronic hysteresis brake.

Electronic Control/Display Panel which includes adjustable watt load control knob, RPM meter for displaying pedal rate and watt-KPM/minute meter for work load readout. Heart rate meter with ear clip and pre-set heart rate adjustment is available as optional accessory.

Write for more information on this and other EDC technological breakthroughs in the radiation/diagnostic field. For example . . .

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**Supine Stress & Imaging Simultaneously**

Introducing:
Cardiac Stress Testing Table for Nuclear or Ultrasonic imaging of the heart simultaneously with exercise.

Now—with our new Cardiac Stress System, you can perform nuclear imaging or ultrasonic imaging during exercise. The EDC stress exercise table holds the patient securely in a supine position during exercise and imaging, allowing functional assessment of the heart during exercise and at rest. This technique provides considerably more information than rest study alone.

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Write for more information on this and other EDC technological breakthroughs in the radiation/diagnostic field. For example . . .
The Clinical Cyclotron™
A new dimension in nuclear medicine

Designed by The Cyclotron Corporation specifically for installation in a hospital's nuclear medical department, the Model CP-16 Clinical Cyclotron™ produces the short-lived, positron emitting \( ^{15}\)O, \( ^{13}\)N, \( ^{11}\)C and \( ^{18}\)F plus other medically useful isotopes. Multicurie quantities of the positron emitters are produced, making possible labelling of organic compounds in addition to online applications.

Among the many new innovative design features incorporated in the Clinical Cyclotron™ is the ability to extract the beam from the machine at more than one location. Furthermore, two radioisotopes can be made simultaneously. It is now possible to make full use of the beam at multiple target locations without the requirement for an external beam transport system.

As the name suggests, the Clinical Cyclotron™ is remarkably easy to operate. In a few weeks a senior hospital technician can be trained in all phases of its use. Production of radioisotopes with the Model CP-16 can be simplified further by selection of the computer control option. In this configuration, start up, operation and shut down of the Clinical Cyclotron™ are handled automatically after the operator has entered the required data.

Another potentially valuable option is complete self-shielding. This can be of particular advantage when it is necessary to make use of existing facilities because of budgetary or other constraints on new construction. As the artist's illustration reveals, this feature permits locating the controls and the Model CP-16 Cyclotron in the same room under "controlled area" conditions.

The standard Clinical Cyclotron™ produces the desired radioisotopes utilizing selected (p,n), (p,xn), and (p,α) reactions shown in the accompanying table. Should a user prefer to employ some or all of the listed (d,n) reactions, this capability is available as an option. Likewise, the ability to vary the energy of the particles accelerated by the Model CP-16 Cyclotron is an optional feature. The energy range applicable to protons is 4-16 MeV; for deuterons, 3-8 MeV.

Drawing on the extensive experience gained in building over 20 cyclotron systems and the advice and counsel of users of these systems, The Cyclotron Corporation also has developed the Model CP-30 Cyclotron. This machine is designed for those users who want to have the ability to produce the full range of medically useful isotopes in the hospital. With the Model CP-30, virtually all of the longer half-life isotopes can be produced in commercial quantities. This cyclotron also can be used as a major component of a neutron therapy system. Computer control and variable energy are standard features of the Model CP-30 Cyclotron. Like the Clinical Cyclotron™ this machine produces protons but the energy range is 8-30 MeV; for optional deuterons, 4-15 MeV.

The Cyclotron Corporation also can provide target and beam transport systems plus complete laboratories including hot cells. Experienced personnel are available to assist the users' architects and engineers in designing a new or remodeled facility.

### Table: Production of Isotopes in Current Use*

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Reaction CP-16**</th>
<th>14 N(p,α)</th>
<th>16 O(p,α)</th>
<th>15 N(p,n)</th>
<th>14 N(d,n)</th>
<th>18 F</th>
<th>81 Kr→81 Rb</th>
<th>67 Ga</th>
<th>111 In</th>
<th>68 Ge</th>
<th>201 Tk→201 Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CP-30**</td>
<td>14 N(p,α)</td>
<td>16 O(p,α)</td>
<td>15 N(p,n)</td>
<td>14 N(d,n)</td>
<td>18 F</td>
<td>81 Kr→81 Rb</td>
<td>67 Ga</td>
<td>111 In</td>
<td>68 Ge</td>
<td>201 Tk→201 Pb</td>
</tr>
</tbody>
</table>

*Where current use data indicates reaction is possible only with Model CP-30 or significantly higher yields are obtained using CP-30, the reaction is printed in blue.

**Acceleration of deuterons is available as an option.

Denotes enriched isotope.
For years the Profession has been considering the potential value of the short-lived positron emitting nuclides in the diagnostic process, particularly $^{15}\text{O}$, $^{13}\text{N}$ and $^{11}\text{C}$. Until recently, the interest had to be relatively academic in the absence of effective positron imaging devices. With the development of The Cyclotron Corporation's versatile Model 4200 Positron Camera System (pictured) and EG&G Ortec's Ecat™ this void has been filled. Since the early sixties compact cyclotrons have been used to produce the short-lived radioisotopes in medical research centers. However, in the opinion of some, such machines are considered too complicated or for other reasons somewhat less than ideal for installation in the typical nuclear medical department. The advent of the Clinical Cyclotron™ removes the last obstacle blocking full exploitation of this exciting new field.
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Complete directions for use are provided with each product. These directions should be read and understood before use. Particular attention should be paid to all warnings and precautions. Additional performance data are available. Should you have any questions, contact your Clinical Assays representative.
NMS, the Artronix Nuclear Medicine System, is a computer system for the acquisition and analysis of gamma camera image data. NMS operates on the Artronix MODULEX multi-task computer system. NMS consists of a large number of integrated programs which are designed to permit smooth and efficient operation. Various configurations provide for simultaneous acquisition of camera data in either list or frame mode, comprehensive data analysis with interactive graphic capabilities, and programming in both FORTRAN and MUMPS. In addition to many built-in analysis and display features, the system supports customized data acquisition and analysis.

Command Program Sequences provide users with the ability to design studies for complete organ function imaging by merely specifying a string of different imaging commands. This customized study, created in minutes, can be filled away as an organ function protocol available for unlimited usage.

A complete software package operating in conjunction with the Model 2721/2722 Nuclear Medicine Interface Subsystem with its cache memory and compendium of gated data acquisition modes provides today's most comprehensive Nuclear Cardiology acquisition and analysis subsystem.

**Bolus Studies** can be acquired in combinations of up to 100 frames/second for up to 1,000 total frames. This is the simplest and yet most useful and comprehensive of the analysis procedures.

**Tracer Activity Curves** provide the basis for the measurement of a broad spectrum of cardiac performance parameters, including left-to-right shunts, cardiac output, stroke volume, pulmonary transit time and both left and right ventricular ejection fractions.

**Blood Pool Studies** can be acquired directly in frame mode into the cache memory in the NMS interface with the averaged cardiac cycle ranging from 8 to 128 data frames of sizes 128 x 128 to 32 x 32 respectively.

Left ventricular ejection fraction, peak fractional ejection rate, peak circumferential fiber shortening, and peak flow time measures are computed and displayed along with the ED and ES images and LV activity curves.

For more information about the Artronix Nuclear Medicine System, call or write Artronix, Inc., or visit Booth 206-208 at the 25th Annual Meeting of the Society of Nuclear Medicine, Anaheim, June 27-30, 1978.
Diagnostic Isotopes introduces
AUTO-MATE XENON GAS DISPENSER

Convenient Hand-Held Xenon Dispenser

Yes, the Auto-Mate Xenon Gas Dispenser eliminates a lot of hassle now associated with Ventilation System studies. This new instrument from Diagnostic Isotopes offers the following advantages: simplifies loading; delivers Xenon by merely pressing a button; punctures vial automatically; delivers full dose in a one breath bolus, administers oxygen by simply reattaching dispenser to tubing and works with all delivery and trap systems. The Auto-Mate provides technician safety because the shipping container is the radiation shielding. Made of lightweight aluminum and brass for extreme durability.

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Harshaw's partnership with nuclear medicine spans 25 years. Our commitment to excellence in service, innovative design, and materials research is more important today than ever before.

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SKELETAL IMAGING AGENT

Excellent in vitro stability
Greater than 98% labeling efficiency 8 hours after preparation. Osteoscan contains sodium ascorbate, an antioxidant that inhibits action of radiolysis by-products and oxidants capable of causing complex breakdown and resultant soft tissue visualization.

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Delivers consistently high-quality scans, using either instant or generator technetium.

Plus these other Osteoscan benefits
- very low tin level to minimize potential for liver visualization and for interference with subsequent brain scans
- rapid blood clearance
- high target-to-nontarget ratio
- diphosphonate's P-C-P bond for excellent in vivo stability

For further information about Osteoscan, please contact: Arnold Austin, Technical Manager, Professional Services Division, Procter & Gamble (513) 977-5547.

In Europe, contact: Philips-Duphar B.V., Cyclotron and Isotope Laboratories, Petten, Holland.
See following page for a brief summary of package insert.
OSTEOSCAN®
(5.9 mg disodium etidronate and 0.16 mg stannous chloride)
SKELETAL IMAGING AGENT

DESCRIPTION
Each vial of OSTEOSCAN contains 5.9 mg disodium etidronate and 0.16 mg stannous chloride as active ingredients. Upon addition of ADDITIVE-FREE 99mTc-pertechnetate, these ingredients combine with 99mTc to form a stable soluble complex.

ACTIONS (CLINICAL PHARMACOLOGY)
When injected intravenously, 99mTc-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 99mTc-labeled OSTEOSCAN.

Three hours after intravenous injection of 1 ml 99mTc-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 99mTc-labeled OSTEOSCAN excreted in the feces is below the level detectable by routine laboratory techniques.

INDICATIONS
OSTEOSCAN is a skeletal imaging agent used to demonstrate areas of altered osteogenesis.

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. Fasting prior to administration may enhance the hepatic uptake of the agent which may result in degradation of pancreatic image quality.

ADVERSE REACTIONS
At present, there are no known contraindications to the use of Selenomethionine Se 75 Injection.

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

The transplacental transport and long biologic halftime of this agent may result in significant radiation exposure to the fetus. Since selenomethionine 75Se is excreted in human milk during lactation, formula-feedings should be substituted for breast-feedings.

CONTRAINDICATIONS: At present, there are no known contraindications to the use of Selenomethionine Se 75 Injection.

PRECAUTIONS: In the use of any radioactive material, care should be taken to ensure minimum radiation exposure to the patient and occupational workers consistent with proper patient management. Fasting prior to administration may enhance the hepatic uptake of the agent which may result in degradation of pancreatic image quality.

ADVERSE REACTIONS: At present, adverse reactions have not been reported following administration of Selenomethionine Se 75 Injection.

HOW SUPPLIED: Selenomethionine Se 75 Injection is available in multiple dose vials in potencies of 0.25 millicurie, 0.5 millicurie, and 1 millicurie. Complete assay data for each vial are provided on the container.

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THE JOURNAL OF NUCLEAR MEDICINE

58A THE JOURNAL OF NUCLEAR MEDICINE
High pancreas specificity

Selenomethionine is a structural analog of the amino acid, methionine, in which the selenium has been substituted for the sulfur atom. Chemically and biologically, they behave alike, including a relatively high degree of uptake in the pancreas during protein synthesis.

Levorotatory compound

Radioactive selenomethionine can be produced in racemic form by chemical synthesis from $^{75}\text{Se}$. At Squibb, however, selenomethionine is prepared biosynthetically by extracting it from the protein product of yeast grown on a low sulfur medium containing $^{75}\text{Se}$ of high specific activity. This compound is levorotatory.

Specific activity

Squibb L-selenomethionine $^{75}\text{Se}$ provides a specific activity of not less than 25 microcuries per microgram of selenium at the time of manufacture.

Sethotope®
Selenomethionine Se 75 Injection

See opposite page for brief summary.
Early detection of deep vein thrombosis of the legs can be accomplished using I-125 labelled fibrinogen and the Model 145A. The leg is scanned after intravenous injection of the labelled fibrinogen. As a thrombosis develops, the radio-active fibrinogen is detected at predetermined points and measured directly as a percentage of the precordial count.

Handily compact and portable, with standard D cell battery operation providing at least 100 hours of uncycled use, the 145A Localization Monitor offers unlimited isotope selection, stainless steel collimator, and solid state design.

Features
- Direct Percentage Analog Display
- Compact & Portable (6½ lbs including batteries & probe)
- Powered by 3 flashlight batteries (No A.C. Hazards)
- Unlimited Isotope Selection

Specifications
- Range: Percent Scale — 0-120%
- CPS Scale — 30, 100, 300, 1000, 3000 CPS
- Meter Response: Fast — 2 seconds
  Slow — 14 seconds
- Dimensions: 4½” H × 5½” W × 8” L (exclusive of handle)
- Recorder Output: 10 mv
- Detector: NaI (Ti) crystal, 1” diam. × 1 mm thick, mounted on PMT with 7 mg/cm² aluminum window

And our service, when you need it, is courteous and quick. Write or call for complete information.

J&S Model 145A
Portable Localization Monitor for I-125 Labeled Fibrinogen Scanning.

Early detection of Deep Vein Thrombosis
No? Are you sure?

The only way to be really sure that radioactive Xenon is not leaking into your laboratory is to measure the air continuously with the Johnston Lab Model 133 B Xenon-133 gas monitor. A dependable instrument for measurement of airborne radioactivity in nuclear medicine laboratories performing Xenon-133 studies.

Easily detects Xenon-133 levels as low as 20% of the maximum 40-hour airborne concentration ($10 \mu$ Ci/m$^3$) specified by the U.S. Nuclear Regulatory Commission (10CFR 20.103).

This reliable low-cost monitor reads 1 to 100 $\mu$ Ci/m$^3$ of Xenon-133. It features a large, easy-to-read panel meter, visual alarm and optional audible alarm, and a recorder output. Provides continuous unattended operation. Shielded against gamma radiation to prevent false alarms.

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DataCamera™, another GE first, is the only mobile scintillation camera system available with data analysis. DataCamera gets to the patient's bedside easily. Its superior positioning capability allows imaging of patients connected to monitoring, life support or traction devices.

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A New Book! CURRENT CONCEPTS IN RADIOLOGY. Edited by E. James Patchen, M.D.; with 35 contributors. Share the insights of 35 renowned authorities as they examine practical topics in nuclear medicine, radiology, and radiologic physics. This new volume records current progress in radionuclide scanning, the advent of CT scanning, and noteworthy improvements in radiologic detection of malignant diseases. You'll read about computer tomography, radionuclide imaging of the perfused or diseased myocardium, and the current status and future direction of radionuclide live imaging. May, 1977. 472 pp., 487 illus. Price, $42.50.


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NUCLEAR DVT DIAGNOSIS
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SAFE DVT monitoring with the IBRIN System can be performed on medical, surgical and orthopedic patients. There is no need to move the patient to a special procedure area. The IBRIN System of DVT detection reduces the need to subject the patient to radiopaque venography.

SIMPLE IBRIN has a long in-vivo half-life, permitting monitoring for up to seven days without additional injections. Serial monitoring allows constant updating of the patient’s status. IBRIN emits low energy radiation enabling the use of a lightweight isotope monitor such as the IBRINITOR for rapid testing of a large number of patients. Monitoring can begin within three hours after injection and results can be confirmed within twenty-four hours.

INJECT IBRIN, a Radionuclide-Labeled (125I) Fibrinogen (Human), is supplied freeze-dried for convenient storage and extended stability. It is reconstituted immediately prior to injection. The patient is intravenously injected with 100μCi of IBRIN prior to testing.

INSPECT Initial monitoring can be performed three hours after the IBRIN injection. The IBRINITOR is specifically designed and built for detecting DVT. Sophisticated electronic design assures reliable accumulation of statistically valid data and eliminates most operator error. The IBRINITOR has a continuous stage design that requires all the correct data in the correct order before giving results. A digital data display and built-in printout insure ease and accuracy of data collection. Push button controls on the detector probe are provided for quick, accurate testing. The probe design includes an angled detector head to facilitate positioning for maximum operator convenience and patient comfort. The IBRINITOR is powered by rechargeable Ni-Cd batteries. A source is provided for calibration convenience and the complete unit weighs less than eight pounds.

DETECT The IBRIN System includes a patient data sheet which provides a convenient display of printout tape and graphical representation of data for the physician’s interpretation and diagnosis.

We will be glad to help you explain the benefits of the IBRIN System to your surgical staff. Write or phone Amersham for complete details.

See following page for brief summary of package insert.
INDICATIONS
IBRIN is indicated for use in prospective studies for the early detection and subsequent monitoring of developing deep-vein thrombosis and in diagnostic studies for the detection of established thrombosis in the legs.

A. The IBRIN (Radioisotopic-Labeled Fibrinogen (Human)) test is indicated for studies for the detection of established thrombosis in the legs.

B. The IBRIN (Radioisotopic-Labeled Fibrinogen (Human)) test is indicated for subsequent monitoring of developing deep-vein thrombosis and for diagnostic studies.

CONTRAINDICATIONS
There are no known contraindications to the use of IBRIN. However, it should be noted that the iodides give rise to block the uptake of 131I by the thyroid gland and therefore should not be administered to patients under 18 years of age, to pregnant, or to patients who are lactating, unless the information to be gained outweighs the potential risk.

WARNINGS
This radiopharmaceutical should not be administered to patients under 18 years of age, to pregnant, or to patients who are lactating, unless the information to be gained outweighs the potential risk.

PRECAUTIONS
Care should be taken to ensure minimum radiation exposure to the patient consistent with proper patient management and to ensure minimum radiation exposure to occupational workers.

This drug contains radioactive materials which must be handled only by qualified personnel in conformity with Nuclear Regulatory Commission, variance, and or other appropriate government regulations. Care must be taken to avoid excessive exposure to its radiation. Shielding or equivalent radiation protective measures must be used.

This product is prepared from units of human plasma which have been tested using RIA methods and found non-reactive for Hepatitis B surface antigen.

Approved detection methods are not sensitive enough to detect all infectious units of blood or all cases of hepatitis. However, IBRIN has been prepared from single donor plasma and has been injected into recipients without the incidence of Hepatitis B as evidenced by periodic physical examination and laboratory testing (e.g., profile, CBC, and Hepatitis B antibody) of the recipients.

There is a number of clinical circumstances requiring consideration in the interpretation of the test results. (See complete Package Insert.) IBRIN (Radioisotopic-Labeled Fibrinogen (Human)) scanning should preferably be performed prior to venography if both procedures are contemplated since venography may cause increases in count rate making interpretation of post-venography scan data difficult.

Adequate reproduction studies on animals have not been performed to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Radioisotopic-Labeled Fibrinogen (Human) may be used in pregnant women only when clearly needed.

ADVERSE REACTIONS
There has been no reported incidence of allergic or anaphylactic reactions following the intravenous administration of IBRIN.

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

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84A THE JOURNAL OF NUCLEAR MEDICINE
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Minitec® (Technetium 99m) Generator was designed for safety as well as efficiency. Protective shielding (\(\frac{5}{8}\)"") surrounds collecting vial during elution and dose withdrawal. No exposed tubing: 1" lead around column affords high shielding-to-activity ratio. Maxi-Shield® provides additional 1 1/2" of solid lead shielding...only cap is removed for elution.

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Customer Service
Squibb Technical Associates have had extensive training in nuclear medicine, radiopharmaceuticals, RIA and instrumentation. When you need technical information or have an unusual problem, a call to your local TA brings the quick, personal attention of an experienced specialist. Assistance is also available at Squibb headquarters. Telephone 609-921-4100 or write Medotopes Technical Customer Service, P.O. Box 4000, Princeton, N.J. 08540.

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Products designed to complement each other are more likely to produce a better end product. When sodium pertechnetate eluate obtained from Minitec (Technetium 99m) Generator is utilized in Squibb imaging kits, the results are purity, quality, and compatibility.

See next page for brief summary.
MINITEC®
Technetium 99m
GENERATOR

DESCRIPTION: Minitec (Technetium 99m) Generator provides a means of obtaining a sterile, nonpyrogenic supply of technetium 99m (99mTc) as sodium pertechnetate 99mTc.

INDICATIONS AND USAGE: Sodium pertechnetate 99mTc is indicated for brain imaging, thyroid imaging, salivary gland imaging, blood pool imaging, and placenta localization.

CONTRAINDICATIONS: None known.

WARNINGS: Radiopharmaceuticals should not be administered to patients who are pregnant or to nursing mothers unless the expected benefit to be gained outweighs the potential hazards. Since 99mTc is excreted in human milk during lactation, formula-feedings should be substituted for breast-feedings.

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

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.

IMPORTANT: Since material obtained from the generator may be intended for intravenous administration, aseptic technique must be strictly observed in all handling. Only the eluent provided from the generator may be intended for intravenous administration.

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

ADVERSE REACTIONS: No adverse reactions specifically attributable to the use of 99mTc have been reported.

For complete prescribing information, consult package insert.

HOW SUPPLIED: Minitec (Technetium 99m) Generator is available in potencies of 220, 440, 880, 1330, 1770, or 2220 millicuries 99mTc at calibration time. Complete assay data for each generator is provided on the label; directions for determining the activity of material eluted from the generator are provided in the package insert. Supplied with the generator are vials of sterile, nonpyrogenic eluent and suitable equipment for eluting, collecting, and assaying the Technetium 99m.

THE JOURNAL OF NUCLEAR MEDICINE

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NUCLEAR RADIOLOGIST—35, certified by ABR (Diagnostic Radiology & Special Competence in Nuclear Radiology) and ABNM. Currently in satisfying and well-paid position, but desire relocation to warmer climate—California preferred—have California license. Reply: Box 604, Society of Nuclear Medicine, 475 Park Ave. South, New York, N.Y. 10016.

BS. NMT, ASCP (NM), ARRT (NM), Two years scanning and R. Two supervisors and R. Some supervisory and educational experience, 688-788-8377 or Box 605. Society of Nuclear Medicine. Private practice preferred. South of Nuclear Medicine, 475 Park Ave. South, NY, NY. 10016.

BOARD CERTIFIED IN NUCLEAR Medicine with General Radiology experience. Desires full-time position in Nuclear Medicine or Radiology starting July 1978. Please reply P.O. Box 606, Society of Nuclear Medicine, 475 Park Ave. South, New York, NY 10016. Or call (412) 941-3386. Home 5 p.m. Presently licensed in Pa., N.J., Ill., Ind., Texas, Ky.

NUCLEAR RADIOLOGIST—SEVEN years experience teaching in a university, five of those years as director, plus four years in private practice. Would like full-time nuclear medicine position, can cover diagnostic radiology. Prefer southeast. Experienced in IND investigation, cardiac scans, EF and gated blood pool studies. Diplomat ABR, ABNM. CV available. Reply: Box 601, Society of Nuclear Medicine, 475 Park Ave. So., New York, NY 10016.


CHIEF NUCLEAR MEDICINE TECHNOLOGIST, ARRT registered. 10 years experience. Capabilities include in vivo and in vitro applications. Expert with most equipment and procedures. Interested in supervising, organizing and planning established or new facilities. Reply to Box 603, Society of Nuclear Medicine, 475 Park Ave. South, New York, N.Y. 10016.

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NUCLEAR MEDICINE RESIDENCY: Applications are now being accepted for the AMA-approved residency program beginning July, 1979. The program includes the George Washington University Hospital, Washington, D.C. and Holy Cross Hospital, Bethesda, Maryland. Comprehensive training in basic science, clinical medicine, and in-vivo/in-vitro nuclear medicine, including RIA and clinical patient services are provided. Resident participation in the Department of Nuclear Medicine at the Medical College of Virginia and the Medical College of Virginia Hospitals is encouraged. Contact: Richard C. Reba, M.D., Director, Division of Nuclear Medicine, Medical College of Virginia Hospitals, 601 N. W. W., Wash., D.C. 20037. Phone: 202-676-3458.

NUCLEAR MEDICINE TECHNOLOGIST: Enjoy year-round, outdoor living in sunny Florida and have the challenge of being with an unusually progressive department in modern 550-plus bed hospital. This is a permanent, full-time position and will provide excellent experience and opportunity for continued learning in all phases of in vivo and in vitro procedures, including computer applications. Requests for further information should be directed to: Virginia Paine (or call her collect at) 305-771-8000 Ex. 7592.

CHIEF NUCLEAR MEDICINE TECHNOLOGIST—Division of Nuclear Medicine, General Hospital, Fort Wayne, Indiana. D.C. 20007, Position requires 6 years experience. Contact: John C. Harbert, M.D. (202) 625-7492.

AUSTRALIA, QUEENSLAND RADIUM Institute, Department of Nuclear Medicine, Townsville, Queensland, Australia. Full-time position. Applications for the position of Nuclear Medicine Technologist are invited from medical practitioners registrable with the Medical Board of Queensland, and desirous of a career in this specialty. Candidates should have the F.R.A.C.P. (Part I), M.R.C.P. (U.K.) or other suitable post-graduate qualification. The Department underwrites the total spectrum of nuclear medicine services including diagnostic imaging and thyroid investigations. The Department is accredited by the Royal Australasian College of Physicians for advanced training in nuclear medicine. Experience in nuclear medicine will be an asset, but is not essential as the successful applicant will be trained within the Department. Salary classification for the position is A$29,227 to A$39,567 per annum, depending upon the experience of the appointee. The successful applicant will be required to undergo the State Service Superannuation Fund. Further information and application forms may be obtained from the Director Queensland Radium Institute. Applications closing on 2nd June 1978 should be forwarded to: Executive Director Medical Services, North Brisbane Hospitals Board, Board Office, Brisbane, 4029 Australia by 2nd June 1978. (4500)

NUCLEAR MEDICINE TECHNOLOGIST—need for department which has FPHO/ Gamma Camera Observation Camera. Applicants must be registered or eligible for registry, Alternating call basis. Send resume to: Radiology Department, Antelope Valley Hospital Medical Center, 1600 West Ave. J., Lancaster, California, 93534.

NUCLEAR MEDICINE TECHNOLOGIST—full-time position for registered Nuclear Medicine Technologist in our Imaging Section. Ideal candidate familiar with both in vivo and in vitro procedures. Further information and application forms may be obtained from the Director, Queensland Radium Institute. Applications should be forwarded to: Executive Director Medical Services, North Brisbane Hospitals Board, Base Hospitals Post Office, Brisbane, 4029 Australia by 2nd June 1978. (4500)

RADIO-PHARMACIST: THE SCHOOL of Pharmacy at the University of Maryland is seeking an experienced radio-pharmacist to supervise its central nuclear pharmacy program. The position will involve administration of its central nuclear pharmacy, technicians, graduate and undergraduate levels, and research in radio-pharmaceutical development. A Ph.D. and academic rank will be commensurate with experience. Please direct correspondence with a curriculum vitae to: Michael D. Lobser, Ph.D., University of Maryland, 636 W. Lombard St., Baltimore, Md. 21201. An Equal Opportunity—Affirmative Action Employer.

NUCLEAR MEDICINE RESIDENT Training Program: Health Sciences Division, Virginia Commonwealth University, Medical College of Virginia Hospital, 601 N. W. W., Wash., D.C. 20037. Applications for places in a two year Nuclear Medicine Training Program. This is an affiliated program utilizing the facilities of the Medical College of Virginia and the Medical College of Virginia Hospitals. Inquiries should be addressed to: Alton R. Sharpe, Jr., M.D., Director, Program in Nuclear Medicine, Health Sciences Division, Virginia Commonwealth University, Medical College of Virginia Hospital, 601 N. W. W., Wash., D.C. 20037. Phone 202-676-3458.

CONFIDENTIAL SERVICE NATION-wide: We are a search firm dealing nationally in the field of Nuclear Medicine. All fees paid by employer. Forward resume with salary requirements and location preferences to: BML, Health Care Division, P.O. Box 6457, Columbia, S.C. 29260, (803) 787-8110.

AUSTRALIA, QUEENSLAND RADIUM Institute, Full-time position, Radiologist, Department of Nuclear Medicine. Applications for the position of Radiologist in Nuclear Medicine are invited from Medical Practitioners who are eligible for registration with the Medical Board of Queensland. The successful applicant should have an appropriate post-graduate qualification, F.R.A.C.P., M.R.C.P. (U.K.), etc. and should be eligible for membership of the Australian and New Zealand Medical Association. The successful applicant will be provided with the large central nuclear pharmacy, and excellent research facilities. Preference for primary radiology training, other academic qualifications and experience in nuclear medicine will be an asset, but are not essential. Excellent opportunity for growth and development, and remuneration is commensurate with experience. Please direct correspondence to: Pharmatopes, Inc., 25721 Coolidge Hwy., Oak Park, Mich. 48237.

NUCLEAR MEDICINE PHARMACIST: APPLICANTS should have some radio-pharmaceutical educational background and should be eligible to register in the state of Queensland. Candidate should have at least 2 years experience, with a special interest in Nuclear Pharmacy. Previous experience in Nuclear Pharmacy is desirable. A state registration certificate is required. Prefer experience in a teaching hospital. A full range of modern research equipment is available. A financial remuneration package will be negotiated subject to qualifications and experience. Write: Nuclear Pharmacy of California, Inc., 2511 West La Palma Avenue, Anaheim, California 92801. (714)761-5822.

Nuclear Medicine Technologist—Wash., D.C. 20007. Position requires an applicant with a post-graduate qualification, M.D., M.R.C.P. (U.K.), etc. and should be eligible for membership of the Australian and New Zealand Medical Association. The successful applicant will be provided with the large central nuclear pharmacy, and excellent research facilities. Preference for primary radiology training, other academic qualifications and experience in nuclear medicine will be an asset, but are not essential. Excellent opportunity for growth and development, and remuneration is commensurate with experience. Please direct correspondence to: Pharmatopes, Inc., 25721 Coolidge Hwy., Oak Park, Mich. 48237.

NUCLEAR MEDICINE TECHNOLOGIST: Immediate open position for a registered Nuclear Medicine Technologist. Excellent opportunity for professional growth and development in this new division of radiology. Position is full-time and salary to be commensurate with qualifications and experience. Experience preferred but not necessary. Apply to Personnel Dept., Amsterdam Medical Center, Amsterdam, N.Y. 10010.

Nuclear Medicine Technician: Immediate opening for a trained nuclear medicine technician in our radiology dept. Excellent opportunity for growth and development in this new division of radiology. Position is full-time and salary to be commensurate with qualifications and experience. Experience preferred but not necessary. Apply to Personnel Dept., Amsterdam Medical Center, Amsterdam, N.Y. 10010.

CHIEF OF NUCLEAR MEDICINE: CHALLENGING position (M.D., Certified or Board eligible in Nuclear Medicine) to the join the staff of a vibrant hospital in Manhattan. Expeditionary training and thoroughly experienced in nuclear medicine. Responsibilities will include all phases of the function of the department as well as medical responsibility for all diagnostic and therapeutic radiopharmaceutical procedures. Excellent benefit program. Please send curriculum vitae, including salary requirements, to: Box 600, Sacred Heart Medical Center, 475 Park Ave. So., New York, N.Y. 10016. An Equal Opportunity Employer. All replies held in confidence.

RADIO-MEDICINAL CHEMIST: POSITION requires research in design and synthesis of preclinical compounds, teaching radiopharmacology, and participation in the development of M.S. and Ph.D. programs in Nuclear and Radio-Medical Chemistry. Registered Pharmacist desirable, but not essential. Experience in one year post-doctoral research and/or teaching experience, but will consider junior candidate. Applications and any correspondence regarding this position should be directed to: Dennis R. Hijoad, Ph. D., Radiology, Nuclear Pharmacy, Box 328, Mayo University Hospitals, Minneapolis, Minn. 55455.

IMMEDIATE OPENING UNDER FEDERAL Civil Service for enthusiastic senior nuclear medicine technologist for position of Radiographer. Imaging Section in newly expanded nuclear medicine facility with active computerized cardiovascular and pulmonary research interests. Starting salary for qualified applicant $13,113. Forward resume to: Rex B. Shater, M.D., Chief, Nuclear Medicine, University Hospital Medical Center, Veterans Administration Hospital, 54th St. and 42nd Ave. S., Minneapolis, Minn. 55417. An Equal Opportunity Employer M/F/H.

RADIO-PHARMACIST: APPLICANTS should have some radio-pharmaceutical educational background and should be eligible to register in the state of Queensland. Candidate should have at least 2 years experience, with a special interest in Nuclear Pharmacy. Previous experience in Nuclear Pharmacy is desirable. A state registration certificate is required. Prefer experience in a teaching hospital. A full range of modern research equipment is available. A financial remuneration package will be negotiated subject to qualifications and experience. Write: Nuclear Pharmacy of California, Inc., 2511 West La Palma Avenue, Anaheim, California 92801. (714)761-5822.

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Technetium 99m HEDSPA (Etidronate Disodium¹ Tin Kit for use in preparation of Technetium Tc 99m Etidronate Tin Complex)

¹USAN designation for 1-hydroxy-ethylidene-1, 1-disodium phosphonate HEDSPA

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Northport, New York 11768
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![Image](https://via.placeholder.com/150)

**Table II.** Radiation attenuation by lead shielding

<table>
<thead>
<tr>
<th>thickness (mm)</th>
<th>0.2</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>attenuation</td>
<td>90%</td>
<td>83%</td>
<td>74%</td>
</tr>
</tbody>
</table>

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

**Table III.** Approximate fraction time chart:

<table>
<thead>
<tr>
<th>Fraction time (hours)</th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>1.0</td>
<td>0.950</td>
<td>0.950</td>
<td>0.950</td>
<td>0.950</td>
<td>0.950</td>
<td>0.950</td>
</tr>
<tr>
<td>2.0</td>
<td>0.900</td>
<td>0.900</td>
<td>0.900</td>
<td>0.900</td>
<td>0.900</td>
<td>0.900</td>
</tr>
<tr>
<td>3.0</td>
<td>0.850</td>
<td>0.850</td>
<td>0.850</td>
<td>0.850</td>
<td>0.850</td>
<td>0.850</td>
</tr>
<tr>
<td>4.0</td>
<td>0.800</td>
<td>0.800</td>
<td>0.800</td>
<td>0.800</td>
<td>0.800</td>
<td>0.800</td>
</tr>
<tr>
<td>5.0</td>
<td>0.750</td>
<td>0.750</td>
<td>0.750</td>
<td>0.750</td>
<td>0.750</td>
<td>0.750</td>
</tr>
<tr>
<td>6.0</td>
<td>0.700</td>
<td>0.700</td>
<td>0.700</td>
<td>0.700</td>
<td>0.700</td>
<td>0.700</td>
</tr>
<tr>
<td>7.0</td>
<td>0.650</td>
<td>0.650</td>
<td>0.650</td>
<td>0.650</td>
<td>0.650</td>
<td>0.650</td>
</tr>
<tr>
<td>8.0</td>
<td>0.600</td>
<td>0.600</td>
<td>0.600</td>
<td>0.600</td>
<td>0.600</td>
<td>0.600</td>
</tr>
<tr>
<td>9.0</td>
<td>0.550</td>
<td>0.550</td>
<td>0.550</td>
<td>0.550</td>
<td>0.550</td>
<td>0.550</td>
</tr>
<tr>
<td>10.0</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
<td>0.500</td>
</tr>
</tbody>
</table>

clinical pharmacology

Normal Human Serum Albumin, being a normal component of blood, leaves the vascular space at a rate slow enough to permit imaging procedures utilizing radioactive tags. Technetium Tc 99m Human Serum Albumin does not rapidly leak from the vascular space, nor is there significant accumulation in organs other than those of excretion, the kidney and bladder. Therefore, the vascular system may be imaged with a minimum of background and organ interference. In humans, a two-component blood clearance rate is observed. The 1/2 slow component ranging from 10 to 16 hours Twenty-four hour urine clearance averaged 39%.

**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.

**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 precautions 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. However, 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.

**Dosage and Administration**

The suggested intravenous dose used in the average patient (70 kg) is 3-5 millicuries of Technetium Tc 99m Human Serum Albumin.

Each dose should be measured by a suitable radioactive calibration system immediately prior to administration.

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

**Radiation Dosimetry**

The estimated absorbed radiation dose to an average patient (70 kg) from an intravenous injection of a maximum dose of 5 millicuries of Technetium Tc 99m Human Serum Albumin are shown in Table IV.

**Table IV.** Estimated absorbed dose

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Absorbed radiation dose (rads)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>0.047</td>
</tr>
<tr>
<td>Marrow</td>
<td>0.076</td>
</tr>
<tr>
<td>Kidneys</td>
<td>0.063</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.156</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.082</td>
</tr>
<tr>
<td>Testes</td>
<td>0.079</td>
</tr>
<tr>
<td>Total Body</td>
<td>0.073</td>
</tr>
</tbody>
</table>

**Method of Calculation**

The absorbed dose to various organs has been calculated using the following formula:

\[ D = \frac{C \times V}{T} \]

where:

- \( D \) = absorbed dose in rads
- \( C \) = activity concentration of the final Technetium Tc 99m Human Serum Albumin preparation
- \( V \) = volume in ml
- \( T \) = time of injection

**References**


**Supplementary Information**

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**Contraindications:** None known.

**Warnings:** In studying patients in whom myocardial infarction or ischemia is known or suspected, care should be taken to assure continuous clinical monitoring and treatment in accordance with safe, accepted procedure. Exercise stress testing should be performed only under the supervision of a qualified physician and in a laboratory equipped with appropriate resuscitation and support apparatus.

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

**Precautions:** Data are not available concerning the effect of marked alterations in blood glucose, insulin, or pH (such as is found in diabetes mellitus) on the quality of thallium Tl 201 scans. Attention is directed to the fact that thallium is a potassium analog, and since the transport of potassium is affected by these factors, the possibility exists that the thallium may likewise be affected.

Thallous Chloride Tl 201, as all radioactive materials, must be handled with care and used with appropriate safety measures to minimize external radiation exposure to clinical personnel. Care should also be taken to minimize radiation exposure to patients in a manner consistent with proper patient management.

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

Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Thallous Chloride Tl 201 should be used in pregnant women only when clearly needed.

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

Safety and effectiveness in children have not been established.

**Adverse Reactions:** Adverse reactions related to use of this agent have not been reported to date.

**Dosage and Administration:** The recommended adult (70kg) dose of Thallous Chloride Tl 201 is 1-1.5mCi. Thallous Chloride Tl 201 is intended for intravenous administration only.

For patients undergoing resting thallium studies, imaging is optimally begun within 10-20 minutes after injection. Several investigators have reported improved myocardial-to-background ratios when patients are injected in the fasting state, in an upright posture, or after briefly ambulating.

Best results with thallium imaging performed in conjunction with exercise stress testing appear to be obtained if the thallium is administered when the patient reaches maximum stress and when the stress is continued for 30 seconds to one minute after injection. Imaging should begin within ten minutes post-injection since target-to-background ratio is optimum by that time. Several investigators have reported significant decreases in the target-to-background ratios of lesions attributable to transient ischemia by two hours after the completion of stress testing.

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

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

**How Supplied:** Thallous Chloride Tl 201 for intravenous administration is supplied as a sterile, non-pyrogenic solution containing 1mCi/ml of Thallous Tl 201, 9mg/ml sodium chloride, and 9mg/ml of benzyl alcohol. The pH is adjusted to between 4.5-6.5 with hydrochloric acid and/or sodium hydroxide solution. Vials are available in the following quantities of radioactivity: 1.5, 3.0, 4.5, 6.0, and 9.0 millicuries of Thallous Tl 201.

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

**Catalog Number NRP-427**

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June 29, 1978
7:00 am to 8:00 am

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