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Are you sure that you’re getting the

For the right answers to the hard questions, look to GE. No other company offers the comprehensive experience—and resources—you need for a confident investment in PET.

1. How close are clinical applications?
We’re very encouraged—in light of the work we’re doing with leading institutions in the U.S. and Europe. While some studies are strictly at the research stage, we’re also seeing strong evidence of PET’s ability to contribute to patient management in cardiology, neurology and oncology. The following chart highlights some emerging applications we feel are most important.

<table>
<thead>
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<th>PET: Technology in Transition</th>
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<td>Current Patient Management</td>
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2. What about reimbursement?
The good news is that reimbursement is linked to the demonstration of clinical efficacy. Evidence is mounting that PET can improve patient care in such areas as brain and cardiac disorders. Better methods of managing such disorders could dramatically improve the outlook for many patients, while reducing health care costs.

Reimbursement involves many complex issues that GE is working to resolve, along with PET practitioners, medical societies, regulatory agencies, insurance companies and provider organizations.

3. How do I begin PET site planning?
By talking to the company who has installed more MR systems than any other manufacturer. Site planning came of age with MR. It is now a highly

Images courtesy of Uppsala PET Center, Uppsala, Sweden

Combined PET/MR image courtesy of McConnell Brain Imaging Center, Montreal Neurological Institute
big picture in PET?

technical and vitally important part of equipment planning. No other company can match GE's track record for successful installations of complex imaging equipment. Our architects and siting engineers can help you throughout the PET siting process, from preliminary evaluation to system installation.

4. How is GE addressing training and staffing?
From two different approaches.
First, through product design. GE engineers are working to simplify scanner operation and tracer production in order to:
- Require fewer specialized personnel.
- Allow cross-training of technologists.
- Simplify training requirements.

Secondly, GE is sponsoring training programs at Uppsala PET Center and Massachusetts General Hospital. Feedback from these sites is shaping the clinically-oriented training programs we provide to new PET customers.

5. What about the economics of PET?
As you know, the sticker price is only part of the equation. Siting, staffing, maintenance and clinical throughput—among other issues—also impact financial planning for PET. GE Medical Systems can help. We routinely assist customers in assessing the short-term and long-range economic impact of new technologies and developing financial strategies for cost-effective acquisition.

6. At this early stage, how do I avoid technology that will become obsolete?
By proceeding cautiously right now, and looking for a manufacturer with a proven commitment to product continuum. That company is GE. Take MR, for instance. The Sigma® MR systems that we shipped 7 years ago are still compatible with every software upgrade and option available today. No other manufacturer can make that claim. And when you're considering a long-term investment in PET, it's important to know that the continuum philosophy is in place and will work for you as well.

7. How do I get the complete picture?
By calling us—the sooner, the better in your planning process. Because a solid investment in PET begins with the right answers—and the right company.

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QUICK... permits complete stress and rest studies in only 90 minutes!

CLEAN... rapid clearance; greater patient comfort

The rapid uptake and washout of CardioTec enables you to start imaging two minutes after injection, and complete a resting-state study within 90 minutes! CardioTec speed may let you begin patient treatment earlier, enabling patients to return home sooner, improving throughput and scheduling.

CLEAR... sharp images enhance diagnostic ability

Good spatial resolution, high myocardial extraction, sensitivity and specificity enhance the ability to distinguish myocardial ischemia and infarction!

CardioTec redefines efficiency in myocardial perfusion imaging. Potential uses for myocardial perfusion agents include imaging patients undergoing post-angioplasty (PTCA), post-surgical (CABG) and post-medicinal (thrombolysis).

The only technetium-based myocardial perfusion imaging agent for rest and stress imaging

CardioTec

(Kit for the Preparation of Technetium Tc 99m Teboroxime)

Please see the brief summary of prescribing information for CardioTec on the adjacent page.
Cardiotec®
Kit for the Preparation of Technetium Tc 99m Teboroxime

FOR DIAGNOSTIC USE

DESCRIPTION
Each 5 mL reaction vial contains a sterile, nonpyrogenic, lyophilized formulation of 2.0 mg cyclohexanedione dioxime, 2.0 mg methyl boronic acid, 2.0 mg pentetate acid, 9.0 mg citric acid, anhydrous; 100 mg sodium chloride, 50 mg gamma cyclodextrin and 0.058 mg (maximum) total tin expressed as stannous chloride (SnCl2), 0.020 mg (minimum) stannous chloride (SnCl2). The pH is adjusted with sodium hydroxide and/or hydrochloric acid prior to lyophilization. The contents of the vial are lyophilized and sealed under nitrogen at the time of manufacture. No bacteriostatic preservative is present.

When sterile, pyrogen-free sodium pertechnetate Tc 99m injection is added to the vial, and the solution is heated at 100°C for 15 minutes, the diagnostic agent Technetium Tc 99m Teboroxime is formed for administration by intravenous injection. The pH of the reconstituted product is 3.7 (range 3.3 to 4.1).

INDICATIONS AND USAGE
Technetium Tc 99m Teboroxime is a myocardial perfusion agent that is useful in distinguishing normal from abnormal myocardium in patients with suspected coronary artery disease using rest and stress techniques.

CONTRAINDICATIONS
None known.

WARNINGS
Stress testing should be performed only under the supervision of a qualified physician and in a laboratory equipped with appropriate monitoring, resuscitation and support apparatus.

PRECAUTIONS
General
Contents of the reaction vial are intended only for use in the preparation of Technetium Tc 99m Teboroxime and are not to be administered directly to the patient.

Contents of the kit before preparation are not radioactive. However, after the addition of sodium pertechnetate Tc 99m injection, adequate shielding of the final preparation must be maintained. The components of the kit are supplied sterile and non-pyrogenic. Aseptic procedures normally employed in making additions and withdrawals from sterile, non-pyrogenic containers should be used during the addition of the pertechnetate solution and the withdrawal of doses for patient administration.

The technetium Tc 99m labeling reactions involved in preparing the agent depend on maintaining the stannous ion in the reduced state. Any oxidant present in the sodium pertechnetate Tc-99m supply may thus adversely affect the quality of the radiopharmaceutical. Hence, sodium pertechnetate Tc-99m containing oxidants should not be employed.

Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the 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.

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

Tc-99m Teboroxime should be formulated no more than 6 hours prior to clinical use.

Carcinogenesis, Mutagenesis, Impairment of Fertility
In comparison with most other diagnostic technetium labeled radiopharmaceuticals, the radiation dose to the ovaries (1.8 rads/50 mCi) is high. Minimal exposure (ALARA) is necessary in women of childbearing capability. (See Dosimetry subsection in DOSAGE and ADMINISTRATION section.)

No long-term animal studies have been performed to evaluate carcinogenic potential or to determine the effects of Cardiotec on fertility in males or females. Three different mutagenicity assays (a reversion test with bacteria, a chromosomal aberration assay and an in vivo mouse micronucleus assay) conducted with cold (decayed) technetium labeled Cardiotec gave negative results. Cardiotec was weakly positive for inducing forward mutations at the TK locus in L5178Y mouse lymphoma cells in the absence of metabolic activation (but only at high concentrations that were toxic to the cells and reduced growth to 33% or less relative to vehicle controls). Cardiotec was negative in this assay in the presence of metabolic activation.

Pregnancy Category C
Animal reproduction studies have not been conducted with Technetium Tc 99m Teboroxime. It is also not known whether Technetium Tc 99m Teboroxime can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. Technetium Tc 99m Teboroxime should be given to a pregnant woman only if the expected benefits to be gained clearly outweigh the potential hazards.

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

Nursing Mothers
Technetium Tc 99m is excreted in human milk during lactation. Therefore, formula feedings should be substituted for breast feedings.

Pediatric Use
Safety and effectiveness in children below the age of 18 have not been established.

ADVERSE REACTIONS
Uncommon adverse reactions reported in clinical trials include metallic taste in mouth, burning at injection site, facial swelling, numbness of hand and arm, hypotension and nausea after administration of Technetium Tc 99m Teboroxime.

HOW SUPPLIED
Cardiotec® (Kit for the Preparation of Technetium Tc 99m Teboroxime) is supplied in kits of 5, 10, and 25 reaction vials.

Reference
1. Data on file, Squibb Diagnostics.


550-502
Issued: March 1991
Printed in U.S.A.
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Stay Current on the 3r's of PET:

- Regulatory Issues
- Reimbursement
- Radiochemistry and Instrumentation
  - Neurological Applications
  - Evaluation of Malignancies
  - Cardiovascular Applications

HOTEL: Loews L’Enfant Hotel, 480 Loews L’Enfant Plaza, S.W., Washington, DC 20004, (202) 484-1000. Reservations must be made by September 27, 1991 in order to receive the special ICP rates. ICP Group Rates: Single $145; Double $155

FOR MORE INFORMATION: Institute for Clinical PET (ICP), 205 National Press Building, Washington, DC 20005, Phone 202-466-4274, Fax 703-765-3795.

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☐ Please send me a Conference program which includes details on the schedule, hotel and travel discounts and ICP membership.

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Refresher and state-of-the-art continuing education courses in chemistry, physics, quality assurance, cardiovascular nuclear medicine, PET, SPECT, and NMR will supply up-to-the-minute approaches and procedures for all clinical settings.

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This year’s presentation of over 1,000 scientific papers and posters includes a distillation of the latest advancements and finest work achieved by outstanding scientists and physicians in the field of nuclear medicine. These papers, presented by the original authors, with over 30 subjects to choose from, will provide a unique opportunity for enhancing your knowledge or exploring new avenues in correlative areas of nuclear medicine. Ample time is allotted at these presentations for questions and discussions.

An extensive display of scientific posters and exhibits will augment the presentations.

Technologist Program
The ever-increasing importance of the role of the nuclear medicine technologist will be explored in our Technologist Program, and over 70 hours of clinical updates will provide chief and staff technologists with the latest in basic, intermediate, and advanced studies. This program will broaden expertise and enhance the technologist’s contributions to nuclear medicine.

Audiovisuals, Books, Journals
The Society of Nuclear Medicine is continually adding to its library of audiovisuals, books, and other publications. A stop at the publications booth is well worth the time. Here you will find on display what the Society has to offer for year-round educational advancement.

Networking opportunities and job referral boards are available at special locations throughout the meeting as well as membership information at our membership booth.

Exposition
More than 100 pharmaceutical and equipment manufacturers will display their latest products in a lively atmosphere. These knowledgeable commercial representatives offer the technical depth our field demands, and they are valuable sources of timely and pertinent information.

Registration

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It is clear that PET has turned the clinical corner. Clinical PET has proven itself to be of significant influence in the field of diagnostic imaging. The unique information provided by PET is rapidly changing the treatment approach of physicians around the world.

Markus Schwaiger, MD
Conference Chairman
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<td>□ Physician/Scientist Professional/Hospital Administrator</td>
<td>$490  $20</td>
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*As a coronary vasodilator, I.V. Persantine® increases coronary blood flow to the levels required for thallium imaging.
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References:
4. Data on file, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT.

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Please see prescribing information on last page of ad for contraindications, warnings, and adverse reactions.
THALLIUM CHLORIDE TI 201

DIAGNOSTIC FOR INTRAVENOUS USE

DESCRIPTION: Thallium Chloride TI 201 is supplied in isotonic solution as a sterile, non-pyrogenic diagnostic radiopharmaceutical for intravenous administration. The aqueous solution at the time of calibration contains 376 mCl/mg (10mCi/mg) Thallium Chloride TI 201. The pH is adjusted with hydrochloric acid and/or sodium hydroxide solution. It is made isotonic with 0.9% sodium chloride and is preserved with 8mg/ml benzyl alcohol.

Thallium Chloride TI 201 is a cyclotron produced with no carrier added and contains no less than 98% Thallium TI 201 as a percentage of total activity with contaminants less than 0.3%. Thallium TI 200, 1.2% Thallium TI 202, and 0.2% Lead 203 expressed as a percentage of TI 201 activity at calibration. It is recommended that Thallium Chloride TI 201 be administered close to calibration time to minimize the effect of higher levels of radionuclide contaminant.

INDICATIONS AND USAGE: Thallium Chloride TI 201 may be useful in myocardial perfusion imaging for the diagnosis and localization of myocardial infarction. It may also have prognostic value regarding survival, when used in the clinically stable patient following the onset of symptoms of an acute myocardial infarction, to assess the site and size of the perfusion defect. Thallium Chloride TI 201 may also be useful in conjunction with exercise stress testing as an adjunct in the diagnosis of ischemic heart disease (atherosclerotic coronary artery disease). It is usually not possible to differentiate recent from old myocardial infarction, or to differentiate exactly between recent myocardial infarction and ischemia.

Thallium Chloride TI 201 is indicated also for the localization of sites of parathyroid hyperactivity in patients with elevated serum calcium and parathyroid hormone levels. It may also be useful in preoperative screening to locate extrathyroidal and mediastinal sites of parathyroid hyperfunction and for post-surgical reexamination. Thallium Chloride TI 201 has not been adequately demonstrated to be effective for the localization of normal parathyroid glands.

CONTRAINDICATIONS: None known.

WARNINGS: In studying patients in whom myocardial infarction or ischemia is known or suspected, care should be taken to assure continuous clinical monitoring and treatment in accordance with accepted standards to avoid adverse events.

Intravenous injection of Thallium Chloride TI 201 should be performed only under the supervision of a qualified radiophysiain and in a laboratory equipped with appropriate resuscitation and support apparatus.

PREGNANCY CATEGORY: C

PUBLICATIONS: Data are not available concerning the effect of marked alterations in blood glucose, insulin, or pH (such as found in diabetes mellitus) on the quality of Thallium Chloride 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.

GENERAL: Do not use after the expiration time and date (5 days maximum after calibration time) stated on the label. Do not use contents if turbid. The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.

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

CARCINOGENESIS, MUTAGENESIS, IMPAIRED FERTILITY: No long-term animal studies have been performed to evaluate carcinogenic potential, mutagenic potential, or whether Thallium Chloride TI 201 affects fertility in males or females. Information exists on 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.

Pregnancy Category: C

Adverse reproductive studies have not been conducted in animals with Thallium Chloride TI 201. It is also unknown whether Thallium Chloride TI 201 can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Thallium Chloride TI 201 should not be given to a pregnant woman except when benefits clearly outweigh the potential risks.

Nursing Mothers: It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, nursing should not be undertaken when a patient is administered radiopharmaceutical material.

Pediatric Use: Safety and effectiveness in children below the age of 18 have not been established.

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

ADVERSE REACTIONS: A single adverse reaction to the administration of Thallium Chloride TI 201 has been reported consisting of a transient, grossly described by patients with a diffuse rash which react to antihistamines and steroids within one hour.

HOW SUPPLIED: Thallium Chloride TI 201 for intravenous administration is supplied as a sterile, non-pyrogenic diagnostic radiopharmaceutical in isotonic solution containing 376 mCl/mg (10mCi/mg) Thallium Chloride TI 201, 0.9% sodium chloride, and 0.9% of benzyl alcohol. The pH is adjusted with hydrochloric acid and/or sodium hydroxide solution, to 6.5-7.5. The quantity of Thallium Chloride TI 201 in 10 ml contains 376 mCl/mg (10mCi/mg). Store at room temperature (15-30°C).

IV PERSANTINE * (diprydamole USP)

Precautions information

INDICATIONS AND USAGE: IV Persantine (diprydamole USP) is indicated as an alternative to exercise in thallium myocardial perfusion imaging for the evaluation of coronary artery disease in patients who cannot exercise adequately.

CONTRAINDICATIONS: Hypersensitivity to diprydamole.

WARNINGS: Serious adverse reactions associated with the administration of intravenous Persantine (diprydamole USP) have included fatal and non-fatal vascular and respiratory symptoms: ventricular fibrillation, symptomatic ventricular tachycardia, transient cerebral ischemia, and bronchospasm.

In a study of 391 patients given intravenous Persantine as an adjunct to thallium myocardial perfusion imaging, two types of serious adverse events were reported: 1) four cases of myocardial infarction (0.1%), two Cases of angina (0.03%), and two cases of severe bronchospasm (0.2%). Although the incidence of these serious adverse events was low (0.2%, 0.1%, and 0.1%), the potential clinical information to be gained through use of intravenous Persantine thallium imaging (see Indications and Usage noting the risk of a major adverse event) must be weighed against the risk to the patient. Patients with a history of unstable angina may be at a greater risk for serious myocardial ischemia. Patients with a history of bronchospasm may be at a greater risk for bronchospasm during IV Persantine use.

When thallium myocardial perfusion imaging is performed with intravenous Persantine, parenteral amphotericin should be readily available for relieving adverse events such as bronchospasm or chest pain. Vital signs should be monitored, and for 10-15 minutes following the intravenous injection of Persantine and an electrophysiologic study should be obtained using at least one chest lead.

In the case of severe hypotension, the patient should be placed in a supine position with the head tilted down if necessary, before administration of parenteral amphotericin. 250 mg of amphotericin does not relieve chest pain symptoms within a few minutes, sublingual nitroglycerin may be administered. If chest pain continues despite use of amphotericin and nitrates, the possibility of myocardial infarction should be considered. If the clinical condition of a patient with an adverse event permits a one minute delay in the administration of parenteral amphotericin, thallium-201 may be injected and allowed to circulate for one minute before the injection of amphotericin. This will allow initial thallium perfusion imaging to be performed before reversal of the pharmacologic effects of Persantine on the coronary circulation.

PRECAUTIONS: See WARNINGS.

Drug Interactions: Oral maintenance theophylline may abolish the coronary vasodilatation induced by intravenous Persantine (diprydamole USP) administration. This could lead to a false negative imaging result.

Cardiogenic, Metastasis, Impaired Fertility: In studies with diprydamole was administered at the feed of doses of up to 75 mg/kg/day (0.4 mg/Kg) the maximum recommended to human oral dose (in mice (up to 122) weight in males and females) there was no evidence of drug related cardiogenic, Mutagenicity testing with diprydamole with bacterial and mammalian systems was negative. There was no evidence of impaired fertility when diprydamole was administered to male and female rats at oral doses up to 10 mg/Kg/day (63 mg/Kg maximum recommended daily human oral dose). A significant reduction in number of corpora lutea with conceptus reduction in implantations and live fetuses was, however, observed at 750 mg/kg/day.

Cardiogenic, Metastasis, Impaired Fertility: In studies with diprydamole was administered at the feed of doses of up to 122 mg/kg/day (0.4 mg/Kg) the maximum recommended to human oral dose (in mice (up to 122) weight in males and females) there was no evidence of drug related cardiogenic, Mutagenicity testing with diprydamole with bacterial and mammalian systems was negative. There was no evidence of impaired fertility when diprydamole was administered to male and female rats at oral doses up to 10 mg/Kg/day (63 mg/Kg maximum recommended daily human oral dose). A significant reduction in number of corpora lutea with conceptus reduction in implantations and live fetuses was, however, observed at 750 mg/kg/day.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

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Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.

Calculation based on assumed body weight of 50 kg.
ERASME HOSPITAL REINFORCES ITS DIAGNOSTIC CAPABILITIES WITH A CYCLONE 30

By André De Laet, Chief editor of TECHNOPOLE

The University of Brussels (ULB) has chosen IBA’s Cyclone 30 to equip its new Positron Emission Tomography (P.E.T.) Center located at Erasme Hospital in Brussels. The Cyclone 30 cyclotron complements existing diagnostic and research capabilities serving Belgium’s university hospitals.

Designed, manufactured and installed from IBA’s headquarters in Louvain-la-Neuve, the Erasme cyclotron is only one of ten Cyclone 30s sold within the past 3 years and one of five already operational around the world. Having passed the acceptance tests, the 30 MeV, negative-ion cyclotron was officially accepted by the hospital in October 1990.

The co-directors of the new P.E.T. center, Dr. André Luxen, an organic chemist, and Dr. Serge Goldman, a neuropsychiatrist, met with André De Laet, chief editor of Belgian high-technology magazine «Technopole» who reports:

Q: What kinds of diagnostic techniques are used at the Erasme Hospital?

Dr. Goldman: This hospital has developed quite a number of diagnostic techniques. Some of these have been devoted to the advancement of medical imaging. Efforts to create tools for increasingly precise but non-invasive examination of the human body have led to the development and routine application of techniques which were practically unknown as little as 10 years ago. These techniques include: echography, computerized axial tomography using X-rays or magnetic nuclear resonance, digitalized angiography and others.

Q: How does the hospital intend to use the CYCLONE 30?

Dr. Luxen: The radioisotope department performs about 10,000 examinations a year. These typically include explorations of the skeletal structure, lungs, heart, thyroid, liver, brain and kidneys as well as searches for sites of infection and inflammation. P.E.T. scanning provides important information about functional changes in metabolism. One of the objectives of the new P.E.T. center will be to improve the possibility of comparing all the valuable information obtained by using a variety of imaging techniques.

Q: What progress in dynamic studies do you expect to make with this new capability?

Dr. Luxen: Because positron emission tomography allows dynamic studies, researchers finally have access to biochemical or pharmacological parameters, enzymes, receptors localization and quantification and other information not otherwise available with animal models.

Q: In what particular areas have Erasme researchers directed their attention?

Dr. Goldman: The brain and the heart are the two organs which receive special atten-
tion in our research programs. Our studies focus on neuronal glucose uptake in several psychiatric disorders, on the integrity of the dopaminergic system (Parkinson's Disease), and on problems of cardiology and oncology. Other studies focus on disorders of the nervous system (dementia, degeneration, etc.).

Q: What were the deciding factors in choosing a cyclotron from IBA?

Dr. Luxen: My time in the United States with a major P.E.T. center strongly influenced me to direct my career towards the life sciences. I was then given the opportunity to apply my knowledge to the creation of a cyclotron department in Brussels. IBA, which at the time was only a small company, made a proposal based on the new negative-ion technology. Bear in mind that there were only four cyclotron builders in the world. In retrospect, choosing such a young company might appear somewhat limiting and risky. However, we very quickly became convinced that IBA had the most interesting offer.

Having used positive-ion technology for a number of years in the U.S., I was very familiar with its capabilities. Obviously, this experience helped me to accurately evaluate the advantages of the new negative-ion technology. It also allowed me to fully appreciate the ease of operation offered by the Belgian equipment. I feel certain that our collaboration with IBA on future developments will be equally fruitful.

Q: What future developments do you have in mind?

Dr. Luxen: IBA supplied a turn-key system - from the very source which feeds the cyclotron to delivery of radio-labelled biological compounds. Cyclotrons are extremely complex systems and IBA supplied fully compatible equipment. It is highly reliable in use and the possibilities for development (e.g. diversification of the radiopharmaceuticals) are numerous. The possibility of upgrading the equipment with add-on features - some of which may not yet have even been imagined - is one of Cyclone 30's greatest advantages. Thanks to its power, Cyclone 30 gives researchers the opportunity to go beyond the limits set by machines of lower beam energy.

Q: What are the principal benefits of working with IBA?

Dr. Luxen: In my opinion, IBA offers three major advantages: their turn-key solution, i.e., total control of labelled compound; their conscientious compliance to deadlines; and Cyclone 30's abundant energy. IBA has developed a range of lower-energy cyclotrons specifically designed to cover the requirements of P.E.T. technology. But with Cyclone 30, Erasme Hospital will be able to expand its research much further. Because a cyclotron represents a 20-year investment, it is important to have long-term plans and to keep a sharp eye on ever-evolving requirements.

Located just outside of Brussels, Belgium, the Erasme University Hospital has a 1500-bed capacity and an annual budget equivalent to about 135 million US$. The workforce totals 2500 employees including 850 nurses and 400 medical doctors. In 1989, Erasme Hospital handled some 20,000 medical examinations. 28,000 patients were treated in the Emergency Ward and 25,000 patients were hospitalized for 24 hours or longer. Ever since its founding in 1977, the objectives set by the management have been to offer the population the best in specialized medical care, to pursue modern clinical teaching and training and to contribute to the advancement of medical research at all levels. Today, in line with these objectives, Erasme Hospital's contribution in the field of nuclear medicine for example, is widely recognized. In addition to Cyclone 30, the Erasme P.E.T. center has acquired a fully equipped radiochemical laboratory. It includes a range of automated processing units developed by IBA to perform chemical syntheses for immediate administration to patients. The Center also uses a high-resolution Siemens P.E.T. scanner which can simultaneously image up to 15 planes of any organ in the body.
Our Customer Order Processing Service (C.O.P.S.) is fast, thorough and second to none. We have one of the most comprehensive catalogs of nuclear supplies and accessories in the industry, and we're constantly updating with new and better products.

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Slow washout and lack of significant redistribution let you image at any point up to 4 hours after injection

Permits imaging at the best time and place for patient, clinic, and physician

Eliminates need to image immediately after injection

Suitable for routine and acute use

Introducing

Cardiolite®

Kit for the preparation of Technetium Tc99m Sestamibi

Clarity that lasts
High degree of accuracy in detection of myocardial abnormalities

In blinded studies, CARDIOLITE imaging was 83% to 96% sensitive and 79% to 100% specific in detecting myocardial infarction, when compared with final diagnoses.

Reassuring safety profile

No known contraindications

Few adverse reactions

CARDIOLITE scans (SPECT) from a 61-year-old female 8 days following acute MI (LFOV camera, high-resolution collimator, 64 x 64 matrix, 180° arc RAO to LPO, 64 projections, 25 s/projection)

Please see final pages for prescribing information.

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Radiopharmaceuticals
DESCRIPTION: Each 5ml vial contains a sterile, non-pyrogenic, lyophilized mixture of: Tetraakis (2-methoxyisobuty1 isonitrile) Copper (I) tetrafluoroborate - 1.0mg Sodium Citrate Dihydrate - 2.6mg L- Cysteine Hydrochloride Monohydrate - 1.0mg Mannitol - 20mg Stannous Chloride, Dihydrate, minimum (SnCl2.2H2O) - 0.025mg Stannous Chloride, Dihydrate, (SnCl2.2H2O) - 0.075mg Tm Chloride (Stannous and Stannic) Dihydrate, maximum (as SnCl2.2H2O) - 0.086mg

Prior to lyophilization the pH is 5.3 to 5.9. The contents of the vial are lyophilized and stored under nitrogen.

This drug is administered by intravenous injection for diagnostic use after reconstitution with sterile, non-pyrogenic, oxygen-free Sodium Pertechnetate Tc99m Injection. The pH of the reconstituted product is 5.5 (5.0-6.0). No bacteriostatic preservative is present.

The precise structure of the technetium complex is Tc99m[MIBI]4 where MIBI is 2-methoxyisobuty1 isonitrile.

PHYSICAL CHARACTERISTICS

Technetium Tc99m decays by isomeric transition with a physical half-life of 6.02 hours.1 Photons that are useful for detection and imaging studies are listed in Table 1.

Table 1. Principle Radiation Emission Data

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % Disintegration</th>
<th>Mean Energy (eV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
</tr>
</tbody>
</table>

1Kocher, David C., Radioactive Decay Data Tables, DOE/TIC-11026, 108 (1981).

EXTERNAL RADIATION

The specific gamma ray constant for Tc99m is 5.4 microcurie/mg-MBq-hr (0.78R/mCi-hr) at 1cm. The first half value layer is 0.07cm of Pb. A range of values for the relative attenuation of the radiation emitted by the technetium complex that results from intersection of various thicknesses of Pb is shown in Table 2. To facilitate control of the radiation exposure from Megabequerel (miccurie) amounts of this radionuclide, the use of a 0.25cm thickness of Pb will attenuate the radiation emitted by a factor of 1.000.

Table 2. Radiation Attenuation by Lead Shielding

<table>
<thead>
<tr>
<th>Shield Thickness (Pb) cm</th>
<th>Coefficient of Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.017</td>
<td>0.5</td>
</tr>
<tr>
<td>0.06</td>
<td>10</td>
</tr>
<tr>
<td>0.16</td>
<td>10^-1</td>
</tr>
<tr>
<td>0.25</td>
<td>10^-2</td>
</tr>
<tr>
<td>0.33</td>
<td>10^-3</td>
</tr>
</tbody>
</table>

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

Table 3. Physical Decay Chart; Tc99m Half-Life 6.02 Hours

<table>
<thead>
<tr>
<th>Hours</th>
<th>Fraction Remaining</th>
<th>Hours</th>
<th>Fraction Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>0*</td>
<td>1.000</td>
<td>5</td>
<td>0.398</td>
</tr>
<tr>
<td>1</td>
<td>0.891</td>
<td>6</td>
<td>0.355</td>
</tr>
<tr>
<td>2</td>
<td>0.794</td>
<td>7</td>
<td>0.316</td>
</tr>
<tr>
<td>3</td>
<td>0.706</td>
<td>8</td>
<td>0.282</td>
</tr>
<tr>
<td>4</td>
<td>0.631</td>
<td>9</td>
<td>0.251</td>
</tr>
<tr>
<td>5</td>
<td>0.562</td>
<td>10</td>
<td>0.224</td>
</tr>
<tr>
<td>6</td>
<td>0.501</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.447</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Calibration Time

CLINICAL PHARMACOLOGY: Technetium Tc99m Sestamibi is a cationic Tc99m complex which has been found to accumulate in viable myocardial tissue in a manner analogous to that of Thallous Chloride TI-201. Scintigraphic images obtained in animals and man after the intravenous administration of the drug have been comparable to those obtained with Thallous Chloride TI-201 in normal and abnormal myocardial tissue.

The major pathway for clearance of Tc99m Sestamibi is the hepatobiliary system. Activity from the gall bladder appears in the intestines within one hour of injection. Twenty-seven percent of the injected dose is excreted in the urine, and approximately thirty-three percent of the injected dose is cleared through the feces in 48 hours. The agent is excreted without any evidence of metabolism.

Pulmonary activity is negligible even immediately after injection. Blood clearance studies indicate that the fast clearing component clears with a t1/2 of 4.3 minutes at rest. At five minutes postinjection about 8% of the injected dose remains in circulation. There is less than 1% protein binding of Technetium Tc99m Sestamibi in plasma. The myocardial biological half-life is approximately six hours after a rest injection. The biological half-life for the liver is approximately 30 minutes after a rest injection. The effective half-life of clearance (which includes both the biological half-life and radiolocide decay) for the heart is approximately 3 hours, and for the liver is approximately 25 minutes, after a rest injection. The ideal imaging time reflects the best compromise between heart count rate and surrounding organ uptake.

A study in a dog myocardial ischemia model reported that Technetium Tc99m Sestamibi undergoes myocardial distribution (redistribution), although more slowly and less completely than Thallous Chloride TI-201. A study in a dog myocardial infarction model reported that the drug showed no redistribution of any consequence. Definitive human studies to demonstrate possible redistribution have not been reported. In patients with documented myocardial infarction, imaging revealed the infarct up to four hours post dose.

Animal studies have shown that myocardial uptake is not blocked when the sodium pump mechanism is inhibited. Myocardial uptake which is coronary flow dependent is 1.2% of the injected dose. The following table illustrates the biological clearance as well as effective clearance (which includes biological clearance and radiolocide decay) of Tc99m Sestamibi from the heart and liver.

[Organ concentrations expressed as percentage of injected dose; data based on an average of 5 subjects.]

<table>
<thead>
<tr>
<th>Time</th>
<th>Biological</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>Liver</td>
<td>Biological</td>
</tr>
<tr>
<td>5 mins</td>
<td>2.0</td>
<td>20</td>
</tr>
<tr>
<td>30 mins</td>
<td>1.1</td>
<td>12</td>
</tr>
<tr>
<td>1 hour</td>
<td>1.0</td>
<td>5.6</td>
</tr>
<tr>
<td>2 hours</td>
<td>1.0</td>
<td>2.2</td>
</tr>
<tr>
<td>4 hours</td>
<td>0.8</td>
<td>0.7</td>
</tr>
</tbody>
</table>

INDICATIONS AND USAGE: CARDIOLITE®, Kit for the preparation of Technetium Tc99m Sestamibi is a myocardial perfusion agent that is useful in distinguishing normal from abnormal myocardium, and in the localization of the abnormality, in patients with suspected myocardial infarction.

CARDIOLITE®, Kit for the preparation of Technetium Tc99m Sestamibi is also useful in the evaluation of myocardial function using the first pass technique.

CONTRAINdications: None known.

WARNINGS: In studying patients in whom cardiac disease is known or suspected, care should be taken to assure continuous monitoring and treatment in accordance with safety, accepted clinical procedure.

PRECAUTIONS:

GENERAL

The contents of the vial are intended only for use in the preparation of Technetium Tc99m Sestamibi and are not to be administered directly to the patient without first undergoing the preparatory procedure.

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.

Contents of the kit before preparation are not radioactive. However, after the Sodium Pertechnetate Tc99m Injection is added, adequate shielding of the final preparation must be maintained.

The components of the kit are sterile and non-pyrogenic. It is essential to follow directions carefully and to adhere to strict aseptic procedures during preparation.

Technetium Tc99m labeling reactions involved depend on maintaining the stannous ion in the reduced state. Hence, Sodium Pertechnetate Tc99m Injection containing oxidants should not be used.

Technetium Tc99m Sestamibi should not be used more than six hours after preparation.

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

Carcinogenesis, Mutagenesis, Impairment of Fertility

In comparison with most other diagnostic technetium labeled radiopharmaceuticals, the radiation dose to the ovaries (1.5 rad/30mCi) is high. Minimal exposure (ALARA) is necessary in women of childbearing capability. (See Dosimetry subsection in DOSAGE AND ADMINISTRATION section.)

The active intermediate, Cu(MIBI),BF4, was evaluated for genotoxic potential in a battery of five tests. No genotoxic activity was observed in the Ames, CHO/HPT and sister chromatid exchange tests (all < 1600). At cytotoxic concentrations (~20μg/ml), an increase in cells with chromosome aberrations was observed in the in vitro human lymphocyte assay. Cu(MIBI),BF4, did not show genotoxic effects in the in vitro mouse micronucleus test at a dose which caused systemic and bone marrow toxicity (8mg/kg, > 600 x maximal human dose).

Pregnancy Category C

Animal reproduction and teratogenicity studies have not been conducted with Technetium Tc99m Sestamibi. It is also not known whether Technetium Tc99m Sestamibi can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. There have been no studies in pregnant women. Technetium Tc99m Sestamibi should be given to a pregnant woman only if clearly needed.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of childbearing capability, should be performed during the first few (approximately 10) days following the onset of menses.
Nursing Mothers
Technetium Tc99m Pertechnetate is excreted in human milk during lactation. It is not known whether Technetium Tc99m Sestamibi is excreted in human milk. Therefore, formula feedings should be substituted for breast feedings.

Pediatric Use
Safety and effectiveness in children below the age of 18 have not been established.

ADVERSE REACTIONS: During clinical trials, approximately 8% of patients experienced a transient metallic or bitter taste immediately after the injection of Technetium Tc99m Sestamibi. A few cases of transient headache, flushing and non-itching rash have also been attributed to administration of the agent. One patient demonstrated signs and symptoms consistent with seizure, eight to ten minutes after administration of the drug. No other adverse reactions specifically attributable to the use of Technetium Tc99m Sestamibi have been reported.

DOSEAGE AND ADMINISTRATION: The suggested dose range for I.V. administration to be employed in the average patient (70kg) is:

70-110 MBq (1.9-2.5 mCi)

The dose administered should be the lowest required to provide an adequate study consistent with ALARA principles (See also PRECAUTIONS).

When used in the diagnosis of myocardial infarction, imaging should be completed within four hours after administration (see also CLINICAL PHARMACOLOGY).

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

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration whenever solution and container permit.

Store at room temperature (5-30°C) before and after reconstitution.

RADIATION DOSIMETRY: The radiation doses to organs and tissues of an average patient (70 kg) per 110 MBq (30 mCi) of Technetium Tc99m Sestamibi injected intravenously are shown in Table 4.

Table 4. Radiation Absorbed Doses from Tc99m Sestamibi

<table>
<thead>
<tr>
<th>Organ</th>
<th>2.0 hour void</th>
<th>4.8 hour void</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rad/30 mCi</td>
<td>mCi/110 MBq</td>
</tr>
<tr>
<td>Breast</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Gallbladder Wall</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Small Intestine</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Upper Large Intestine</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Lower Large Intestine</td>
<td>3.9</td>
<td>4.2</td>
</tr>
<tr>
<td>Stomach Wall</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Heart Wall</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Kidneys</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Liver</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Lungs</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Bone Surfaces</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Thyroid</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Ovaries</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Testes</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Red Marrow</td>
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<td>Urinary Bladder Wall</td>
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<tr>
<td>Total Body</td>
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INSTRUCTIONS FOR PREPARATION OF Technetium Tc99m Sestamibi
Preparation of the Technetium Tc99m Sestamibi from the Kit for the preparation of Technetium Tc99m Sestamibi is done by the following aseptic procedure:

a. Prior to adding the Sodium Pertechnetate Tc99m Injection to the vial, tear off a radiation symbol and attach it to the neck of the vial.

b. Waterproof gloves should be worn during the preparation procedure. Remove the plastic disc from the vial and swab the top of the vial closure with alcohol to sanitize the surface.

c. Place the vial in a suitable radiation shield with a fitted radiation cap.

d. With a sterile shielded syringe, aseptically add absorbate-free, sterile, non-pyrogenic Sodium Pertechnetate Tc99m Injection (292-520 MBq, 25-150 mCi) in approximately 1 to 3 ml.

e. Aseptically add the Sodium Pertechnetate Tc99m Injection to the vial in the lead shield. Without withdrawing the needle, remove an equal volume of headspace to maintain atmospheric pressure within the vial.

f. Swirl the contents of the vial for a few seconds.

g. Remove the vial from the lead shield and place upright in a boiling water bath for 10 minutes. Timing for 10 minutes is begun as soon as the water begins to boil again.

h. Remove the vial from the water bath, place in the lead shield and allow to cool for fifteen minutes.

i. Using proper shielding, the vial contents should be visually inspected. Use only if the solution is clear and free of particulate matter and discoloration.

j. Assay the reaction vial using a suitable radioactivity calibration system. Record the Technetium Tc99m concentration, total volume, assay time and date, expiration time and lot number on the vial shield label and affix the label to the shield.

k. Store the reaction vial containing the Technetium Tc99m Sestamibi at room temperature (15-30°C) until use; at such a time the product should be aseptically withdrawn.

Technetium Tc99m Sestamibi should be used within six hours of preparation. The vial contains no preservative.

Note: Adherence to the above product reconstitution instructions is recommended. Product should be used within 6 hours after preparation.

Final product with radiochemical purity of at least 90% was used in the clinical trials that established safety and effectiveness. The radiochemical purity was determined by the following method.

DETERMINATION OF RADIOCHEMICAL PURITY IN Technetium Tc99m Sestamibi
1. Obtain a Baker-Flex Aluminum Oxide coated, plastic TLC plate, #1 B-F, pre-cut to 2.5cm x 7.5cm.

2. Dry the plate or plates at 100°C for 1 hour and store in a desiccator. Remove pre-dried plate from the desiccator just prior to use.

3. Apply 1 drop of ethanol* using a 1ml syringe with a 22-26 gauge needle, 1.5cm from the bottom of the plate. THE SPOT SHOULD NOT BE ALLOWED TO DRY.

4. Add 2 drops of Technetium Tc99m Sestamibi solution, side by side on top of the ethanol* spot. Return the plate to a desiccator and allow the sample spot to dry (typically 15 minutes).

5. The TLC tank is prepared by pouring ethanol** to a depth of 3-4mm. Cover the tank and let it equilibrate for 10 minutes.

6. Develop the plate in the covered TLC Tank in ethanol* for a distance of 5cm from the point of application.

7. Cut the TLC plate 4cm from the bottom and measure the Tc99m activity in each piece by appropriate radiation detector.

8. Calculate the % Tc99m Sestamibi as:

% Tc99m Sestamibi = ____ microCi Top Piece ____ x 100
% Tc99m Sestamibi = ____ microCi Both Pieces

*The ethanol used in this procedure should be 95% or greater. Absolute ethanol (99%) should remain at a 95% ethanol content for one week after opening if stored tightly capped, in a cool dry place.

HOW SUPPLIED: Du Pont's CARDISOLITE®, Kit for the preparation of Technetium Tc99m Sestamibi is supplied as a 5mL vial in kits of two (2), five (5) and thirty (30) vials, sterile and non-sterile.

Prior to hypophorization the pH is between 5.3-5.9. The contents of the vials are hypophorized and stored under nitrogen. Store at room temperature (15-30°C) before and after reconstitution. Technetium Tc99m Sestamibi contains no preservatives. Included in each two (2) kit is one (1) package insert, five (5) vial shield labels and five (5) radiation warning labels. Included in each five (5) vial kit is one (1) package insert, five (5) vial shield labels and five (5) radiation warning labels. Included in each thirty (30) vial kit is one (1) package insert, thirty (30) vial shield labels and thirty (30) radiation warning labels.

The U.S. Nuclear Regulatory Commission has approved this reagent kit for distribution to persons licensed to use byproduct material identified in 35.100 and 35.200 of 10 CFR Part 35, to persons who hold an equivalent license issued by an Agreement State, and, outside the United States, to persons authorized by the appropriate authority.

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THE HOSPITAL OF THE GOOD SAMARITAN
LOS ANGELES

John Hunter Hospital
Newcastle, Australia

Department of Medical Imaging
Staff Specialists in Nuclear Medicine
JHH 91/56

Australian East Coast - permanent or temporary (6 to 12 months) position available for a Nuclear Medicine Physician with the Hunter Area Health Service in Newcastle, NSW. Applicants must be eligible for membership of the Australian and New Zealand Association of Physicians in Nuclear Medicine and be registrable in New South Wales. Newcastle is a coastal city of 500,000 people, 100 miles north of Sydney. It boasts a temperate climate, some of the world's finest beaches, a large saltwater lake (ideal for water sports), and is situated near one of Australia's best known wine growing areas. A new 500 bed university teaching hospital has been commissioned which offers a wide range of specialty medical and surgical services including all 'all-digital' 3 camera Nuclear Medicine Department. The area nuclear medicine service consists of 6 cameras (4 SPECT) sited at 2 hospitals. There is opportunity for research and the position would be suitable for sabbatical leave or a recently qualified specialist.

Send applications to Dr A. South, Director of Nuclear Medicine, John Hunter Hospital, New Lambton Heights, NSW 2305, Australia by 22 April 1991, or contact him on 61 49 21 3390.
National Institutes of Health
Public Health Service
Department of Health and Human Services

Radiologist

The National Institutes of Health (NIH) is seeking an experienced Board-certified radiologist to direct its new Diagnostic Radiology Research Program (DRRP). The Director will organize and conduct a research training program in diagnostic imaging for radiologists and provide a coordinating focus for the many ongoing research initiatives in diagnostic imaging at the NIH. The Diagnostic Radiology Research Program will train between 4-6 radiologists a year, and will have access to extensive research facilities, including an NMR dedicated exclusively to the research program and supported by the NIH Nuclear Medicine Research Center. In addition, the Director will be provided with laboratory facilities, personnel and operating budget to pursue independent research in diagnostic imaging. Applicants should have an ongoing radiology research program and relevant experience in clinical imaging and in teaching of diagnostic radiology. Interested individuals should submit a curriculum vitae and bibliography to:

Dr. Dinah Singer
Office of Intramural Affairs
National Institutes of Health
Building 1, Room 140
9000 Rockville Pike
Bethesda, MD 20892

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PENN STATE UNIVERSITY
THE MILTON S. HERSHEY MEDICAL CENTER

FACULTY POSITION IN NUCLEAR MEDICINE

The Division of Nuclear Medicine of the Department of Radiology at the Penn State University's Milton S. Hershey Medical Center is recruiting a physician with board certification in Nuclear Medicine (ABNM) for a full-time academic position. Board certification in Diagnostic Radiology (ABR) is desirable but not essential.

Penn State University Hospital is a 350-bed tertiary care facility (currently expanding to 500 beds) in Hershey, Pennsylvania, near Harrisburg, the State Capitol. Nuclear Medicine is a division of the Department of Radiology which has an academic faculty of twenty physicians and six Ph.D.s.

The Nuclear Medicine Division currently performs 5000 exams per year, expected to rise further as renovations and expansion are completed in subsequent years. There are currently five gamma cameras and a Hologic QDR 1000W bone density unit in place with one additional camera being added in 1991 or 1992. Four or five of the six will be tomographic.

Areas of emphasis currently include cardiac and pediatric nuclear medicine. An interest in neuronspecific medicine and brain tomography would be desirable but not essential. An interest in clinical and/or basic research is desirable.

Applicants should respond as soon as possible with a letter of interest and current curriculum vitae. Please direct inquiries to:

Douglas F. Eggl, M.D., Chief
Division of Nuclear Medicine
Department of Radiology
Penn State University/Hershey Medical Center
P. O. Box 850, Hershey, PA 17033

Penn State University is an affirmative action employer. Women and minorities are encouraged to apply.

---

Hahnemann University, a 616-bed university teaching hospital, is seeking full-time staff technologists for the departments of:

Nuclear Medicine Technologists

- NUCLEAR CARDIOLOGY
- NUCLEAR MEDICINE

Candidates must be CNMT or ARRT qualified/registry eligible.

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PHYSICIAN

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Department of Radiology
Section of Nuclear Medicine

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• Knowledge of quality control techniques for SPECT.

SPONSORSHIP:
This program is sponsored by the Medical College of Wisconsin.

TUITION:
The tuition fee of $650 includes the course syllabus, handouts, breaks, breakfasts, lunches, and other amenities involved in making this a pleasant learning experience. Maximum enrollments have been established. Cancellations prior to the course will be refunded, less a $30 administrative fee.

CREDIT:
The Medical College of Wisconsin is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians. Accordingly, the Medical College of Wisconsin designates this continuing medical education activity as meeting the criteria for 13.00 hours in Category I toward the Physician’s Recognition Award of the American Medical Association.

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SPECT Brain Imaging Fellowship Coordinator
Nuclear Medicine Division
Medical College of Wisconsin
8700 W. Wisconsin Avenue
Milwaukee, WI 53226 (414)257-6088

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Fundamentals of Nuclear Medicine

2nd Edition
Edited by Naomi P. Alazraki, MD and Fred S. Mishkin, MD

Fundamentals of Nuclear Medicine, 2nd Edition, provides physicians, physicians-in-training, scientists, and technologists with a comprehensive introduction to the basic principles of nuclear medicine, including the most recent advances in this fast-changing field.

Following the format of the acclaimed first edition, the editors have revised and expanded each chapter, adding major new sections on PET imaging, diagnostic decision making, parathyroid and adrenal imaging, and bone density measurement. In addition, several new scan images and graphs serve to illustrate the text.

Fundamentals of Nuclear Medicine fills the need for a current basic text to acquaint practitioners and students with the possibilities and limitations of nuclear medicine in detecting and evaluating common disorders. It is essential to all those who want an understanding of this rapidly evolving technology as it emerges from the investigative to the clinical stage.

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SPECIAL STUDENT OFFER: Bulk quantities of Fundamentals of Nuclear Medicine, 2nd Edition, are available for instructors to introduce medical and technologist students to nuclear medicine. Accredited instructors may purchase a minimum of 10 copies at $4.00 each (includes shipping).

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Springer International
Each description of the products below was condensed from information supplied by the manufacturer. The reviews are published as a service to the professionals working in the field of nuclear medicine and their inclusion herein does not in any way imply an endorsement by the Editorial Board of The Journal of Nuclear Medicine or by The Society of Nuclear Medicine.

**FDA Approves I.V. Persantine**

Du Pont Merck Pharmaceutical Company has received approval from the FDA to market I.V. Persantine® (dipyridamole USP), the first pharmacologic alternative to exercise in thallium stress testing for evaluation of coronary artery disease in patients who cannot exercise adequately. The drug will be used to evaluate thousands of patients with suspected heart disease who cannot perform exercise testing on a treadmill or whose tests are unsatisfactory. I.V. Persantine, which is indicated as an adjunct to thallium myocardial perfusion imaging, simulates the physiologic effect of exercise by increasing coronary blood flow pharmacologically. I.V. Persantine/thallium testing could be used annually for as many as half a million patients previously unable to be tested effectively. Thallium studies using I.V. Persantine have been conducted at more than 100 clinical sites in the United States and worldwide since 1978, and I.V. Persantine has been available in the United Kingdom since 1987. Persantine is a registered trademark of Boehringer Ingelheim International GmbH. The intravenous form of the drug will be marketed, manufactured, and distributed in the U.S. by Du Pont Merck under an exclusive licensing agreement with Boehringer Ingelheim Pharmaceuticals, Inc. Roger Morris, External Affairs Dept., Du Pont Company, Wilmington, DE 19898. (302) 992-4747.

Circle Reader Service No. 101

**FDA Approves Cardiolite**

Du Pont Merck has received approval from the FDA to market its new technetium agent, Cardiolite® (technetium 99mTc) sestamibi), for use in pinpointing heart attack damage, evaluating perfusion, and determining pumping efficiency in a single study. The agent allows imaging of the heart up to four hours after injection, enabling physicians to first stabilize heart attack patients and then acquire images that show the heart as it appeared during the heart attack. Following treatment with clot dissolving drugs, Cardiolite can be injected again. A comparison of the original and follow-up images identifies heart tissue saved by the initial therapy. Cardiolite is a nonradioactive preparation that can be stocked in hospitals to make it convenient for emergency and routine examinations. It is transformed into a tracer when combined with technetium. Cardiolite is suitable for planar and SPECT imaging camera systems. The technetium agent offers distinct advantages over thallium. While Cardiolite can be stocked, thallium doses are radioactive when shipped and must be ordered for each study, thus requiring advance scheduling of patients. Also, the four-hour time period for imaging after injection with Cardiolite is more than fifteen times longer than the period during which thallium can be imaged. Roger Morris, External Affairs Dept., Du Pont Company, Wilmington, DE 19898. (302) 992-4747.

Circle Reader Service No. 102

**FDA Approves CardioTec**

Squibb Diagnostics, a division of Bristol-Myers Squibb company, has received approval from the FDA to market its new technetium agent, CardioTec® (kit for the preparation of technetium 99mTc teboroxime), for use in myocardial perfusion studies, both at rest and at stress. CardioTec has received a therapeutic rating of B from the FDA for a new chemical entity representing a modest therapeutical gain over existing marketed agents. CardioTec can easily be prepared on site as needed and the agent allows physicians to image the heart within five minutes of its administration to the patient. The speed with which it can be used, coupled with the production of high-quality images, offers physicians the opportunity to make quick therapeutic decisions about possible lifesaving therapy for patients suffering from or at risk for myocardial infarction. CardioTec is the first of a new class of imaging agents known as BATO's (boronic acid adducts of technetium dioximes) indicated for evaluating coronary blood flow. BATO compounds readily cross cell membranes, including those of the myocardium, even at high flow rates characteristic of patient exercise or pharmacologic intervention. Rapidly eliminated from the heart, BATO compounds allow repeat studies to be performed quickly, including the imaging of a patient's status before and possibly after intervention. The rapidity of the studies offers greater patient convenience and potential for significant cost savings. Using CardioTec, a typical stress/rest study can be completed within 1½ to 2 hours with only 20 minutes of total camera time needed, while a thallium study usually requires 4 or more hours for completion, including 50 minutes of camera time. Squibb Diagnostics has established CardioTec Learning Centers at key locations across the country including Worcester, MA; Philadelphia, PA; Providence, RI; Houston and Dallas, TX; Fairfield and Roseville, CA; Chicago, IL; and Richmond, VA. Janet Skidmore, Industry and Public Affairs, Bristol-Myers Squibb Company, PO. Box 4000, Princeton, NJ 08543. (609) 921-5615.

Circle Reader Service No. 103
SPECT Hand Grips

Atomic Products Corporation has developed SPECT Hand Grips for positioning a patient within the confines of a SPECT imaging table. For most imaging applications, the patient's arms must be kept away from the torso. Atomic's Hand Grips provide the patient with comfortable, stable arm support away from the imaging area. The Hand Grip is mounted to the head of the table and can be adjusted to accommodate a variety of patient arm positions over a 10-inch travel. These grips are comfortably cushioned and can be used with any manufacturer's SPECT table. Atomic Products Corporation, PO. Box 702, Shirley, NY 11967. (516) 924-9000.

Circle Reader Service No. 108

Parallel Image Processing Accelerator

Ektron Applied Imaging, Inc., a Kodak subsidiary, introduces the EktronBOSS™ Parallel Image Processing Accelerator for Sun workstations. Using EktronBOSS, workstations can run at supercomputer speed. Image processing applications that once took hours can now be accomplished in seconds. Ektron-BOSS consists of a set of three boards that plug into an expansion chassis. Different combinations of these boards can be used to configure image processing subsystems with peak performance ranging from 500 to over 5,000 MIPS and from 70 to over 700 MFLOPS. Medical imaging applications can be developed using a powerful set of software tools supplied with the EktronBOSS. The accelerator's systems are scalable. Once application software is written, that same software can be run on larger, more powerful, EktronBOSS configurations. Marketing/Sales, Ektron Applied Imaging, Inc., 23 Crosby Drive, Bedford, MA 01730. (617) 275-0475.

Circle Reader Service No. 105

X-Ray Densitometers

Lunar Corporation has received FDA 510K registration for its DPX-L and DPX-olpha dual-energy X-ray bone densitometers. These instruments are comparable to the standard DPX densitometer but provide spine and femur scans in the AP projection in only two minutes. This is 2 to 4 times faster than non-Lunar densitometers. Lateral spine scans require only four minutes, compared to twelve minutes on a standard DPX. The DPX-olpha is a smaller version of the DPX-L model and is designed for specialty clinics and smaller imaging centers. Its compact space requirements (1.6 m²) is half the size of competitive instruments. Lunar is also introducing its Achilles Ultrasound Densitometer. This instrument utilizes both speed-of-sound and attenuation in the os calcis, an area of purely trabecular bone, to provide precise skeletal evaluation. Lunar Corporation, 313 West Beltline Highway, Madison, WI 53713. (608)274-2663 or (800) 445-8627.

Circle Reader Service No. 106

Thermal Desorption System

Scientific Instrument Services introduces the new Short Path Thermal Desorption System for use in GC/MS for the identification and quantitative determination of both volatile and semi-volatile samples in complex matrices. Due to its novel design, this new system eliminates the problems observed with other desorption systems. The system is fully compatible with all gas chromatographic techniques and detectors including systems interfaced to mass spectrometers and infrared spectrometers. Sanford V. Overton, Product Manager, Scientific Instrument Services, Inc., Route 179, RD 2, Box 198, Ringoes, NJ 08551. (201) 788-5550.

Circle Reader Service No. 108

I.V. Pumpette

Master Medical Corporation introduces the Stat 2™ I.V. Pumpette, which delivers constant i.v. flow rates using gravity. The Pumpette automatically maintains i.v. flow rates under changing conditions, whether the i.v. bag is full or almost empty. Changes in bed height do not affect the set rate, and the rate remains accurate no matter what changes in position the patient may make, from lying down to standing up. Fluctuations in venous pressure do not require re-setting of the rate, and the set rate is accurate over hours or days. The inexpensive and disposable Stat 2 Pumpettes are available in a variety of i.v. set configurations. They have full-dial visibility and are easy to use. Some situations still require an alarm or higher pressure from an electronic pump but the need for them is now greatly reduced. Master Medical Corporation, 7033 E. First Ave., Scottsdale, AZ 85251. (602) 957-9111 or (800) 962-8573.

Circle Reader Service No. 109
Call for Abstracts for Works-in-Progress

The Society of Nuclear Medicine
38th Annual Meeting
Tuesday, June 11–Friday, June 14, 1991
Cincinnati, OH Cincinnati Convention Center

The 1991 Scientific Program Committee and the Scientific & Teaching Sessions Committee solicit the submission of abstracts from members and nonmembers of The Society of Nuclear Medicine for the 38th Annual Meeting in Cincinnati, OH. Works-in-Progress accepted for the program will be published in a separate on-site show directory that will be distributed to all those who attend the meeting. The accepted Works-in-Progress will also be published in the September issue of the Journal of Nuclear Medicine and, for the Technologist Section, in the September issue of the Journal of Nuclear Medicine Technology. Original contributions on a variety of topics related to nuclear medicine will be considered, including:

- INSTRUMENTATION AND DATA ANALYSIS
- RADIOASSAY
- RADIOPHARMACEUTICAL CHEMISTRY
- DOSIMETRY/RADIOBIOLOGY
- NUCLEAR MAGNETIC RESONANCE CHEMISTRY
- CLINICAL SCIENCE APPLICATIONS
  - Bone/Joint
  - Cardiovascular (clinical and basic)
  - Endocrine
  - Gastroenterology
  - Neurology (clinical and basic)
  - Oncology (non-antibody)
  - Immunology (antibody)
  - Pediatrics
  - Pulmonary
  - Renal/Electrolyte/Hypertension
  - Hematology/Infectious Disease

Authors seeking publication for the full text of their papers are strongly encouraged to submit their work for immediate review to the JNM, and for the technologist section, to the JNMT.

Deadline for receipt of abstracts for Works-in-Progress is Monday, April 15, 1991.

The official abstract form for Works-in-Progress may be obtained from the October 1990 issue of the JNM or by calling or writing:

The Society of Nuclear Medicine
Att: Abstracts
136 Madison Avenue
New York, NY 10016-6760
Tel: (212) 889-0717
FAX: (212) 345-0221

CardioGen-82
Rubidium Rb 82 Generator

INDICATIONS AND USAGE
Rubidium chloride Rb 82 injection is a myocardial perfusion agent that is useful in distinguishing normal from abnormal myocardium in patients with suspected myocardial infarction.

CardioGen-82 (Rubidium Rb 82 Generator) must be used with an infusion system specifically labeled for use with the generator and capable of accurate measurement and delivery of doses of rubidium chloride Rb 82 injection not to exceed a single dose of 2200 MBq (60 mCi) and a cumulative dose of 4440 MBq (120 mCi) at a rate of 50 mL/min with a maximum volume per infusion of 100 mL and a cumulative volume not to exceed 200 mL. These performance characteristics reflect the conditions of use under which the drug development clinical trials were conducted.

Adequate data from clinical trials to determine the precise localization of myocardial infarction or identification of stress-induced ischemia have not been collected.

Positron emission tomographic (PET) instrumentation is recommended for use with rubidium chloride Rb 82 injection.

CONTRAINDICATIONS
None known.

WARNINGS
Caution should be used during infusion as patients with congestive heart failure may experience a transitory increase in circulatory volume load. These patients should be observed for several hours following the Rb-82 procedure to detect delayed hemodynamic disturbances.

PRECAUTIONS
General
Data are not available concerning the effect of marked alterations in blood glucose, insulin, or pH (such as is found in diabetes mellitus) on the quality of rubidium chloride Rb 82 scan. Attention is directed to the fact that rubidium is physiologically similar to potassium, and since the transport of potassium is affected by these factors, the possibility exists that rubidium may likewise be affected.

Rubidium chloride Rb 82 injection must be administered only with an appropriate infusion system capable of meeting the performance characteristics previously described. (See INDICATIONS AND USAGE.) The drug should be used only by those practitioners with a thorough understanding of the use and performance of the infusion system.

Repeat doses of rubidium chloride Rb 82 injection may lead to an accumulation of the longer lived radioactive contaminants strontium Sr 82 and strontium Sr 85.

Since eluate obtained from the generator is intended for intravenous administration, aseptic techniques must be strictly observed in all handling. Only additive free Sodium Chloride Injection USP should be used to elute the generator. Do not administer eluate from the generator if there is any evidence of foreign matter.

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

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

Cardiogenna, Mutagenesa, Impairment of Fertility
No long-term studies have been performed to evaluate carcinogenic potential, mutagenic potential, or to determine whether rubidium Rb 82 may affect fertility in males or females.

Pregnancy Category C
Animal reproductive studies have not been conducted with rubidium Rb 82. It is also not known whether rubidium Rb 82 can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. Rubidium Rb 82 should be given to pregnant women only if the expected benefits to be gained clearly outweigh the potential hazards.

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

Nursing Mothers
It is not known whether rubidium Rb 82 is excreted in human milk. Due to the short half-life of rubidium Rb 82 (75 sec) it is unlikely that the drug would be excreted in human milk during lactation. However, because many drugs are excreted in human milk, caution should be exercised when rubidium Rb 82 is administered to nursing women.

Pediatric Use
Safety and effectiveness in children have not been established.

ADVERSE REACTIONS
No adverse reactions specifically attributable to rubidium Rb 82 have been reported during controlled clinical trials.

HOW SUPPLIED
CardioGen-82 (Rubidium Rb 82 Generator) is supplied in the form of strontium Sr 82 adsorbed on a hydrous stannic oxide column with an activity of 90-150 millicuries Sr-82 at calibration time. The generator is encased in a lead shield surrounded by a labeled plastic container. Complete assay data for each generator is provided on the container label. CardioGen-82 (Rubidium Rb 82 Generator) is intended for use only with an appropriate, properly calibrated infusion system labeled for use with the generator.

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Circle Reader Service No. 77
We’ve removed your PET collar

PET perfusion studies without a cyclotron

CardioGen-82® (Rubidium Rb 82 Generator) is the only generator-based myocardial perfusion agent indicated for PET imaging.

Now in 45 to 60 minutes you can have PET images to help you distinguish normal from abnormal myocardium. All without the expense of a cyclotron!

The short 75-second half-life lowers the radiation burden to the patient. When incorporated into the Rubidium Infusion System, serial imaging of myocardial blood flow changes can be performed as often as every ten minutes.

The CardioGen-82 System also improves patient throughput and scheduling efficiency by enabling you to perform multiple studies in a short time.

Remove the PET collar from your department. Get the PET images you need in 45 to 60 minutes, without a costly cyclotron.

Rubidium-82 Infusion System

CardioGen-82® Rubidium Rb-82 Generator

Please see adjacent page for brief summary of prescribing information.

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