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

Neoscan™
gallium citrate Ga 67

from medi+physics™

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

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

**NEOSCAN MEANS** a gallium citrate Ga 67 that MPI will send to you with no additional delivery charge along with your supply of Sodium Iodide I 123, Technetium Prepared Products or Xenon 133-V.S.S. (xenon Xe 133).
DESCRIPTION: Neoscan for diagnostic use is supplied as a sterile, apyrogenic aqueous solution for intravenous injection. Each milliliter of the solution contains 2 millicuries of gallium Ga 67 at calibration time, no carrier-added, 2.5% sodium citrate, and 1% benzyl alcohol as a preservative. The pH is between 4.5-7.5. Gallium Ga 67, with a half-life of 78.1 hours, is cyclotron produced by the proton irradiation of zinc Zn 68-enriched zinc oxide. The radionuclidic composition, at calibration time, is not less than 98.9% of the total activity from gallium 67 with less than 1% of the total radioactivity due to gallium 66 and with zinc 68 and other radiocontaminants contributing less than 0.1% of the total activity.

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

CONTRAINDICATIONS: None known.

WARNINGS: This radiopharmaceutical should not be administered to children or to patients who are pregnant or to nursing mothers unless the information to be gained outweighs the potential hazards. Ideally, examinations using radiopharmaceuticals, especially those elective in nature, in women of childbearing capability should be performed during the first few (approximately 10) days following the onset of menses.

PRECAUTIONS: A thorough knowledge of the normal distribution of intravenously administered gallium citrate Ga 67 is essential in order to accurately interpret pathologic studies. The finding of an abnormal gallium concentration usually implies the existence of underlying pathology, but further diagnostic studies should be done to distinguish benign from malignant lesions. Neoscan is intended for use as an adjunct in the diagnosis of certain neoplasms. Negative results do not preclude the presence of disease. Gallium citrate Ga 67 as well as other radioactive drugs, must be handled with care. Appropriate safety measures should be used to minimize radiation exposure to clinical personnel and to patients, consistent with proper patient management.

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

Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Gallium citrate Ga 67 should be used in pregnant women only when clearly needed. Gallium citrate Ga 67 has been found to accumulate in breast milk and should not be used in nursing mothers. Safety and effectiveness in children have not been established.

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

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

Studies indicate the optimal tumor-to-background concentration ratios are often obtained about 48 hours after administration. However, considerable biological variability may occur in individuals, and acceptable images may be obtained as early as 6 hours and as late as 120 hours after injection. Approximately 10% of the administered dose is excreted in the feces during the first week after injection. Daily laxatives and/or enemas are recommended from the first day of injection until the final images are obtained in order to cleanse the bowel of radioactive material and minimize the possibility of false positive studies.

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

HOW SUPPLIED: Neoscan is supplied as a no-carrier-added sterile apyrogenic aqueous solution for intravenous use. Each milliliter contains 2 mCi = 10% gallium Ga 67 at the time of calibration with 2.5% sodium citrate. Benzy alcohol 1% is present as a preservative. The pH is between 4.5-7.5.

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

When you think of gallium imaging, think of Neoscan™ from medi+physics™
Dualcount™ from DPC doesn't just make claims about quality and performance...they prove it. Check and compare the facts on DPC's $^{57}$Co Vitamin B12.

**Vitamin B12**

- **Precision:**
  - Within-run: 3-4%
  - Run-to-run: 3-4%

- **Sensitivity:** 50 pg/ml

- **Spiking-Recovery:** 100% (appr.)

- **Range:** 100-2,400 pg/ml

- **Blanks:** 2-3%

- **50% Intercept:** 600 pg/ml (appr.)

Our new B12 kit becomes a DUALCOUNT™ kit by simply adding a single vial of $^{125}$I Folate. We developed it this way for your convenience and economy.

**DUALCOUNT™ TEST ON**

**Customer Choice** — Assay for Folate or B12 or combination

**Interchangeable Components** — separate isotopes, all other reagents are identical

**Color Coded**

**Count Either Free** (pellet) or Bound (supernatant) **Low Blanks**

**Charcoal Tablets** • **Lyophilized Reagents** • **Stable PGA**

Diagnostic Prod

12306 Exposition Boulevard • Los Angeles, CA
Dualcount™ is a step above the other B12/Folate Kits on the market. Our $^{125}$I Folate is the industry standard. Known for its consistency, reproducibility and extreme sensitivity... the results are predictable.

**FOLATE**

- **PRECISION:**
  - WITHIN-RUN: 2-3%
  - RUN-TO-RUN: 3-5%

- **SENSITIVITY:**
  - 0.3 ng/ml

- **SPIKING-RECOVERY:**
  - 100% (appr.)

- **RANGE:**
  - 1-24 ng/ml

- **BLANKS:**
  - 2-3%

- **50% INTERCEPT:**
  - 4 ng/ml (appr.)

---

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- **CALIBRATORS** - yield identical values as N-Methyltetrahydrofolate • 15
- **MINUTE HEATING** • 100µl SAMPLE SIZE • RBC FOLATE • TWO SIMPLE DISPENSATIONS • REAGENTS STABLE AT 4°C • ECONOMICAL • SIMPLE PROCEDURE • 100, 200 & 500 TUBE KITS • INDIVIDUAL CALIBRATORS • LINEAR ON LOG-LOGIT PLOT

---

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Today clinical diagnosis has attained high quality standards.

We feel, however, that goals are made to be overcome. That's why our RIA kits provide you with not only a series of data, but also the necessary accompaniments: accuracy, sensitivity, precision, practicality.

For example, our kits for cardiological diagnosis. In fact, an early diagnosis of cardio-ischemia may play a very important role in its treatment.

CIS offers two new tests: Diagnosis of heart attacks and possible relapses, MYOK (kit for myoglobin radioimmunoassay).

Correct digitalis treatment, DIGOCTK 125 kit for digoxin radioimmunoassay, with iodinated tracer, in coated tube).
THANKS
THANKS
THANKS
to our engineering, sales and service people for making our Giant-Field XL-91 Gamma Camera a winner.
to our customers for giving us the chance to prove it. They are happy and so are we!
to the excellent technical measurements, these fine clinical results were predictable. They demonstrate that the biggest camera is also the best.

PLEASE
...we would like nothing more than to install a winner for you.
May we have the chance?

Typical Condensed Performance Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field of View</td>
<td>16.5&quot; dia (214 sq in)</td>
</tr>
<tr>
<td>Intrinsic Resolution</td>
<td>3/32&quot; lead bars with 3/32&quot; spacing visualized using 99mTc point source over entire 16.5&quot; field</td>
</tr>
<tr>
<td>Uniformity</td>
<td>± 2% over 16.5&quot; field of view in Autocomp mode (± 10% maximum integral in uncorrected field with 20% window)</td>
</tr>
<tr>
<td>Integral Linearity Error</td>
<td>Less than ± 3%</td>
</tr>
<tr>
<td>Count Rate Capability</td>
<td>&gt;100K per sec in 20% window</td>
</tr>
<tr>
<td>Energy Resolution</td>
<td>14% F. W. H. M. with 99mTc</td>
</tr>
</tbody>
</table>

RAYTHEON MEDICAL ELECTRONICS

RAYTHEON
70 Ryan Street
Stamford Connecticut 06907
Tel: 800-243-9058
For high-quality lung perfusion imaging

PULMOLITE™
Technetium Tc 99m Aggregated Albumin Kit

Convenient
stores at room temperature
Rapidly prepared
inject sodium pertechnetate
Tc 99m into vial, shake for
30 seconds—and it's ready
for administration
Complete
no additional reagents or
equipment
Economical
5 vial package and 30 vial
Convenience Pak

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 impertinent to blood flow.

While this effect is probably physiologically insignificant in most patients the administration of aggregated albumin is possibly hazardous in acute cor pulmonale and other states of severely impaired pulmonary blood flow.

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

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

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

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

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

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

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

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

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

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

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

Safety and effectiveness in children have not been established.

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

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

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

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

Dosage and Administration: The recommended intravenous dose range for the average patient (70kg) is 1 to 4 milliliter. The volume of the dose may vary from 0.2 to 13ml.

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

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

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

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

Each vial contains 3.6-6.5 x 10⁹ aggregated albumin particles.

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

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

Cat. No. NRP-415

New England Nuclear
Medical Diagnostics Division
**INDICATIONS**

Dicopac Kit consisting of cyanocobalamin Co 58 and cyanocobalamin Co 57 combined with human intrinsic factor is used to assess vitamin B₁₂ absorption in the diagnosis of malabsorption due to the lack of intrinsic factor, e.g., Addisonian (pernicious) anemia, and as a diagnostic adjunct in other defects of intestinal absorption.

**CONTRAINDICATIONS**

- None.

**WARNINGS**

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

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

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

**PRECAUTIONS**

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

The test should not be started within 24 hours of a therapeutic dose (1000 μg) of vitamin B₁₂ or within 24 hours of a loading dose of vitamin B₁₂ given for the Schilling test. If bone marrow examinations are to be done, they should precede the administration of this test, as the flushing parenteral dose of vitamin B₁₂ may alter the bone marrow picture.

**ADVERSE REACTIONS**

- None.
WAIT. All Xenon Gas Monitors are not created equal.

Before you invest in xenon monitoring equipment, discover the unique features of the new XenAlert™ XENON-133 MONITOR

The ONLY wide-range unit that monitors ROOM AIR and GAS TRAP OUTPUT

- Reads directly in Maximum Permissible Concentration (MPC) units (or fractions thereof).
- Integrates and displays $^{133}$Xe concentration in MPC-Hours.*
- Audio and visual indicators alert you BEFORE hazardous xenon concentrations are reached.

...AND MUCH MORE!

Details on request. Ask for Bulletin 266-B

*N The Maximum Permissible Concentration of $^{133}$Xe in a restricted area is $1 \times 10^{-1}$ μCi/ml for a time period of 40 hours in any 7 consecutive days.

TM Nuclear Associates
Are you on target in diagnosing the condition of your patient?

Unit dose kits each contain 10 reagent vials.

Unit dose allows each patient dose to contain the same activity, volume, and average quantity of each reagent material.

Unit dose can increase the likelihood of proper diagnosis since the patient's condition becomes the primary variable.

Unit dose is cost effective since you prepare only what you need.

Unit dose reduces your costs compared to multidose when one or two patient studies per day of a specific type are to be performed.

Unit dose is ideal for the single special or late afternoon study when a prepared multidose vial is not available.

Unit dose allows improved record keeping since the history of each dose can be easily tracked.

From Atom to Image

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

For technical information or literature call:
Toll Free 800-431-1146
in N.Y.S. 914-351-2131
Ten sterile unitdose reaction vials each containing 7 mg human serum albumin and 0.08 mg stannous tartrate, lyophilized. Hydrochloric acid was added prior to lyophilization for pH adjustment.

**REAGENT KIT FOR CARDIAC BLOOD POOL IMAGING**

- **Maximum vial activity**: 30 mCi/1 ml
- **Easy to prepare**: (see directions): Just add sterile preservative-free water, Technetium 99m pertechnetate, then shake. Requires no electrolytic equipment or time-consuming procedures.
- **High blood concentrations**: Approximately 60% remains in the circulation after 2 hours, approximately 45% after 4 hours (in normal patients).
- **Consistently high binding efficiency**: Technetium binding range of 90-99% immediately after tagging.
- **Stable formulation**: Uses stannous tartrate, which is more stable to air oxidation than stannous chloride.
- **Free from extraneous constituents**: Following aseptic preparation, final product contains HSA, water, stannous tartrate, and sodium chloride.

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

For ordering, customer service, and technical information on HSA (Product Number UC-HA-81) call toll-free: (800) 431-1146. In New York State call: (914) 351-2131.
The kit consists of 10 unit dose reaction vials each containing a lyophilized mixture of 7 mg human serum albumin and 0.08 mg stannous tartrate. Hydrochloric acid was added prior to lyophilization for pH adjustment. All components are sterile and pyrogen-free. When a solution of sterile and pyrogen-free Sodium Pertechnetate Tc 99m in isotonic saline is mixed with these components, folows the instructions provided with the kit, Technetium Tc 99m Human Serum Albumin is formed, with a labeling efficiency of 90% or greater. The product so derived has a pH of 2.5-3 and is intended for intravenous injection. The precise structure of Technetium Tc 99m Human Serum Albumin is not known at this time. The Normal Human Serum Albumin in this preparation was nonreactive when tested for the H2 surface antigen (HbsAg) by radioimmunoassay.

physical characteristics

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

<table>
<thead>
<tr>
<th>Photon Energy (keV)</th>
<th>Gamma-2</th>
<th>87.9</th>
<th>140.5</th>
</tr>
</thead>
</table>


external radiation

The specific gamma ray constant for Technetium Tc 99m is 0.87 milliCi/hour.cm. The first half-value thickness of lead (Pb) for Technetium Tc 99m is 0.2 mm. A range of 3 mm of lead or 1 cm of Pb will decrease the external radiation exposure by a factor of 1,000.

<table>
<thead>
<tr>
<th>Shield Thickness (mm)</th>
<th>Coefficient of Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>10</td>
</tr>
<tr>
<td>0.95</td>
<td>10</td>
</tr>
<tr>
<td>1.8</td>
<td>10</td>
</tr>
<tr>
<td>3.6</td>
<td>10</td>
</tr>
<tr>
<td>4.5</td>
<td>10</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>
<thead>
<tr>
<th>Time (hours)</th>
<th>Fraction Remaining</th>
<th>Time (hours)</th>
<th>Fraction Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.000</td>
<td>3</td>
<td>0.447</td>
</tr>
<tr>
<td>1</td>
<td>0.891</td>
<td>6</td>
<td>0.399</td>
</tr>
<tr>
<td>2</td>
<td>0.790</td>
<td>9</td>
<td>0.355</td>
</tr>
<tr>
<td>3</td>
<td>0.706</td>
<td>12</td>
<td>0.317</td>
</tr>
<tr>
<td>4</td>
<td>0.631</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.563</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.502</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Calibration Time. (Time of Preparation)

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 over other than those of excretion, the kidney and bladder. Therefore, the vascular system may be imaged with a minimal background of background and organ interference. In humans, a two-component blood clearance rate is observed, the T 1/2 slow component ranging from 10 to 16 hours. Twenty-four hour urine clearance averaged 30%.

indications and usage

Technetium Tc 99m Human Serum Albumin is used as an agent for imaging the heart blood pool to and 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, a few adverse effects may result within the first few hours after injection. These may be due to the normal protein content of the serum. If irritation occurs, it is advisable to alternate the injection sites to avoid irritation and absorption.

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 radiodiagnostics. Technetium Tc 99m Human Serum Albumin must not be used after 3 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 the drug is excreted in human milk. As a general rule, nursing should not be undertaken while a patient is on a drug since many drugs are excreted in human milk. Safety and effectiveness in children have not been established.

Technetium Tc 99m Human Serum Albumin, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to mini- minimize external radiation exposure to laboratory personnel. All personnel should be advised to use appropriate shielding and keep the radionuclide to a minimum. Personnel should avoid exposure to the radionuclide, as well as to the patient, consistent with proper patient management.

The labeling reactions involved in preparing the agent depend on the technique used. Any agent present in the Sodium Pertechnetate Tc 99m cannot be removed by the safety of the prepared agent. Hence, Sodium Pertechnetate Tc 99m containing oxidents, or other additives, should not be employed without first demonstrating that it is without adverse effect on the patient's existing medical condition.

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

radiation dosimetry

The estimated absorbed radiation dose to an average adult patient is shown in Table IV.

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Absorbed Radiation Dose</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>0.166</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>


how supplied

kit contents

10 STERILE UNIT DOSE REACTION VIALS (5 cc, gold aluminum overwrap), each containing 7 mg human serum albumin and 0.08 mg stannous tartrate, lyophilized. Hydrochloric acid was added prior to lyophilization for pH adjustment.

20 PRESSURE-SENSITIVE LABELS for final Technetium Tc 99m Human Serum Albumin preparation.

1 PACKAGE INSERT.

storage

Store kit contents in refrigerator (24°C). Do not freeze. Discard.

Directions

The residual materials may be discarded in ordinary trash provided the vials and syringes are read background with an appropriate low range survey meter. It is suggested that all identifying labels be destroyed before discarding.

There are no adverse effects of the Technetium Tc 99m Human Serum Albumin preparation. Technetium Tc 99m Human Serum Albumin is not radioactive. No specific precautions are necessary.

The following directions must be carefully followed for optimum preparation of the Technetium Tc 99m Human Serum Albumin.

1. Aseptically swallow a reaction vial containing the sterile, lyophilized human serum albumin.
2. Aseptically inject 0.5 ml of Sterile Water for Injection; withdraw an equal volume of air.
3. Mix contents by swirling.
4. Place vial in appropriate lead shield. * Use Unit Dose vial shield, Catalog No. 17500501.
5. Aseptically swallow a reaction vial.
6. Aseptically inject 1.3 ml of Sodium Pertechnetate Tc 99m having a maximum activity of 30 millicuries/ml into the vial; withdraw equal volume of air.
7. Mix contents of vial by gentle shaking for 10 seconds.
8. Affix pressure-sensitive label to shield vial.
9. Allow to stand for 20 minutes after mixing to allow maximum tagging.
10. The TECHNETIUM Tc 99m HSA is ready for use.
11. Mix contents of vial (step 7) prior to withdrawing patient dose.
12. Mix contents of syringe by repeated inversion immediately prior to injection.
14. Do not use the preparation after 3 hours from the time of formulation.

The radioactive concentration of the final Technetium Tc 99m Human Serum Albumin preparation may be calculated by using the following formula:

C = A/V where C equals radioactivity concentration of the preparation (millicuries/ml).

A = Tc 99m activity added to the reaction mixture vessel (millicuries).

V = Total volume in the final mixture (ml).

This kit is approved for use by persons licensed by the U. S. Nuclear Regulatory Commission pursuant to Sec. 36.14 and Sec. 35.100 Group III of 10 CFR Part 35 or under equivalent license of Agreement States.

Medical Products Division Nuclear Products

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For efficiency in brain and renal imaging
GLUCOSCAN™
Technetium Tc 99m Gluceptate Sodium Kit

Considered superior to technetium pertechnetate or DTPA\(^{1,2,3}\)

**Higher target to background ratios**

“The results of the computer background study for \(^{99m}\)Tc GH versus \(^{99m}\)TcO\(_4\) show an average calvaria/brain ratio of 2.1 and 1.6 for \(^{99m}\)Tc GH and \(^{99m}\)TcO\(_4\), respectively, at 90 min. after injection.” Rollo et al\(^2\)

**May detect lesions not seen with other agents**

“...\(^{99m}\)Tc glucoheptonate concentrates in all lesions which accumulate \(^{99m}\)TcO\(_4\) or \(^{99m}\)Tc DTPA, and in certain cases, appears to localize lesions which do not concentrate other agents.” Rollo et al\(^2\)

When compared to pertechnetate ... “Glucoheptonate offers a significant improvement in lesion detection (for both infarcts and tumors).” Waxman et al\(^3\)

**Optimal imaging at 90 minutes postinjection, without KClO\(_4\)**

“\(^{99m}\)Tc glucoheptonate combines the absence of oral activity with the convenience of obtaining highly diagnostically accurate images at 90 minutes.” Rollo et al\(^2\)

**Excellent pharmacokinetics for busy nuclear medicine department**

“Kinetic studies have shown that while some of the activity is rapidly cleared through the urine, the remainder is retained in the renal cortex. In humans, about 25% of the injected dose is excreted in the urine during the first hour post-injection. Within the same interval, blood activity rapidly clears to less than 2% of the injected dose.”\(^4\)
Single radionuclide study detects masses; assesses renal size, shape, position

A multifunctional agent

...whose appearance in the renal parenchyma and collecting system reflects cortical blood flow, tubular function and collecting system patency.

Less limited by poor renal function than IVP

"Several patients with BUNs of 90 mg/dl or greater have been imaged, and information concerning renal size, contour and relative function obtained." Leonard et al5

Safe method to assess renal function and morphology in patients allergic to iodinated contrast agents

Diagnostic results comparable to that of IVP for detection of mass lesions

"Glucoheptonate renal studies were performed on 275 patients, 55 of whom had angiography and/or surgery as well as IVP. All studies were interpreted prospectively by a board certified staff physician utilizing pertinent clinical information. In this study, the glucoheptonate images provided greater accuracy in the detection of renal mass lesions than the IVP (85% versus 67% respectively). This improved accuracy resulted from the greater sensitivity and specificity of the glucoheptonate images." Leonard et al6

CLINICAL PHARMACOLOGY: Technetium Tc 99m Glucenate Sodium has been shown to be free of adverse reactions in animals and in humans. It is not dependent on renal function or on the presence of other radionuclides. It is not absorbed or retained by the body. It is rapidly excreted in the urine, and there are no known side effects.

INDICATIONS AND USAGE: The use of Technetium Tc 99m Glucenate Sodium is for intravenous injection for diagnostic purposes only. Its use is limited to the detection of extravasation of contrast material into the soft tissues and to the detection of traumatic or arteriovenous fistulae.

CONTRAINDICATIONS: None known.

ADVERSE REACTIONS: None known.

DOSAGE AND ADMINISTRATION: The recommended dose for the average 70kg adult patient is 20-25µCi of Technetium Tc 99m Glucenate Sodium.

RADIATION DOSIMETRY: The estimated radiation absorbed doses to average adult patient (70kg) from Technetium Tc 99m Glucenate Sodium are shown in Table 4.

Table 4. Radiation Absorbed Doses

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Absorbed Dose</th>
<th>Rads/millirads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidneys</td>
<td>3.40</td>
<td>34000</td>
</tr>
<tr>
<td>Liver</td>
<td>0.20</td>
<td>200</td>
</tr>
<tr>
<td>Bladder Wall</td>
<td>0.30</td>
<td>3000</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.32</td>
<td>32000</td>
</tr>
<tr>
<td>Testes</td>
<td>0.20</td>
<td>20000</td>
</tr>
<tr>
<td>Whole Body</td>
<td>0.15</td>
<td>15000</td>
</tr>
</tbody>
</table>

HOW SUPPLIED: NEN's GLUCOSCAN Technetium Tc 99m Glucenate Sodium Kit is supplied as a set of five or thirty vials, sterile and non-pyrogenic. Each vial contains lyophilized sodium pertechnetate, 20µCi of technetium-99m (2µCi of sodium pertechnetate).

INSTRUCTIONS FOR PREPARATION OF THE KIT: Sodium pertechnetate, 20µCi of technetium-99m (2µCi of sodium pertechnetate) is contained in each vial. It is supplied in a lyophilized form and is reconstituted with an appropriate amount of sterile water for injection. The reconstituted solution is stable for at least 1 hour at room temperature. It is recommended that the solution be used within 30 minutes after reconstitution.

NEN New England Nuclear
Medical Diagnostics Division
601 Treble Cove Rd., North Billerica, MA 01862

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(Not Massachusetts and International: 617-482-9595)

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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, US Patent Number 3,717,763

Our third is first again

Toshiba's GCA-402 Jumbo Gammacamera

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Phone (408) 736-1101.
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 does not 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.
TechneScan® MAA KIT
AGGREGATED ALBUMIN (HUMAN) KIT (Lyophilized)
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.

TechneScanMAA Lyophilized (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 $2 \times 10^4$ aggregated albumin particles. 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 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 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 elective 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 TechneScan 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. TechneScan 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 exposure to patients, personnel, and the general public. Safety and effectiveness in children have not been established.

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 milliliters. 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 10^6 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 10^6 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 radioassay information string tags.

Mallinckrodt, Inc.
P.O. Box 5840
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32A THE JOURNAL OF NUCLEAR MEDICINE

Digital’s Gamma-11 nuclear medicine data analysis system has already proven itself in more than 400 installations.

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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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Inject
Inspect
CERTAIN The diagnostic accuracy of IBRIN for the detection of deep-vein thrombosis (DVT) has been confirmed in over 100 studies which show a 92% correlation with venography. IBRIN actively participates in thrombus physiology, its consistent clotlability insures bioactivity and allows accurate detection of both forming and established thrombi.

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 100 uCi 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 assure 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 leg.

A. The IBRIN (Radionuclide-Labeled (125I) Fibrinogen (Human)) test is indicated in patients with signs and/or symptoms suggestive of deep-vein thrombosis with or without associated pulmonary embolism or in patients with pulmonary embolism, with or without evidence of peripheral deep-vein thrombosis. In patients with established, old or 'inactive' thrombi, the test will be positive only if radionuclide-labeled fibrin deposition occurs in a sufficient quantity to allow detection. Its use is not contraindicated in patients on antiocoagulants.

B. The IBRIN (Radionuclide-Labeled (125I) Fibrinogen (Human)) test is indicated for the detection of thrombus formation in patients undergoing major orthopedic or other surgical procedures, myocardial infarction, pulmonary disease, malignant disease and other medical conditions known to predispose to thromboembolism.

CONTRAINDICATIONS
There are no known contraindications to the use of IBRIN. However, it should be noted that the iodides given to block the uptake of (125I) by the thyroid gland are contraindicated in patients with a known sensitivity to the iodides.

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

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of child bearing capability should be performed during the first few (approximately 10) days following the onset of menses. Nursing mothers should substitute formula feeding after the administration of Fibrinogen (125I). Extraordinary precautions have been taken in the preparation of IBRIN (Radionuclide-Labeled (125I) Fibrinogen (Human)) to eliminate the possible transmission of hepatitis. Nevertheless, the remote risk of hepatitis associated with the administration of Radionuclide-Labeled (125I) Fibrinogen (Human) cannot be entirely eliminated. The finding of viral hepatitis in any patient up to six months after the administration of IBRIN should be reported to Amersham for further evaluation, since there are numerous possible sources of hepatitis infection.

PRECAUTIONS
Care should be taken to ensure minimum radiation exposure to the patient, consistent with proper patient management, and to insure 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 agreement, or other appropriate government regulations. Care must be taken to avoid excessive exposure to its radiation. Shielding and 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 possible cases of hepatitis. However, IBRIN has been prepared from single donor plasma and has been injected into recipients without incidence of fibrinogen related Hepatitis B as evidenced by periodic physical examination and laboratory testing (liver profile, CBC, and Hepatitis B surface antigen and antibody by radioimmunossay) of the recipients.

There are a number of clinical circumstances requiring consideration in the interpretation of the test results. (See complete Package Insert.)

Fibrinogen (125I) 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 monitoring 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 any adverse affects on the fetus. Radionuclide-labeled (125I) Fibrinogen (Human) should 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.
Today clinical diagnosis has attained high quality standards.

We feel, however, that goals are made to be overcome. That's why our RIA kits provide you with not only a series of data, but also the necessary accompaniments: accuracy, sensitivity, precision, practicality.

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**CORTCK 125**: kit for direct radioimmunoassay of plasmatic and urinary cortisol, with iodinated tracer, in coated tube.
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**The highs.** CENTRIA gives you outstandingly high throughput and efficiency. It's a snap to run as many as 72 tubes an hour with about ten minutes of hands-on time. Total automation in the three independent, integrated CENTRIA modules (pipettor, incubator/separator, counter/computer) makes it possible. And the automation also gives you outstanding reproducibility. From tube to tube. From run to run. Even from day to day.

**The lows.** If you've shopped around, you already know that our reagent cost of about 70¢ per tube is almost the lowest you can get. So low, in fact, that CENTRIA is economical to run even for less than a full batch.

The extras. CENTRIA diagnostic kits now cover two thirds of current RIA assay types, with more under development. Training is included. Technical and field engineering support are available. When you're using CENTRIA, we won't love you and leave you.

**Make a date.** Learn more about CENTRIA. We can show you a short film or arrange a visit to an on-line installation. And let us explain the details of our performance evaluation plan. You owe it to yourself to know as much as possible about the RIA system you're going to live with.

*Customer will be obligated for freight and removal charges. Reagents not included. CENTRIA is a registered trademark of Union Carbide Corporation.
Recent research shows...

Solitary lesion seen with OSTEOSCAN™
Technetium Tc99m etidronate sodium kit

Same patient scanned with Tc 99m pyrophosphate™

In whole body scans from which these skeletal views were taken, a solitary ileal metastasis was seen with Osteoscan, but not with the pyrophosphate imaging agent.
Clinical evidence produced by two groups of investigators demonstrates that Osteoscan outperforms pyrophosphates in detecting bone lesions.

"In ten of the 30 scans (33%) one or more metastases not detected on the Tc-PPI [pyrophosphate] image were noted by at least two of the three readers with Tc-HEDP [Osteoscan]."

"...in three of 30 patients the Tc-PPI [pyrophosphate] scan was falsely read as normal by at least two of three readers, whereas metastatic disease was found in these patients with Tc-HEDP [Osteoscan]."

The superior lesion detection demonstrated by Osteoscan may be explained by the higher tumor to normal bone ratios obtained. In fact, it was concluded that Osteoscan "...is at present the agent of choice for routine clinical practice."

With Osteoscan, you can also expect excellent in vitro stability (greater than 96% tag 8 hours after preparation) ... a very low tin level (.16 mg stannous chloride per vial) to minimize the potential for liver visualization or interference with subsequent brain scans ... rapid blood clearance ... plus excellent in vivo stability due to Osteoscan's P-C-P bond.

For additional information, call or write Procter & Gamble, Professional Services, P.O. Box 85507, Cincinnati, Ohio 45201, (513) 977-5547.

In Europe, contact: Philips-Duphar B.V., Cyclotron and Isotope Laboratories, Petten, Holland.

References:
Helps detect, localize, and delineate acute myocardial infarction

Phosphotec®

Technetium Tc 99m-Pyrophosphate-Tin Kit

In detection of acute myocardial infarction, "the agent of choice [of the several 99mTc complexes] at the present time is 99mTc-pyrophosphate." Imaging is particularly useful in detecting recent infarcts when imaging is performed within 24 hours to six days after onset of suggestive symptoms. An effective adjunct in clinical situations such as equivocal ECG's, postoperative cardiac status, and when standard diagnostic aids are difficult to interpret.

Easy preparation. Two steps:
(1) Add sterile sodium pertechnetate 99mTc. (Maintain shielding at all times.)
(2) Shake gently, assay dose, and inject IV over 10 to 20 seconds. Cardiac imaging can be performed 45-60 minutes postinjection.

Also indicated for fast, dependable skeletal imaging.


See next page for brief summary.
DESCRIPTION: Phosphotec provides all the nonradioactive components required to prepare a sterile, pyrogen-free technetium Tc 99m-phosphosphate-tin complex. Each reaction vial contains 40 mg sodium pyrophosphate (equivalent to 23.9 mg anhydrous sodium pyrophosphate) and 1 mg stannous fluoride; the product does not contain a preservative. When sterile, pyrogen-free Sodium Pertechnetate Tc 99m is added to the reaction vial, a technetium Tc 99m-phosphosphate-tin complex is formed.

INDICATIONS AND USAGE: Technetium Tc 99m-Phosphate-tin complex may be used as a bone imaging agent to delineate areas of altered osteogenesis. It is also a cardiac imaging agent used as an adjunct in the diagnosis of acute myocardial infarction.

CONTRAINDICATIONS: None known.

WARNINGS: This product should not be administered to patients who are pregnant or to nursing mothers unless the benefits 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 (approx. 10) days following the onset of menses.

It has been reported that false positive or false negative brain scans may result when brain scans using sodium pertechnetate Tc 99m are performed after a bone scan has been done using an agent containing stannous ions, e.g., a pyrophosphate bone agent. This is thought to be due to the interaction of Tc 99m with stannous ions inside red blood cells. Therefore, in those cases where brain scans are indicated along with imaging of bone or myocardial imaging, the brain scan should be performed first, if feasible. Alternatively, another brain imaging agent, such as Tc-99m DTPA, may be employed. False-positive and false-negative myocardial scans may occur, therefore, the diagnosis of acute myocardial infarction depends on the overall assessment of laboratory and clinical findings.

The contents of the Phosphotec reaction vial are intended only for use in the preparation of Technetium Tc 99m-Phosphate-tin solution and are not to be directly administered to the patient. Any sodium pertechnetate Tc 99m solution which contains an oxidizing agent is not suitable for use with Technetium Tc 99m-Phosphate-tin Kit. The contents of the kit are not radioactive. However, after sodium pertechnetate Tc 99m is added, adequate shielding of the final preparation must be maintained. Technetium Tc 99m-Phosphate-tin Solution must be used within 12 hours of reconstitution.

PRECAUTIONS: Technetium Tc 99m-Phosphate-tin solution, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Also, care should be taken to minimize radiation exposure to the patients consistent with proper patient management. Both prior to and following administration of Technetium Tc 99m-Phosphate-tin solution, the patient should be encouraged to drink fluids and to void as often as possible thereafter to minimize radiation exposure to the bladder and background interference during imaging if not contraindicated by the patient's cardiac status. The patient's cardiac condition should be stable before beginning the cardiac imaging procedure. Interference from chest wall lesions such as breast tumors and healing rib fractures can be minimized by employing three projections (e.g., anterior, lateral, and left anterior oblique).

Adverse reproductive studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. This drug 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 the drug since many drugs are excreted in human milk. Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: No adverse reactions specifically attributable to the use of Technetium Tc 99m-Phosphate-tin have been reported.

For full prescribing information, see package insert.

HOW SUPPLIED: In a kit containing five reaction vials (5 ml size).
A DYNAMIC QUANTITATIVE STUDY OF rCBF

Victoreen's new Meditronic Cerebrograph gives you dynamic quantitative measurement of regional Cerebral Blood Flow. Its computerized printout provides on-the-spot data on the functional level of the brain — data that cannot be obtained by other investigative methods.

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

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

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The cerebrograph that gives you a dynamic quantitative printout of rCBF. The result of more than 10 years' worldwide experience by Meditronic in multi-detector rCBF equipment.

Sold and serviced exclusively in the United States and Canada by Victoreen Instrument Division, Sheller-Globe Corporation.

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SHELTER-GLOBE CORPORATION
Manufactured by

Isotronic
DK 9660 HADSUND-DENMARK

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Currently in use in hospitals worldwide.

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Model 510 (5cc and 6cc) 97.00 ea.
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Model 220 (2cc) 125.00 ea.
Model 320 (3cc) 125.00 ea.
Model 520 (5cc and 6cc) 125.00 ea.
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1. All models without Luer Lock will accept Luer Lock and non-Luer Lock syringes.
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For information contact: Nuclear Pacific, Inc., 6701 Sixth Avenue So., Seattle, WA 98108 (206) 763-2170.
Dyna®Mo, Picker's high-resolution mobile scintillation camera, extends the role of nuclear medicine to every corner of the hospital. This battery-powered unit can move at a speed of 1.5 mph (2.4 kph) and then slip into the most crowded ER, CCU, ICU, cardiac catheter lab, neurology, neonatal or pediatric department, or any postoperative care unit, outpatient clinic, isolation ward, or patient room. Or, it can stand on its own as a main general purpose camera, or perform as a spare system for use during peak workloads.

A complete nuclear department ready to roll into place. On its own, DynaMo's high-resolution images — 3.6 mm FWHM — make it the equal of our finest small field of view cameras. Its 5-motion detector and its integral tape recorder make it a virtual department in itself. Its modularity, superior uniformity, and high counting efficiency make DynaMo a typical member of the Picker Dyna® Camera 4 family, an all-around camera system with a broad range of performance capabilities that deliver superior clinical images. DynaMo's quick-change collimators feature the flip focus diverging/converging and the 15° slant-hole cardiac collimator. All this works to the convenience of the operator and the comfort of the patient.
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THE JOURNAL OF NUCLEAR MEDICINE
If you’ve waited until now to get started in cardiovascular nuclear medicine...

Thallous Chloride
TI 201

New England Nuclear
To help rule out, confirm or evaluate

**Coronary artery disease**

Positive stress ECG without angina

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

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

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

*Working diagnosis*
Coronary artery disease, confirmed on preoperative angiography.

**Acute myocardial infarction**

Early diagnosis

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

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

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

*Working diagnosis*
Extensive antero-septal MI.
To start using thallium-201 in your department, you’ll need

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

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

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

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

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

Electronic image acquisition and processing, to help resolve ambiguous studies.

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

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

*Your NEN representative may help recommend an institution in your area. For continuing medical education programming, ask your NEN representative or write: Teaching Program Administrator, New England Nuclear, 549 Albany Street, Boston, Mass. 02118.
Thallous Chloride
TI 201
November 1977

FOR DIAGNOSTIC USE

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

PHYSICAL CHARACTERISTICS
Thallium TI 201 decays by electron capture to Mercury Hg 201 with a physical half-life of
73.1 hours. Photons that are useful for detection and imaging are listed in Table 1. The lower
energy X-rays obtained from the Mercury Hg 201 daughter of TI 201 are recommended
for myocardial imaging, because the mean 9/2/3 disintegration at 68-80.3 keV is much
greater than the combination of gamma-4 and gamma-6 mean 9/2/3 disintegration.

<p>| Table 1. Principal Radiation Emission Data |</p>
<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean %/integration</th>
<th>Mean Energy (keV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma-4</td>
<td>2.65</td>
<td>135.3</td>
</tr>
<tr>
<td>Gamma-6</td>
<td>10.0</td>
<td>167.4</td>
</tr>
<tr>
<td>Mercury X-rays</td>
<td>94.5</td>
<td>68-80.3</td>
</tr>
</tbody>
</table>

Table 2. Radiation Attenuation by Lead Shielding

<table>
<thead>
<tr>
<th>mm of Lead (Pb)</th>
<th>Coefficient of Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.23</td>
<td>0.5</td>
</tr>
<tr>
<td>0.83</td>
<td>10</td>
</tr>
<tr>
<td>1.9</td>
<td>10^2</td>
</tr>
<tr>
<td>3.1</td>
<td>10^3</td>
</tr>
<tr>
<td>4.4</td>
<td>10^4</td>
</tr>
<tr>
<td>5.7</td>
<td>10^5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Table 3. Thallium TI 201 Decay Chart; Half-Life 73.1 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction Remaining</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>-12.0</td>
</tr>
<tr>
<td>-46.0</td>
</tr>
<tr>
<td>-80.0</td>
</tr>
<tr>
<td>-114.0</td>
</tr>
<tr>
<td>-12.0</td>
</tr>
<tr>
<td>-6.0</td>
</tr>
<tr>
<td>0.0</td>
</tr>
<tr>
<td>6.0</td>
</tr>
<tr>
<td>12.0</td>
</tr>
</tbody>
</table>

*Calibration Time

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

In clinical studies, thallium images have been found to visualize areas of infarction con-
formed by electrocardiographic and enzyme changes. Regions of transient myocardial ischemia
related to areas perfused by coronary arteries with partial stenoses have been visualized when thallium was admin-
istered to examine patients with an exercise stress test. It is usually not possible to differentiate
recent from old myocardial infarction, and no exact differentiation can be made between
recent myocardial infarction and ischemia. After intravenous injection, Thallous
Chloride TI 201 clears rapidly from the blood with maximal concentration by normal myo-
cardium occurring at about ten minutes.

INDICATIONS AND USAGE: Thallous Chloride TI 201 may be useful in myocardial perfusion imaging
for the diagnosis and localization of myocardial infarction.

It may also be useful in conjunction with exercise stress testing as an adjunct in the diagnosis
of ischemic heart disease (athero-

sclerotic coronary artery disease).

CONTRAINDICATIONS: None known.

WARNINGS: In studying patients in whom myocardial infarction or ischemia is known or
suspected, care should be taken to assure con-

This study should be performed only
under the supervision of a qualified physi-

The TI 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 TI 201, as all radioactive materials, must be handled with care and used
with appropriate safety measures to

Adequate reproduction studies have not been performed to evaluate carcinogenic potential.

The results of animal studies have been performed in animals to determine whether
this drug affects fertility in males or females, has teratogenic potential, or has other

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.

DOSE AND ADMINISTRATION: The recommended adult (70kg) dose of Thallous Chloride TI
is 11.5mcCi. Thallous Chloride TI 201 is intended for intravenous administration only.

For patients undergoing resting thallium studies, imaging is optimally begun within
10-20 minutes after injection. Several inves-
tigators 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 max-
imum stress and when the stress is continued for 30 seconds to one minute after injection.

Imaging should begin within ten minutes. Thallous
Chloride TI 201 is usually administered
post-injection since target-to-background ratio is optimum by that time. Several inves-
tigators 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.

Radio pharmaceuticals should be used by per-
sons with specific training in the safe use and handling of radionuclides produced by
nuclear reactor or particle accelerator and

RADIATION DOSIMETRY

The estimated absorbed radiation dose to an average patient (70kg) from an intravenous injection of a maximum dose of 1.5 milli-
curies of TI 201 is shown in Table 4.

Table 4. Radiation Dose Estimates of Thallous Chloride TI 201: Absorbed Dose/15mcCi Thallous Chloride TI 201 Administered

<table>
<thead>
<tr>
<th>Radiation Source</th>
<th>Heart</th>
<th>Small Intestines</th>
<th>Kidneys</th>
<th>Liver</th>
<th>Red Marrow</th>
<th>Ovaries</th>
<th>Testes</th>
<th>Thyroid</th>
<th>Total Body</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.51</td>
<td>0.97</td>
<td>2.2</td>
<td>0.93</td>
<td>0.51</td>
<td>0.85</td>
<td>0.81</td>
<td>1.12</td>
<td>0.36</td>
</tr>
</tbody>
</table>

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

HOW SUPPLIED: Thallous Chloride TI 201 for intravenous administration as a sterile, non-
pyrogenic solution containing at calibration time, 1 mcCi/ml of Thallous TI 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 TI 201.

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

Catalog Number MHR-427

New England Nuclear Medical Diagnostics Division
601 Treble Cove Rd., North Billerica, MA 01862
Call Toll-Free: 800-225-1572/Telex: 94-0996
(In Mass. and International: 617-482-9955)

Los Angeles: NEN West, 17210 South Gramercy Place, Gardena, California 90247 Tel: 213-321-3371
Canada: NEN Canada, 2453-49th Avenue, Lachine, Que. H8T 3C9 Tel: 514-636-4971
Europe: NEN Chemicals GmbH, D-6072 Dreesch, W Germany, Postfach 407240 Tel: 060130 85034 Order Entry: (06103) 81011
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Sealed flood sources

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

Anatomical marker sources

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

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

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

$^{129}$I rod sources for γ counters

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

For further information please write or phone

The Radiochemical Centre Limited, Amersham, England. Telephone: 024-4444
In the Americas: Amersham Corporation, Illinois 60005. Telephone: 312-593-6300
In W. Germany: Amersham Buchler GmbH & Co KG, Braunschweig. Telephone: 05307-4693-97
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<td>DENMARK, ICELAND</td>
<td>Kingo Diagnostica Enegaehaven 605 DK-2980, Kokkedal, Denmark Phone: 03-244512 Kaj Kingo</td>
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<td>TAIWAIN</td>
<td>Formosa Medical Instruments Co. Ltd. Chang Ching Building, 25-1 Chin Nan Rd., Sec. 3 Taipei 106 Phone: 02-7719668 Telex: 19852 Mr. Sean K. Fu, Managing Dir.</td>
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<td>SOUTH AFRICA</td>
<td>Well Organisation (Pty) Ltd. P.O. Box 31315 Braamfontein, 2017 Phone: 11-724-8368 Telex: 960 88370 Alan L. Weil</td>
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<td>Hawaii Mega-Cor., Inc. P.O. Box 17234 Honolulu, 96817 Phone: (808) 521-4521 Telex: 723-7430296</td>
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Hodgkin's disease

21-year-old male with low-grade FUO of six weeks duration, profuse diaphoresis and general malaise. The only finding upon physical examination was shotty adenopathy of left axilla. Chest X-ray normal. Gallium-67 spot images disclosed hilar and carinal uptake, confirmed upon mediastinoscopy as stage 2B Hodgkin's disease.
In hundreds of institutions across the nation, gallium-67 imaging is a valuable adjunct in the diagnosis, staging and assessment of therapy directed against bronchogenic carcinoma, Hodgkin's disease and certain lymphomas.

Gallium-67 imaging can help:
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- stage disease, e.g., in planning or supplementing laparotomy and lymphangiography; it is particularly valuable for staging disease in patients for whom invasive procedures are contraindicated;
- assess efficacy of surgery, radiation therapy or chemotherapy in patients with demonstrated pre-therapy gallium-67 uptake.

New England Nuclear supplies, upon request, a special nuclear medicine department reference manual on the use of Gallium Citrate Ga 67. It also provides without charge a complete teaching rounds program on the clinical utilization of gallium-67 imaging. The program, which consists of 35mm slides, lecture outlines, home-study monographs and self-examinations, is approved for two hours of elective continuing education credit.

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**PHYSICAL CHARACTERISTICS**

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

<table>
<thead>
<tr>
<th>TABLE 1. Principal Radiation Emission Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Radiation</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Gamma-2</td>
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<tr>
<td>Gamma-3</td>
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<td>Gamma-5</td>
</tr>
<tr>
<td>Gamma-6</td>
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</table>

<table>
<thead>
<tr>
<th>TABLE 2. Ga-67 Decay Chart</th>
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<tr>
<td><strong>Half-Life 78 Hours</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Hours Remaining</th>
<th>Hours Remaining</th>
<th>Hours Remaining</th>
<th>Fraction</th>
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<td>48</td>
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<tr>
<td>36</td>
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<tr>
<td>24</td>
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<td>12</td>
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<tr>
<td>24</td>
<td>84</td>
<td>0.47</td>
<td></td>
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</tbody>
</table>

**EXTERNAL RADIATION**

The specific gamma ray constant for Ga 67 is 1.80 mR/hr at 1cm. The first half value thickness of lead is 0.04mm. A range of values for the relative attenuation of the radiation emitted by this radionuclide that results from interposition of various thicknesses of Pb is shown in Table 3. For example, the use of 8mm of Pb will decrease the external radiation exposure by a factor of 61.

<table>
<thead>
<tr>
<th>TABLE 3. Radiation Attenuation by Lead Shielding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Radius Attenuation Factor</strong></td>
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<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

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

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

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

**CONTRAINdications:** None known.

**WARNINGS:** Galium Citrate Ga 67 should not be administered to children or to patients who are pregnant or to nursing mothers unless the information to be gained outweighs the potential hazards. Ideally, examinations using radiopharmaceutical drug products, especially those elective in nature of a woman of childbearing capacity should be performed during the first few (approximately ten) days following the onset of menses.

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

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

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

Galium Citrate Ga 67, as well as other radioactive drugs, must be handled with care and appropriate safety measures should be used to minimize external radiation exposure to clinical personnel. Also, care should be taken to minimize radiation exposure to patients consistent with proper patient management.

No long term animal studies have been performed to evaluate carcinogenic potential. Adequate reproduction studies have not been performed in animals to determine whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Galium Citrate Ga 67 should be used in pregnant women only when clearly needed.

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

Safety and effectiveness in children have not been established.

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

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

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

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

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

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

**RATIONALE DOSIMETRY**

The dosimetry values listed in Table 4 for Galium Citrate Ga 67 are those of the NMD Committee.

| TABLE 4. Dosimetry of Gallium Citrate Ga 67 for Maximal Dose of 5mCi |
|--------------------------|--------------------------|
| **Rads/mCi** | **Rads/mCi** |
| Whole Body | 1.30 | Tests  |
| Skeleton | 2.20 | Gastronintestinal Tract  |
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| Kidney | 2.05 | Lower Large Intestine  |
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The contents of the vial are radioactive and adequate shielding and handling precautions must be maintained.

**Catalog Number:** NRP-121

October 1977
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CRC Handbook of Nuclear Medicine
From the expanding CRC Handbook Series in Clinical Laboratory Science, Section A, material presented in this volume is largely tabular data of properties of radiopharmaceuticals and detectors as well as clinical information of use in the field. Includes necessary text for smooth transition between tables. By Richard P. Spencer, Ph.D., and David Seligson, Sc.D., M.D., 632 pp., 7 1/8 x 10", 1977, $61.75, outside U.S. $71.50, catalog 7071VG.

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See opposite page for brief summary.
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[Timpe, G.M. Precautions for Avoiding $^{133}$Xe Release From Charcoal Xenon Traps. Journal of Nuclear Medicine Technology Volume 4, Number 4, Pages 208-209.]
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KEYNOTE SPEAKER:  
Gov. Dixie Lee Ray  
PANEL ON REGULATORY AFFAIRS:  
Leaders from Gov't., Industry & Users  
RADIONUCLIDE PRODUCTION  
P. Silvester (U. K.)  
QUALITY CONTROL:  
K. Kristiansen (Denmark)

Tuesday - March 20  
FUNCTIONAL IMAGING:  
H. Atkins  
( Brookhaven Nat'l Lab.)  
INORGANIC RADIOPHARMACEUTICALS  
E. Deutsch  
(Univ. of Cincinnati)  
ORGANIC RADIOPHARMACEUTICALS  
A. Wolf  
( Brookhaven Nat'l Lab.)  
IMMUNOLOGY  
R. Elkins (U. K.)  
ONCOLOGY / HEMATOLOGY:  
J. Adelstein  
(Peter Bent Brigham Hospital)  
G. Ege  
(Canada)

Wednesday - March 21  
RES / BILIARY:  
M. Loberg  
(Univ. of Maryland)  
RENAL:  
S. Winchell  
(Medi+Physics)  
CENTRAL NERVOUS SYSTEM:  
M. J. Welch  
Mallinckrodt Inst. of Rad.

Thursday - March 22  
SALMON BARBEQUE

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☐ We want to make our employees more aware. We will carry an article about child abuse in our company publication. We will carry your public service announcements in our company publication.
☐ We want our employees to know more about the problem. Please send us _____ copies of the pamphlet "Prevent Child Abuse" at 10¢ a copy for 100 copies or more.
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Cool rapidly in ice water or refrigerator while observing proper radiation safety measures. Refer to package insert for full preparation instructions.
New! TSC preparation now takes less time.

The CintiCHEM® TSC reagent kit for imaging of functioning reticuloendothelial cells in the liver, spleen and bone marrow requires less of your time to prepare than any other sulfur colloid kit available.

- Needs boiling only once for 5 minutes. Other kits can demand 2 boilings plus cooling period.
- Buffer is injected into the reaction vial immediately after removal from the boiling water bath.
- Dose vial is then rapidly cooled in an ice-water bath or similar cold environment.

Take advantage of our other CintiCHEM products for nuclear medicine:

- Technetium 99m HEDSPA (Etidronate Disodium) Tin Kit for use in preparation of Technetium Tc 99m Etidronate Tin Complex
- Technetium 99m DTPA (DTPA Tin Kit for use in preparation of Technetium Tc 99m DTPA Tin Chelate)
- Technetium 99m MAA (Technetium Tc 99m Aggregated Albumin)
- Technetium 99m HSA (Technetium Tc 99m Human Serum Albumin)

All of the above are available in multidose and unit dose kits.

Technetium Tc 99m Generator for the production of Sodium Pertechnetate Tc 99m, available in 500, 1000, 1500, or 2000 millicuries.

For ordering or additional information Call toll-free: (800) 431-1146
In New York State call: (914) 351-2131

Indications and usage

Technetium Tc 99m Sulfur Colloid Injection is used as an aid in the detection and localization of functioning reticuloendothelial cells in the liver, spleen, and bone marrow.

Contraindications

None known.

Warnings

- The contents of the two syringes, one syringe containing the sodium thiosulfate solution and the second a saline solution, are intended only for use in the preparation of the Technetium Tc 99m Sulfur Colloid injection and are not to be directly administered to the patient.
- The contents of the kit are not radioactive. However, after the Sodium Pertechnetate Tc 99m is added, adequate shielding of the radiolabel must be maintained.

This radiopharmaceutical preparation should not be administered to children or to patients who are pregnant or during lactation unless the expected benefits are likely to be gained outweigh the potential hazards.

Ideally, examination 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 menopause.

Precautions

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

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

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

Technetium Tc 99m Sulfur Colloid Injection is physically unstable and as such the particles will settle with time. Failure to agitate the vial adequately before use may result in non-uniform distribution of activity and it is therefore recommended that because of the increasing probability of agglomeration with aging, a batch of Technetium Tc 99m Sulfur Colloid Injection not be used after six hours from the time of formulation.

Adverse reactions and reproduction studies have not been performed in animals. Boiling, however, whether this drug affects fertility in males or females, has teratogenic potential, or has other adverse effects on the fetus. Technetium Tc 99m Sulfur Colloid Injection should be used in pregnant women only when clearly needed. It is not known whether this drug is excreted in human milk. Sulfuric acid is the general rule, nursing should not be undertaken while the patient is on a drug since many drugs are excreted in human milk.

Safety and effectiveness in children have not been established.

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

adverse reactions

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

Dosing and administration

The suggested intravenous dose range used in the preparation of Technetium Tc 99m Sulfur Colloid Injection is 10 to 80 millicuries of Technetium Tc 99m Sulfur Colloid Injection.

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

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

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

Note: The kit contains:

- 5 STERILE VIALS, each containing 0.5 ml of sodium thiosulfate solution.
- 5 STERILE SYRINGES, (labeled "A"), each containing 1.7 mg of sodium thiosulfate in 1 ml aqueous solution.
- 5 STERILE SYRINGES, (labeled "B"), each containing 12 mg of sodium monothiosulfate solution to contain 43 mg of sodium thiosulfate, 76.5 mg of sodium thiosulfate, and 16 mg of monothiosulfate.
- 5 STERILE SYRINGES, (labeled "C"), each containing 0.6 mg of sodium thiosulfate solution containing 100 mg of sodium thiosulfate and 50 mg of sodium thiosulfate.
- 10 RADIOACTIVE SYMBOL LABELS.
- 10 Pressure-Sensitive Labels for final Technetium Tc 99m Sulfur Colloid Injection preparation.
- 1 Package Insert.

Storage

Store kit contents at room temperature (18-25°C) until use.

Dosing

The following dosing schedule is to be carefully followed for optimum preparation of the Technetium Tc 99m Sulfur Colloid Injection:

1. Affix radioactive symbol label to reaction vial.
2. Aseptically inject 0.5 to 5.0 ml of sterile Sodium Pertechnetate Tc 99m, up to 75 millicuries which must contain less than 10 micrograms of aluminium, into the reaction vial. Vial the excess pressure in the vial by withdrawing an equal volume of air. Mix the solution.
3. Assemble the thiosulfate syringe (labeled "A") and inject the total contents into the reaction vial with gentle agitation. Vial the excess pressure by withdrawing an equal volume of air and remove the needle.
4. Immediately inject contents of syringe B into reaction vial.
5. Remove vial and shake gently for a few seconds.
6. Rapidly cool to room temperature (note: rapid cooling in an ice bath is preferred) before use and then affix the descriptive label to the dose vial.
7. Maintain adequate shielding of the radioactive colloid preparation. Do not use the preparation after six hours from the time of formulation.

UNION CARBIDE CintiCHEM®

Technetium 99m Sulfur Colloid Kit for Use in Preparation of Technetium Tc 99m Sulfur Colloid Injection

Union Carbide Corporation • Medical Products Division
Nuclear Products • Tuxedo, New York 10987

"CintiCHEM" is a registered trademark of Union Carbide Corporation.
FEATURING

- Rapid, simple procedure
- Precalibrated Standards
- Control serum provided
- 10 picogram sensitivity in serum, plasma, cerebrospinal fluid and urine.
- $^{125}$I tracer stable for two months. No tracer binding by serum proteins in the dilutions of this assay.
- High specificity; less than 0.005% cross reactivity with folic acid, folinic acid and 5-N-methyltetrahydrofolic acid
- Separation of bound tracer does not require charcoal
- Available in 100 and 200 tube kits

RIA ASSAY PROCEDURE – 5 Easy Steps

**STEP 1**
Pipe standards, patient sample or control

**STEP 2**
Add $^{125}$I Methotrexate derivative

**STEP 3**
Add Methotrexate antiserum

**INCUBATE ALL TUBES FOR 45 MINUTES**

**STEP 4**
Add precipitant

**STEP 5**
Spin, decant and count precipitate

Also available:
$^{125}$I Folate
$^{57}$Co Vitamin B$_{12}$
$^{125}$I Digoxin-RIA
$^{125}$IT$_{4}$-RIA
$^{125}$I TSUptake
$^{125}$I TSH-RIA
$^{125}$I Doxorubicin

For further information call or write:

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

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

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

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

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

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

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

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

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