

# SIEMENS

## Head-to-head, nobody outperforms Siemens.

*"I've used many different brands of nuclear imaging equipment, but none live up to Siemens." —Nuclear Physician*

*"In this day and age, you need their kind of stability." —Chief Technologist*

*"Service is a Siemens high point. It's one of the main reasons we buy their nuclear medicine equipment." —Administrator*

Leadership technology. Rock-solid reliability. Service that keeps uptime up. These doctors and administrators are all talking about one thing: value in nuclear medicine equipment.

And they find it all in one company: Siemens.

Simply put, people depend on our equipment. The new Integrated DIACAM™ System continues to set the standard. And our second generation MULTISPECT™ Systems extend that reputation. Features like the revolutionary ICON™ interface bring interactive ease and flexibility to nuclear studies. And the new Integrated Console saves the two things most valuable in a nuclear department—space and time.

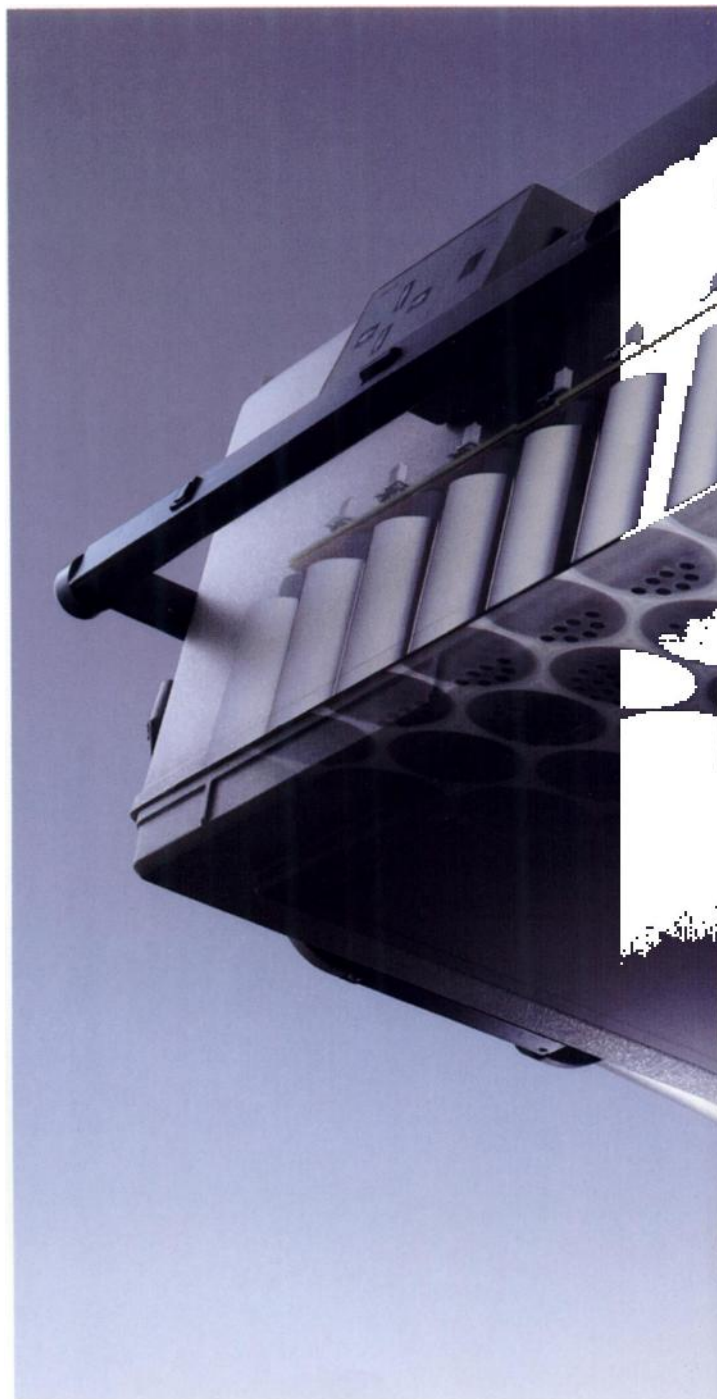
Advanced features, sensible designs, continuous improvements. At Siemens, we use our heads to keep you ahead in nuclear medicine.

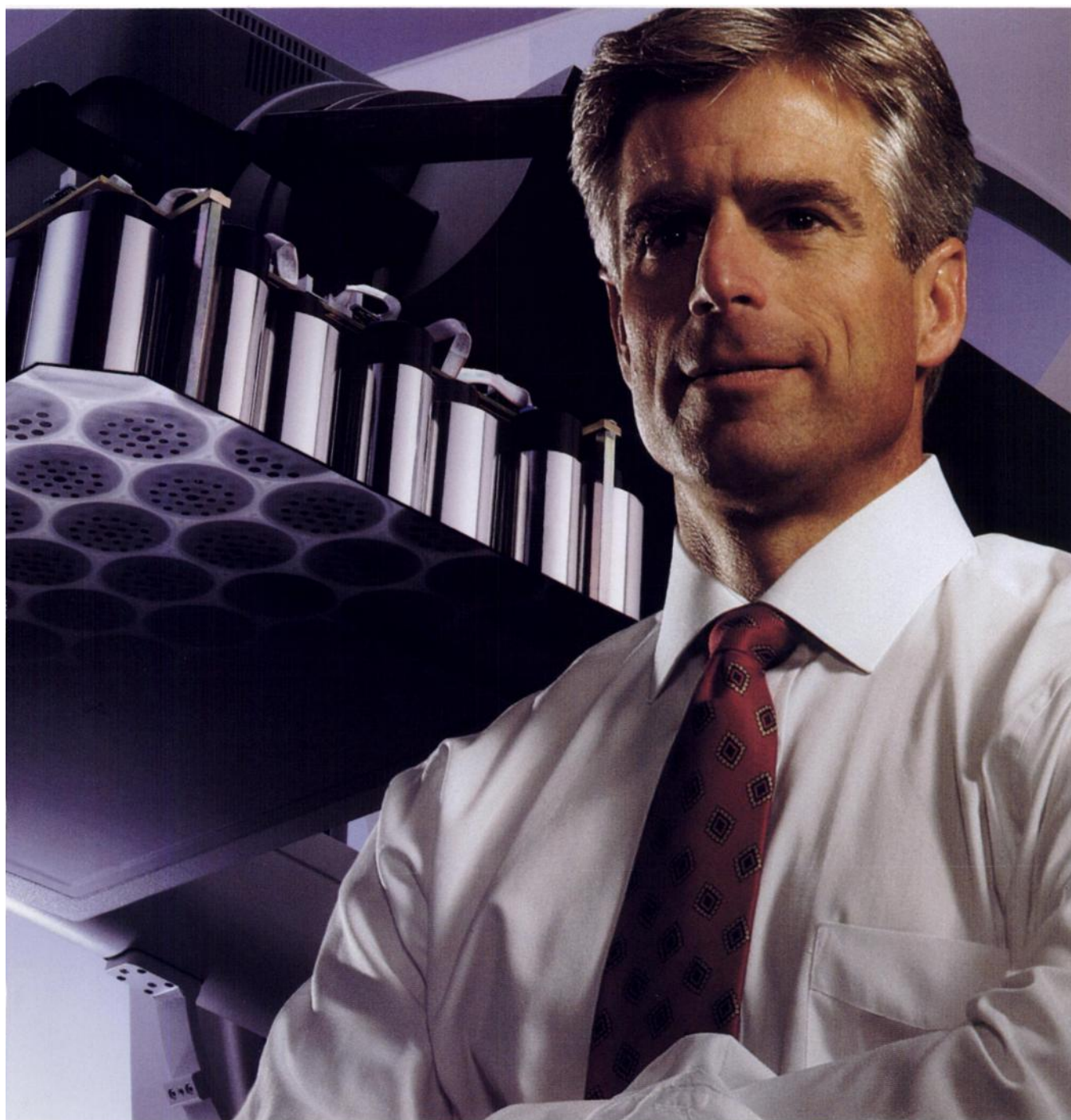


**Siemens Medical  
Systems, Inc.**

2501 North Barrington Road  
Hoffman Estates, IL 60195  
Telephone: 708-304-7252

**Siemens . . .  
technology in caring hands.**





Visit us at RSNA in Chicago, IL  
Booth 1533



# Freedom of choice

begins here

and here.



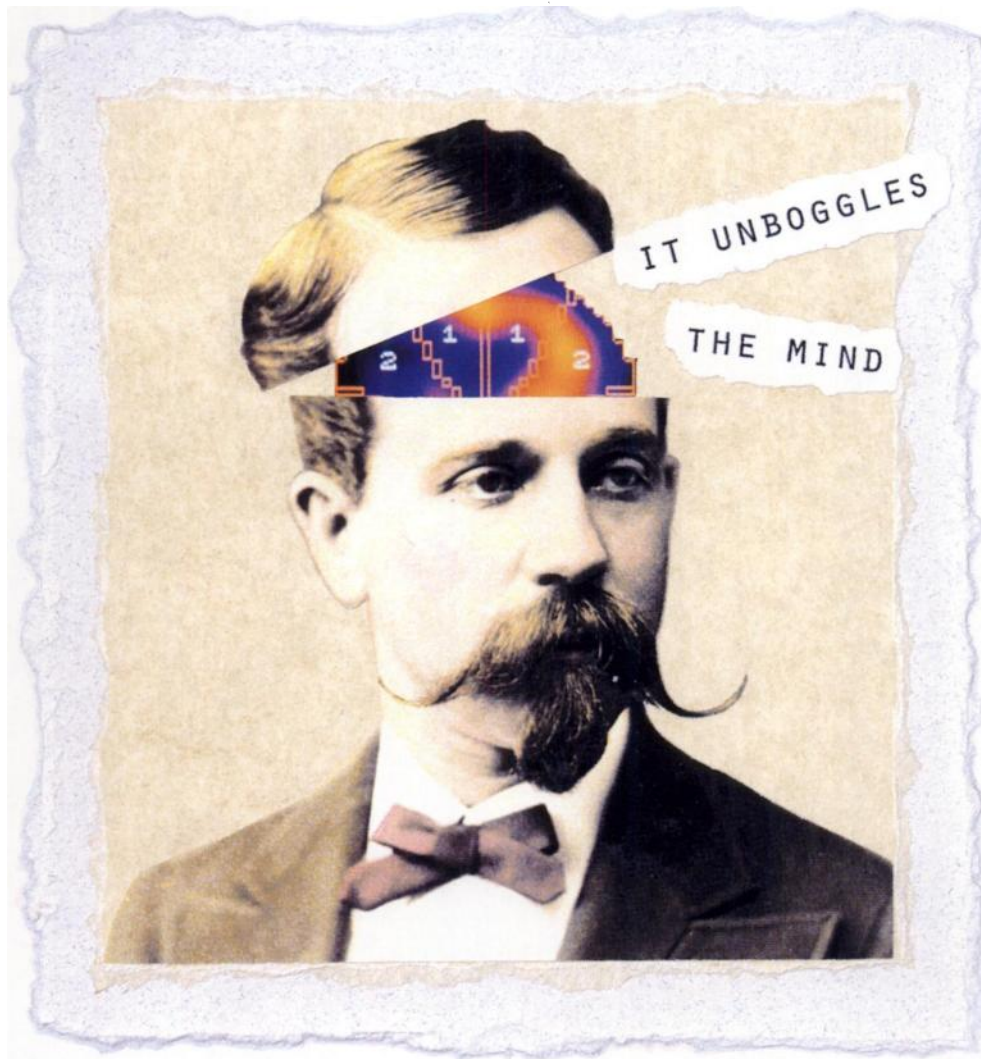
For all the thyroid uptake tests you need to handle quickly and accurately, there's really only one system capable of being compared to our computer-based, Capintec System 1000. It's our fast, accurate and economical CAPTUS® 500. Both feature on-screen prompts and spectrums, hard-copy printouts, and with the addition of a well detector let you do a variety of laboratory and wipe tests efficiently and easily. In fact, the only difficulty you'll ever have is simply choosing the system best suited to your needs. For more information, please call (800) 631-3826 today.



**CAPINTEC, INC.**

6 Arrow Road, Ramsey, NJ 07446  
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## PINNACLE'S CLINICAL SOFTWARE IS SO COMPREHENSIVE,



Medasys reveals advanced, new protocols for studying and diagnosing diseases like Alzheimer's, AIDS and others which will increasingly test your departments' expertise and imaging capabilities.

As you know, it's the software and its protocols which give an imaging system its greatest value. Now you can get the world's most complete library of software with our Pinnacle System.

Pinnacle allows you to choose from a greater selection of protocols and run up to four simultaneously. Users can set and save each protocol's parameters for greater ease of operation and continuity of results. With our multi-tasking capabilities, you'll see increased productivity. Most importantly, you can diagnose with total confidence, and stay on the leading edge with Medasys' continual software upgrades.



Medasys is continuing its tradition of opening minds to the unexpected possibilities of nuclear imaging.

Call today for a free consultation:

1.800.331.1958



**MEDASYS**

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Ann Arbor, MI 48108  
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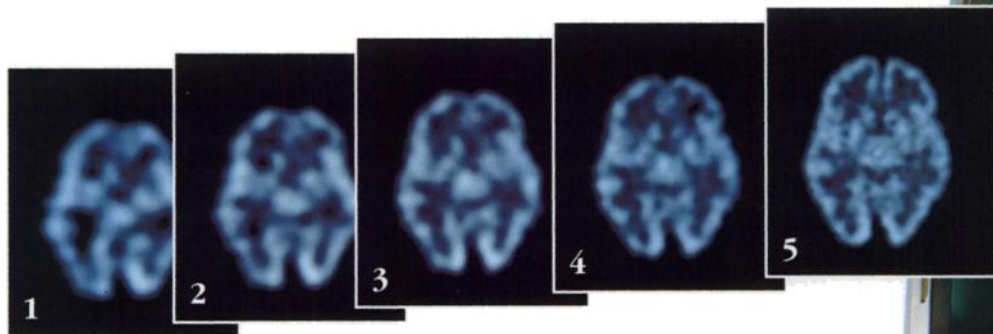


**A new gold standard in  
Nuclear Imaging:**

# **Helix<sup>TM</sup>**

**The latest member of the APEX family**

**The first  
Slip-Ring Nuclear Imaging System,  
with the unprecedented imaging power of  
continuous, high-speed orbiting**



*A sequence of five evolving SPECT images: Note improvement of image quality, yielding final resolution of 7mm (tomographic brain phantom scan, courtesy of Dr.J. Abramovici, Ixelle, Belgium).*

***Elscint***

*The Intelligent Image*

# **Events that changed the course of Nuclear Imaging:**

**1971–Elscint takes the lead in the 70's  
by introducing the industry's first image  
processing station, the VDP.**

**1981–Elscint sets the trend for the 80's  
by introducing the first digital gamma camera,  
the APEX.®**

**1991–Elscint introduces...**

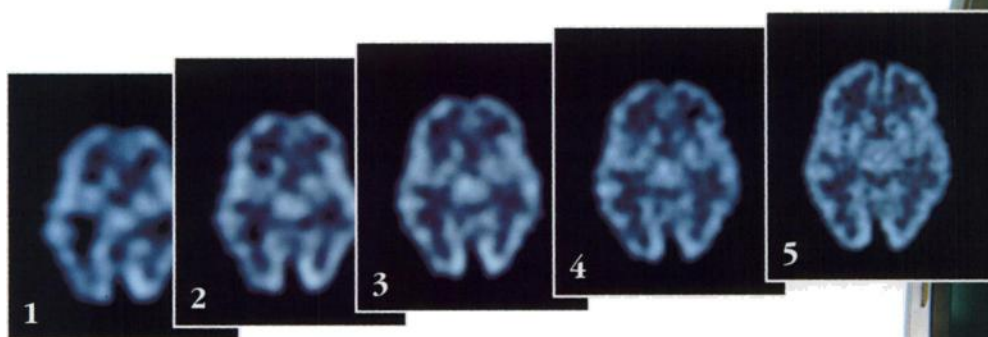


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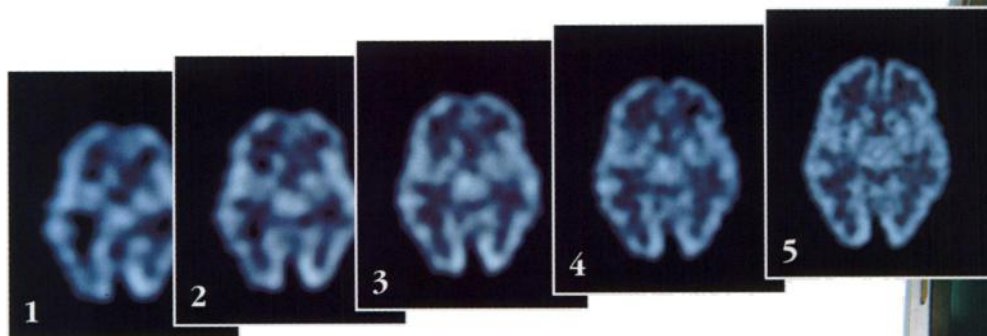


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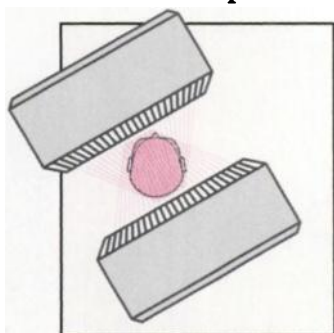


*A sequence of five evolving SPECT images: Note improvement of image quality, yielding final resolution of 7mm (tomographic brain phantom scan, courtesy of Dr. J. Abramovici, Ixelle, Belgium).*

***Elscint***  
*The Intelligent Image*

## Dual-head SPECT: triple efficiency

You can perform Helix tomographic

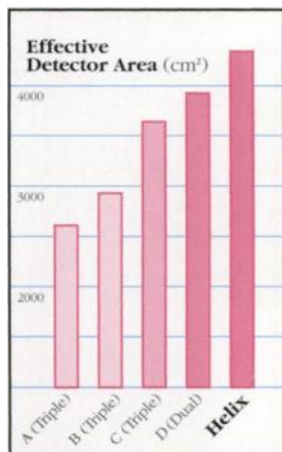


*Ultraflared™ fan-beam collimators: more than triple the sensitivity*

scans at up to 3.5 times the efficiency of conventional imagers, because Helix's jumbo-size detectors cover an area of 4320 square centimeters.

This means maximum SPECT detection efficiency, and makes unsurpassed 7mm system resolution images achievable.

And only Helix can span a 400mm-long segment in a single SPECT scan. Not to mention our unique Scatter-Free Imaging™ package built right into the system for much improved contrast and resolution.



*Helix's 4320 cm² detector area – unsurpassed in the industry*

## SPECT and Whole-Body: the best of both worlds

Face it, most multi-head systems just can't do whole-body scans. Not so with Helix.

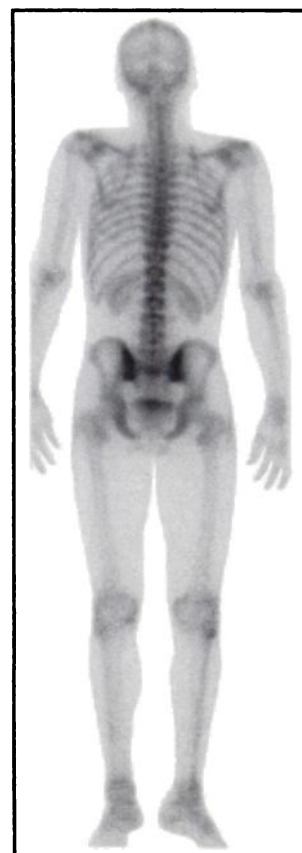
Helix gives you the best of SPECT, the best of Whole-Body, with no compromises,

no trade-offs.

Two super-size rectangular detectors provide 3.5mm resolution\* across the entire field. Plus, microcast collimators and Scatter-Free Imaging give you the highest lesion detectability available.

And Helix's pre-programmable, body contoured "smart" scans, with 1280 x 1024 display, give you what you're looking for – the best possible Whole-Body images.

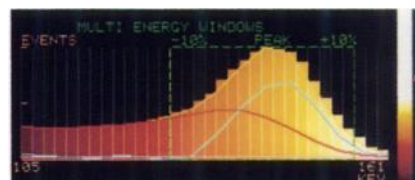
No compromises, no trade-offs – no excuses.



*540 x 400 mm jumbo detectors and 3.5 mm resolution optimize Whole-Body scanning*

## Planar imaging: Scatter-Free and more

With Scatter-Free Imaging, the system "learns" the local scatter characteristics



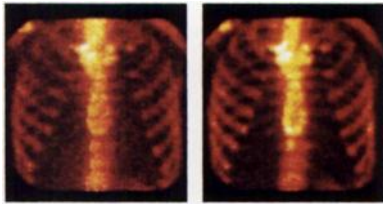
*Multi-window acquisition and energy-weighted processing yield Scatter-Free Imaging.*

and makes corrections based on the measured energy spectrum, for

\*HR configuration



# Helix's golden aspect of Nuc



*20% window image*

*Scatter-Free image*

each pixel, for each image, for each patient.

Result: better image contrast, better spatial resolution,

better lesion detectability.

For truly complete imaging, jumbo-size 400x540mm detectors with 3.5mm resolution\* maintain image clarity all the way across the entire field.

## A triumph of technology: for now and for the future

Helix represents a culmination of efforts, based on a solid R&D foundation and drawing from a decade of experience gained over the course of close to 2000 APEX installations worldwide.

Helix's Slip-Ring technology will carry it well into the 21st century, together with such features as: a 100 MHz infra-red optronics communications link... an Intel™ i486 33 MHz computer platform... truly modular design... and advanced detector technology.

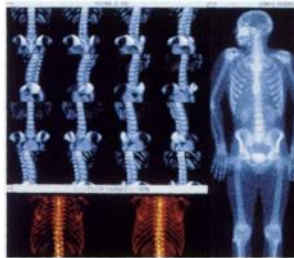


*Helix's high-speed 100 MHz infra-red optronics data link frees SPECT from cable tangles*

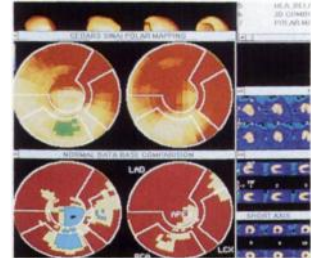
## Clinical software: nobody comes even close to APEX. Nobody.

Elscint has – right now – the most complete range of nuclear imaging clinical software in the industry.

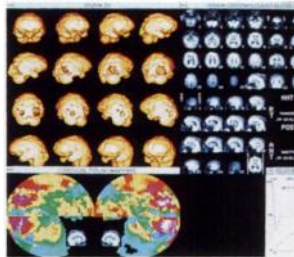
Helix draws on more than a decade of



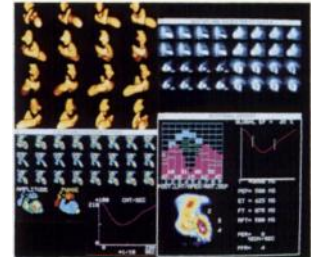
*3D volume rendering bone scan*



*Cedars-Sinai quantitative SPECT*



*HMPAO brain SPECT polar mapping*



*Gated tomographic wall motion evaluation*

pioneering activity in digital nuclear imaging and over 20 years of medical image processing experience.

Built-in CLIP™ programs cover the widest spectrum of nuclear medicine processing protocols, each optimized for a specific task, and clinically validated over the last decade.

Simply put, when it comes to user-tested, user-available software, nobody comes close to APEX. Nobody.

# **Events that changed the course of Nuclear Imaging:**

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# Helix:

## The dual-head, multi-purpose nuclear imager featuring Slip-Rings.

### Only from Elscint.



*"I am easily satisfied  
with the very best."*

Winston Churchill

***Elscint***  
*The Intelligent Image*

**BELGIUM:** ZAVENTEM, TEL: (2) 720.92.46 **BRAZIL:** SAO PAULO, TEL: (11) 869-4644 **CANADA:** MARKHAM, ONT. TEL: (416) 474-1229  
**FRANCE:** BAGNOLET, TEL: (14) 8-57-08-18 **GERMANY:** WIESBADEN, TEL: (61) 22-7070 **ITALY:** MILANO, TEL: (2) 376-1976  
**MEXICO:** MEXICO D.F., TEL: (2) 545-8018 **SPAIN:** BARCELONA, TEL: (3) 209.21.99 **UNITED KINGDOM:** WATFORD, HERTS, TEL: (923) 239-511  
**U.S.A.:** HACKENSACK, N.J., TEL: (800) 228-7226, (201) 342-2020

APEX, CLIP, Helix, Ultraflared, RingMaster, Evolving-Images, RollBack, Scatter-Free Imaging, Touch-Ruler, ApexNet, ApexView and MasterMind are trademarks of Elscint Ltd.  
Other names are trademarks of their respective owners.



# touch. In every lear Imaging.

## **Helix workstation: perfect harmony**

Think of a workstation as a symphony orchestra with instruments like 32 MB RAM, 128 KB cache memory, i486 33 MHz CPU, 800 MB optical disk, 700 MB hard disk, 1280 x 1024 display, 19" color screen, IBM standard operating system and Ethernet.™

All world-class performers, to be sure. But only if they're playing from the same sheet of music.

Our Helix symphony is a harmonious combination of raw computer power; Elscint's industry-leading clinical software repertoire; real-time acquisition and reconstruction; IBM standard window management; full-simultaneity; multi-tasking; and the most powerful NM PACS in the industry.

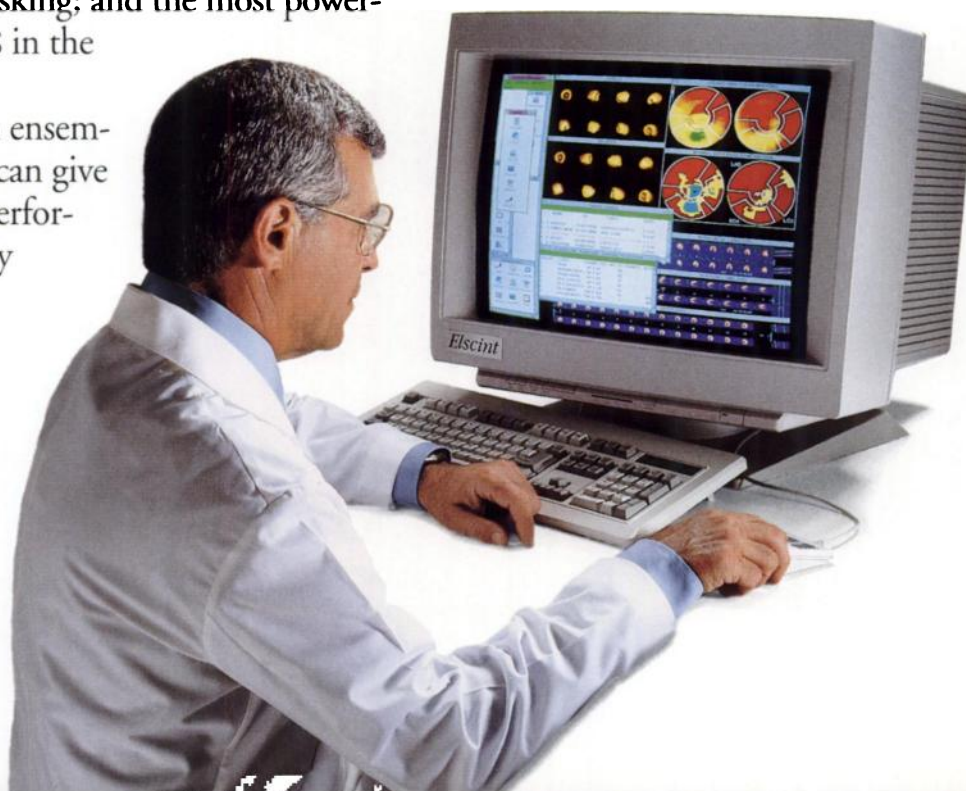
Quite an ensemble. So you can give a virtuoso performance, every time.

## **Helix: an ergonomic marvel**

A solid, fixed gantry... a superbly balanced cantilevered patient handling system for precise scanning... programmable "home" positions for easy patient set-up and collimator exchange... Touch-Ruler™ for single-touch Whole-Body scans... low-attenuation, ultra-thin interchangeable pallets of carbon fiber composite for high-resolution Whole-Body and SPECT scans... compact gantry design... 2.7-inch "brain reach" for better brain SPECT.

We've addressed every last detail of design to give you the ultimate imaging system.

*Light-weight, interchangeable pallets facilitate patient comfort for SPECT and Whole-Body scans.*



## The well-connected imager: leader of the PACS

Decide on Helix, and you instantaneously become a member of the most advanced NM PACS in the industry – right from day one.

If you have other Elscint APEX systems, Helix connects right into data communication and into centralized data and archive management via ApexNet,<sup>™</sup> Elscint's NM PACS.

Multi-system connectivity is facilitated with more than 90% of the cameras and processors produced by other vendors like General Electric, Siemens, ADAC and Picker, or computers by DEC, IBM and others.

Helix provides instant access to data. ApexNet lets you view and process patient studies from different departments simultaneously, and ApexView,<sup>™</sup> Elscint's remote viewing station, puts you in the picture even at home.

## Service à la MasterMind<sup>™</sup>: no time for down time

At Elscint we value your time. And Helix service support is among the world's most advanced thanks to DigitalGuard, FieldWatch, and MasterMind.<sup>™</sup>

DigitalGuard is a built-in optronic system for periodic automatic calibration of the gamma camera.



*Helix: global connectivity...all the way home*

FieldWatch is a computerized, quick-response service network.

MasterMind is an artificial intelligence "expert" system, providing every

on-site nuclear medicine field engineer with the constantly updated troubleshooting expertise of the company's leading scientists and engineers.

The result: service done right the first time, every time.



*MasterMind: Artificial Intelligence-guided service*

## Helix: the intelligent investment

When it comes to multi-detector systems, Helix could be the easiest, most logical product choice you ever made. You simply can't go wrong.

With Helix you know that every referral can be imaged, every nuclear medicine

procedure can be performed. No compromises, absolutely none.

Multi-Detector Evaluation	Helix	Product A	Product B
Slip-Ring continuous rotation	✓		
Cardiac SPECT	✓		
Brain SPECT	✓		
Whole-Body imaging	✓		
Scatter-Free Imaging	✓		
Software repertoire	✓		
Workstation power	✓		
Complete PACS	✓		
Advanced ergonomics	✓		
Immunity from obsolescence	✓		





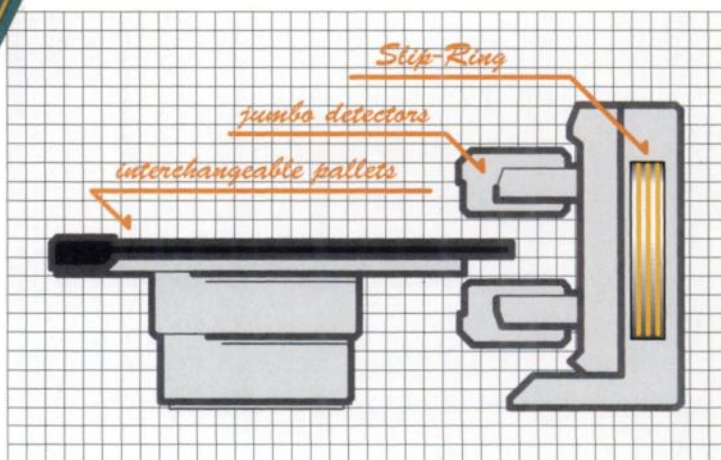
**Look at Elscint's new Helix,** and you're looking at the future of nuclear imaging technology.

A whole new world of imaging brought to life by our RingMaster™ Slip-Ring System. Take Evolving-Images™ and RollBack™, for example, two terms that are probably new to you.

With Evolving-Images you can now display and update SPECT images *as* you acquire them, not only *after* the job is done.

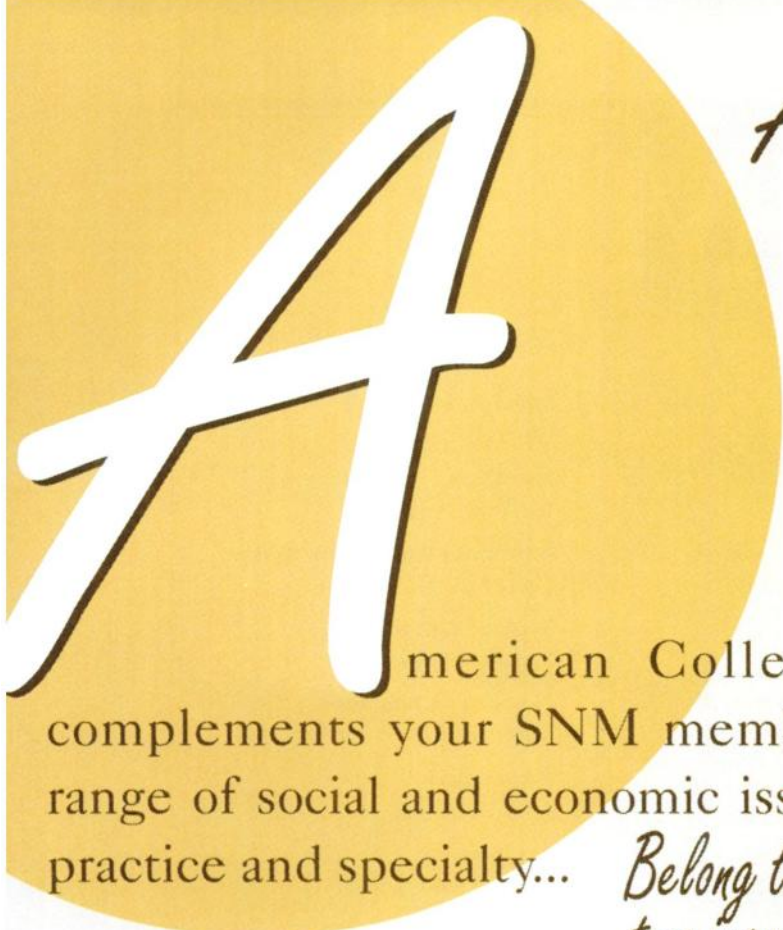
With RollBack, if a patient moves during a scan, you can recall the reconstructed image, as it was just prior to the movement, in order to assess its diagnostic value. Saves re-takes, saves time, saves money.

Helix's continuous-rotation Slip-Ring technology will open new horizons in nuclear imaging, such as Whole-Body SPECT spiral imaging, cardiac SPECT beat rejection and SPECT brain perfusion.



*Large-bore Slip-Rings in the "heart" of the Helix gantry*





# ACNP & SNM: You Need Them Both!

American College of Nuclear Physicians  
complements your SNM membership by addressing a wide  
range of social and economic issues vital to the future of your  
practice and specialty...

*Belong to both and maximize the benefits these  
two important professional societies can offer!*

## Add to Your Professional Excellence

Improve your skills and enhance your practice with:

- The ACNP Practice Audit Program  
– *the most in-depth assessment available to  
confirm your quality assurance program*
- Practice Enhancement Workshops  
– *optimize billing and reimbursement procedures*
- Continuing Medical Education Programs
- Monthly Newsletters
- ACNP's Resource Center and Library

## Build Your Practice

Network with referring physicians, academia,  
industry and others in the field of Nuclear  
Medicine via the:

- ACNP Membership Directory  
– *with names, addresses, phone numbers and  
fax numbers of all College members*
- Professional and Public Information Program  
– *promoting the awareness and utilization of  
Nuclear Medicine*
- Speakers Bureau

## Stay Informed

Keep on top of the latest legislation and regulations  
affecting Nuclear Medicine through the:

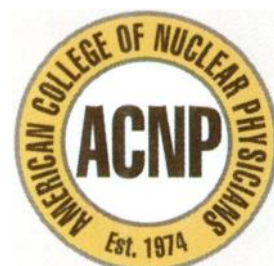
- ACNP Annual Meeting
- ACNP Interim Meeting
- Scanner – *our monthly newsletter*

## Advance the Science of Nuclear Medicine

Fight costly and unnecessary regulations.

## Join and Receive a FREE Practice Audit Manual (Valued at \$100)

— the complete manual used to prepare for the  
rigorous ACNP Practice Audit.  
It contains all the standards and  
requirements that must be satisfied in  
order to receive ACNP Certification —  
the only way to determine the true  
quality and excellence of a Nuclear  
Medicine Operation. Use it to evaluate  
your own practice's strengths and  
weaknesses.



**Which  
imaging company  
grew a record 192-fold  
over the past 21 years ? ...**

**... and has MRI, CT, Nuclear Medicine  
and Ultrasound installations  
in 54 countries worldwide ?**

- ☐ **Toshiba**
- ☐ **General Electric**
- ☐ **Elscint**
- ☐ **Picker**
- ☐ **Siemens**
- ☐ **Hitachi**
- ☐ **Philips**

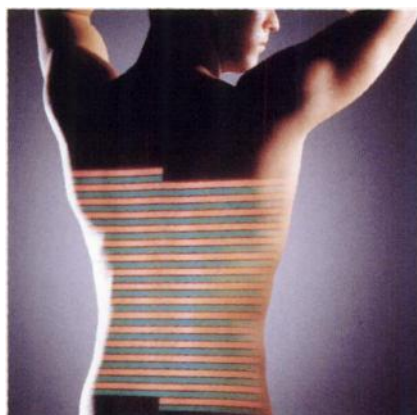
# The answer Here are some

## A long list of imaging firsts: CT-Twin™ is our latest.

For more than two decades the name Elscint has been synonymous with innovation ... from our introduction of the industry's first medical imaging workstation to our most recent breakthrough, unique Twin-Beam™ technology. At the heart of the CT-Twin imager, Twin-Beam delivers simultaneous dual-slice imaging in CT, opening a new era of Double-Helix™ spiral scanning.



Spiral scanning

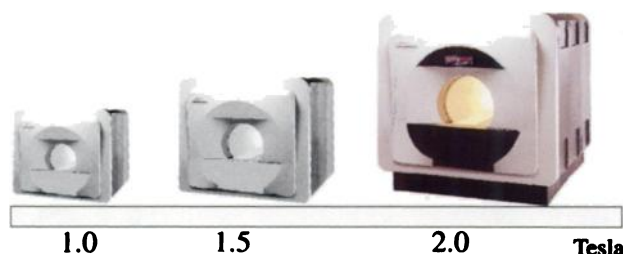


Double-Helix spiral scanning

*Spiral volume scanning (top picture) has greatly advanced CT. But CT-Twin's Double-Helix spiral scanning (lower picture) goes even further, **doubling** spiral performance. For the **same** scan time, scan volume is **doubled**.*

## Daring design solutions: highest field MRI and more.

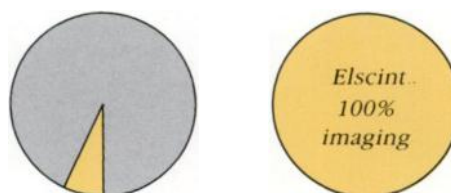
Never a follower, Elscint is bold in expanding medical-imaging frontiers ... from the highest count rate in nuclear medicine to our uncompromising solutions in high-field MRI. With our GYREX® 2-Tesla, we went all the way, offering the highest field-strength authorized by federal health agencies for routine clinical use.



*Elscint's GYREX 2-Tesla features an uncompromised 2-tesla magnet field strength.*

## Focused business philosophy: 100% medical imaging.

Elscint has a single purpose. Totally dedicated to medical imaging, our philosophy is to master all facets of this complex business, from clinical needs to service technology. This enables rapid response to the evolving needs of the radiology community.



*Medical imaging is only 6-8% of the total business for most multi-modality companies; for Elscint it is 100%.*



# is Elscint. reasons why.



2200

## Global strategy from day one.

Medical imaging knows no national boundaries, and Elscint has been an international company from its very inception. With a dozen wholly-owned subsidiaries and scores of

representative offices worldwide, we have installed thousands of imaging systems in 54 countries.



*From Warsaw to Beijing, L.A. to Brussels, many of the thousands of APEX users around the world regularly convene to exchange information and learn about new developments.*

83 86 89 92

*Today, more than 2000 nuclear medicine systems bear the "APEX" nameplate.*

**Elscint**  
*The Intelligent Image*

**U.S.A.** Elscint Inc. (201) 342-2020; 1-800-228-7226 **Belgium** Elscint N.V./S.A. (2) 720.92.46;  
**Brazil** Elscint Ltda. (011) 869-4644; **Canada** Elscint Ltd. (416) 474-1229;  
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# HIGH PERFORMANCE IS A HABIT AT VICTOREEN.

Victoreen Inc., is the world's largest manufacturer of radiation measurement instruments, the largest distribution network worldwide and we now have the "largest" (86%) open area on the Model RP-1 Pancake Probe series. The unique hexagonal shape, ultra thin stainless steel mesh work surpasses beta particle detection in count rate and percent detection efficiency. It not only provides equivalent or better detection capability than a copper-beryllium screen, it also provides the ultimate in durability of stainless steel.

The Model RP-1 was designed to maximize detection efficiency for gamma, beta, and alpha detection and compatible with a large array of G-M counting survey instruments. If you agree bigger is better...

For additional information, request Report RP-1 by calling (216) 248-9300 Customer Service.



Advanced Technology Working for People and the Environment.



Visit us at RSNA in Chicago, IL  
Booths 1924 & 5527

VICTOREEN, INC.  
6000 Cochran Road  
Cleveland, Ohio 44139-3395  
Phone: (216) 248-9300  
FAX: (216) 248-9301

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VICTOREEN GmbH  
A Subsidiary of VICTOREEN, INC.  
Eibenstrasse 13  
8012 Ottobrunn bei  
Munich, Germany



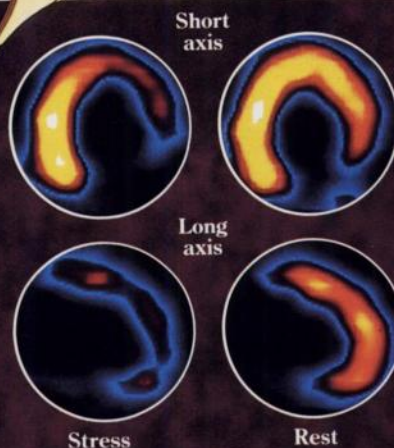
*Some cardiac  
imaging agents  
leave something out  
of the picture...*

**INFORMATION  
& THROUGHPUT**



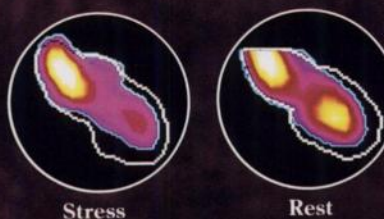
# MORE INFORM

## Perfusion Study— Identifying Ischemic Areas



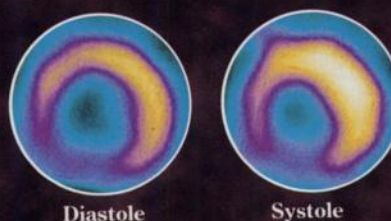
A patient was imaged with CARDIOLITE for perfusion and first pass-function assessment. These tomographic slices show a fixed inferolateral perfusion defect in the territory of old inferior myocardial infarction. There is also a reversible anterolateral defect in the territory of a diagonal branch of the LAD. Coronary angiography showed a totally occluded RCA and a tight proximal stenosis of a large first diagonal branch of the LAD.

## First Pass— Function



End-diastolic perimeter (white line) and end-systolic image acquired following rest injection of CARDIOLITE show LV dilatation with reduced (30%) LVEF and inferior hypokinesis. Stress perimeter and image acquired following exercise injection show decreased anterolateral wall motion, which corresponds anatomically to the perfusion defect seen on the perfusion scans above.

## Gated Study (SPECT)— Wall Motion



Gated short axis SPECT studies (imaged with CARDIOLITE) of a 64-year-old male with hypertensive cardiomyopathy demonstrate an inferoseptal myocardial infarction. The increased color intensity from diastole to systole represents myocardial wall thickening.

Please see last page of advertisement for Brief Summary of Prescribing Information.



*New expanded uses  
fill in the gaps with more  
myocardial information*

# ATION

From identifying ischemia to localizing infarction, CARDIOLITE now fills in all the gaps for a complete clinical picture. With a CARDIOLITE study, you can assess the perfusion status of your patients...and much more. CARDIOLITE can also fill in myocardial information that is missing from thallium imaging—wall motion from gated studies and evaluation of function with the first-pass technique.

And, image after image, you won't find any gaps in quality, because CARDIOLITE provides the superior clarity of technetium.



## Cardiolite<sup>®</sup>

Kit for the preparation of Technetium Tc99m Sestamibi

*Fills in the gaps...with clarity that lasts*

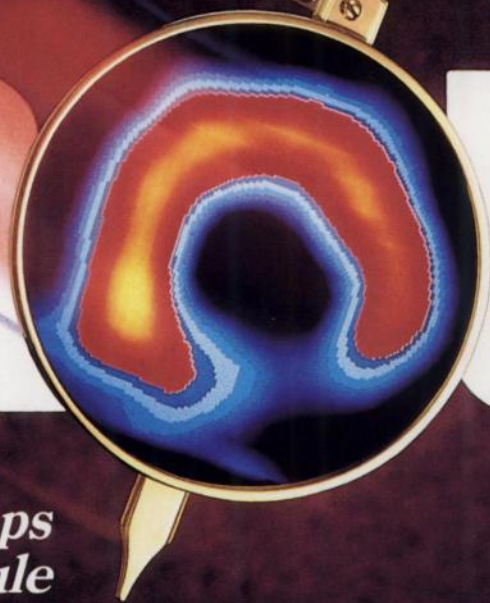
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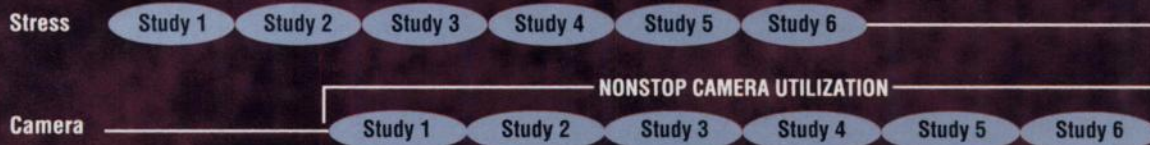
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# THROUGH

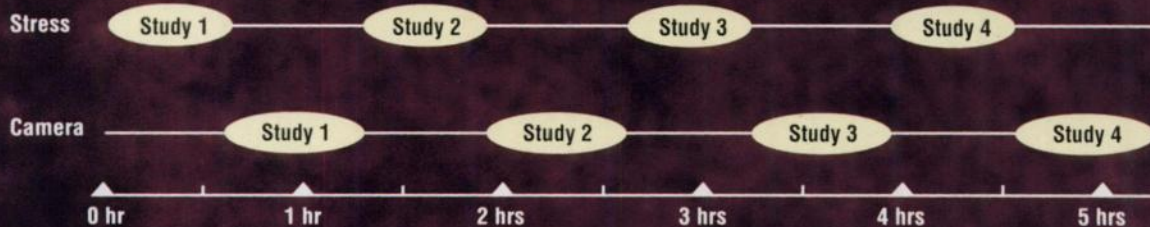


*CARDIOLITE fills in gaps  
in your imaging schedule*

## *CARDIOLITE: Institution 1*



## *Thallium: Institution 2*



Due to the lack of clinically significant redistribution and the slow washout of CARDIOLITE, patients can be batched for stress injection, then imaged one after another over a broader period of time. In comparison, imaging with thallium must take place almost immediately; therefore the camera is frequently idle.

*Please see last page of advertisement for Brief Summary of Prescribing Information.*



*Improved  
camera utilization  
fills in scheduling gaps  
for greater throughput*

CARDIOLITE virtually eliminates the gaps of time between camera use often associated with thallium. That's because CARDIOLITE allows you to uncouple the

# THROUGHPUT

time of injection from the time of imaging. Patients can be batched for stress, then imaged at any time... up to 4 hours after injection. So your patients are ready and waiting for the camera, not the other way around.

As seen in the diagram, this permits the camera schedule to be filled all day...so there are no gaps in productivity.



**Cardiolite<sup>®</sup>**  
Kit for the preparation of Technetium Tc99m Sestamibi

*Fills in the gaps...with clarity that lasts*

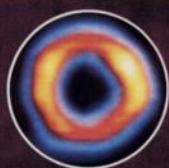
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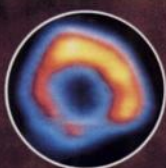
# SUPERIOR

## INFORMATION & THROUGHPUT

*Filling in the gaps  
with the superior  
clarity of technetium*



CARDIOLITE



Thallium

Rest studies of a 37-year-old male with a 45-inch chest circumference and slightly elevated left hemidiaphragm using CARDIOLITE and thallium-201 as the imaging agents. The images with CARDIOLITE are of superior quality, with less regional variation in count density and less hemidiaphragmatic attenuation.

CARDIOLITE fills in the information gaps to provide more information...all with the superior image clarity of technetium. Through new, expanded uses, CARDIOLITE gives you a complete CAD picture... from ischemia to infarction. CARDIOLITE also fills in gaps in your imaging schedule through the ability to uncouple the time of injection from the time of imaging. Patients can be batched, then imaged one after the other...virtually eliminating downtime for your camera.

More information. Greater throughput.  
CARDIOLITE fills your cardiac imaging needs.



# Cardiolite<sup>®</sup>

Kit for the preparation of Technetium Tc99m Sestamibi

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*Fills in the gaps...with clarity that lasts*

*Please see last page of advertisement for Brief Summary of Prescribing Information.*

## Brief Summary

# Cardiolite

Kit for the preparation of Technetium Tc99m Sestamibi

## FOR DIAGNOSTIC USE

**DESCRIPTION:** Each 5ml vial contains a sterile, non-pyrogenic, lyophilized mixture of:

Tetrakis (2-methoxy isobutyl isonitrile) Copper (I) tetrafluoroborate - 1.0mg  
Sodium Citrate Dihydrate - 2.6mg  
L-Cysteine Hydrochloride Monohydrate - 1.0mg  
Mannitol - 20mg  
Stannous Chloride, Dihydrate, minimum ( $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ ) - 0.025mg  
Stannous Chloride, Dihydrate, ( $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ ) - 0.075mg  
Tin Chloride (Stannous and Stannic) Dihydrate, maximum (as  $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ ) - 0.086mg

Prior to lyophilization the pH is adjusted with HCl to 5.3-5.9. 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, oxidant-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  $\text{Tc99m}[\text{MIBI}]_6^+$  where MIBI is 2-methoxy isobutyl isonitrile.

**INDICATIONS AND USAGE:** CARDIOLITE, Kit for the preparation of Technetium Tc99m Sestamibi is a myocardial perfusion agent that is useful in the evaluation of ischemic heart disease. CARDIOLITE, Kit for the preparation of Technetium Tc99m Sestamibi is useful in distinguishing normal from abnormal myocardium and in the localization of the abnormality, in patients with suspected myocardial infarction, ischemic heart disease or coronary artery disease. Evaluation of ischemic heart disease or coronary artery disease is accomplished using rest and stress techniques.

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

Rest-exercise imaging with Tc99m Sestamibi in conjunction with other diagnostic information may be used to evaluate ischemic heart disease and its localization.

In clinical trials, using a template consisting of the anterior wall, inferior-posterior wall and isolated apex, localization in the anterior or inferior-posterior wall in patients with suspected angina pectoris or coronary artery disease was shown. Disease localization isolated to the apex has not been established. Tc99m Sestamibi has not been studied or evaluated in other cardiac diseases.

It is usually not possible to differentiate recent from old myocardial infarction or to differentiate recent myocardial infarction from ischemia.

**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 safe, accepted clinical procedure. Infrequently, death has occurred 4 to 24 hours after Tc99m Sestamibi use and is usually associated with exercise stress testing (See Precautions).

### 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 preparative 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.

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.

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

The most frequent exercise stress test endpoints, which resulted in termination of the test during controlled Tc99m Sestamibi studies (two-thirds were cardiac patients) were:

Fatigue	35%
Dyspnea	17%
Chest Pain	16%
ST-depression	7%
Arrhythmia	1%

#### Carcinogenesis, Mutagenesis, Impairment of Fertility

In comparison with most other diagnostic technetium labeled radiopharmaceuticals, the radiation dose to the ovaries (1.5rads/30mCi at rest, 1.2 rads/30mCi at exercise) is high. Minimal exposure (ALARA) is necessary in women of childbearing capability. (See Dosimetry subsection in DOSAGE AND ADMINISTRATION section.)

The active intermediate,  $[\text{Cu}(\text{MIBI})_2\text{BF}_4]$ , was evaluated for genotoxic potential in a battery of five tests. No genotoxic activity was observed in the Ames, CHO/HPRT and sister chromatid exchange tests (all *in vitro*). At cytotoxic concentrations ( $\geq 20\mu\text{g}/\text{ml}$ ), an increase in cells with chromosome aberrations was observed in the *in vitro* human lymphocyte assay.  $[\text{Cu}(\text{MIBI})_2\text{BF}_4]$  did not show genotoxic effects in the *in vivo* mouse micronucleus test at a dose which caused systemic and bone marrow toxicity ( $9\text{mg}/\text{kg}$ ,  $> 600 \times$  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.

#### 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. Cases of angina, chest pain, and death have occurred (See WARNINGS and PRECAUTIONS). The following adverse reactions have been rarely reported: signs and symptoms consistent with seizure occurring shortly after administration of the agent; transient arthritis in the wrist joint; and severe hypersensitivity, which was characterized by dyspnea, hypotension, bradycardia, asthenia and vomiting within two hours after a second injection of Technetium Tc99m Sestamibi.

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

370-1110MBq (10-30mCi)

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.

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 15-25°C before and after reconstitution.

**RADIATION DOSIMETRY:** The radiation doses to organs and tissues of an average patient (70kg) per 1110MBq (30mCi) of Technetium Tc99m Sestamibi injected intravenously are shown in Table 4.

Table 4. Radiation Absorbed Doses from Tc99m Sestamibi

Organ	Estimated Radiation Absorbed Dose			
	2.0 hour void		4.8 hour void	
	rads/ 30mCi	mGy/ 1110MBq	rads/ 30mCi	mGy/ 1110MBq
Breasts	0.2	2.0	0.2	1.9
Gallbladder Wall	2.0	20.0	2.0	20.0
Small Intestine	3.0	30.0	3.0	30.0
Upper Large Intestine Wall	5.4	55.5	5.4	55.5
Lower Large Intestine Wall	3.9	40.0	4.2	41.1
Stomach Wall	0.6	6.1	0.6	5.8
Heart Wall	0.5	5.1	0.5	4.9
Kidneys	2.0	20.0	2.0	20.0
Liver	0.6	5.8	0.6	5.7
Lungs	0.3	2.8	0.3	2.7
Bone Surfaces	0.7	6.8	0.7	6.4
Thyroid	0.7	7.0	0.7	6.8
Ovaries	1.5	15.5	1.6	15.5
Testes	0.3	3.4	0.4	3.9
Red Marrow	0.5	5.1	0.5	5.0
Urinary Bladder Wall	2.0	20.0	4.2	41.1
Total Body	0.5	4.8	0.5	4.8

Organ	Stress			
	2.0 hour void		4.8 hour void	
	rads/ 30mCi	mGy/ 1110MBq	rads/ 30mCi	mGy/ 1110MBq
Breasts	0.2	2.0	0.2	1.8
Gallbladder Wall	2.8	28.9	2.8	27.8
Small Intestine	2.4	24.4	2.4	24.4
Upper Large Intestine Wall	4.5	44.4	4.5	44.4
Lower Large Intestine Wall	3.3	32.2	3.3	32.2
Stomach Wall	0.5	5.3	0.5	5.2
Heart Wall	0.5	5.6	0.5	5.3
Kidneys	1.7	16.7	1.7	16.7
Liver	0.4	4.2	0.4	4.1
Lungs	0.3	2.6	0.2	2.4
Bone Surfaces	0.6	6.2	0.6	6.0
Thyroid	0.3	2.7	0.2	2.4
Ovaries	1.2	12.2	1.3	13.3
Testes	0.3	3.1	0.3	3.4
Red Marrow	0.5	4.6	0.5	4.4
Urinary Bladder Wall	1.5	15.5	3.0	30.0
Total Body	0.4	4.2	0.4	4.2

Radiopharmaceutical Internal Dose Information Center, July 1990, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37831, (615) 576-3449.

**HOW SUPPLIED:** Du Pont Radiopharmaceutical's CARDIOLITE\*, 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-pyrogenic.

Prior to lyophilization the pH is between 5.3-5.9. The contents of the vials are lyophilized and stored under nitrogen. Store at 15-25°C before and after reconstitution. Technetium Tc99m Sestamibi contains no preservatives. Included in each two (2) vial kit are one (1) package insert, six (6) vial shield labels and six (6) radiation warning labels. Included in each five (5) vial kit are one (1) package insert, six (6) vial shield labels and six (6) radiation warning labels. Included in each thirty (30) vial kit are 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 pursuant to section 35.11 and section 35.200 of Title 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.

#### Marketed by

Du Pont Radiopharmaceutical Division  
The Du Pont Merck Pharmaceutical Co.

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Billerica, Massachusetts, USA 01862

For ordering Tel. Toll Free: 800-225-1572

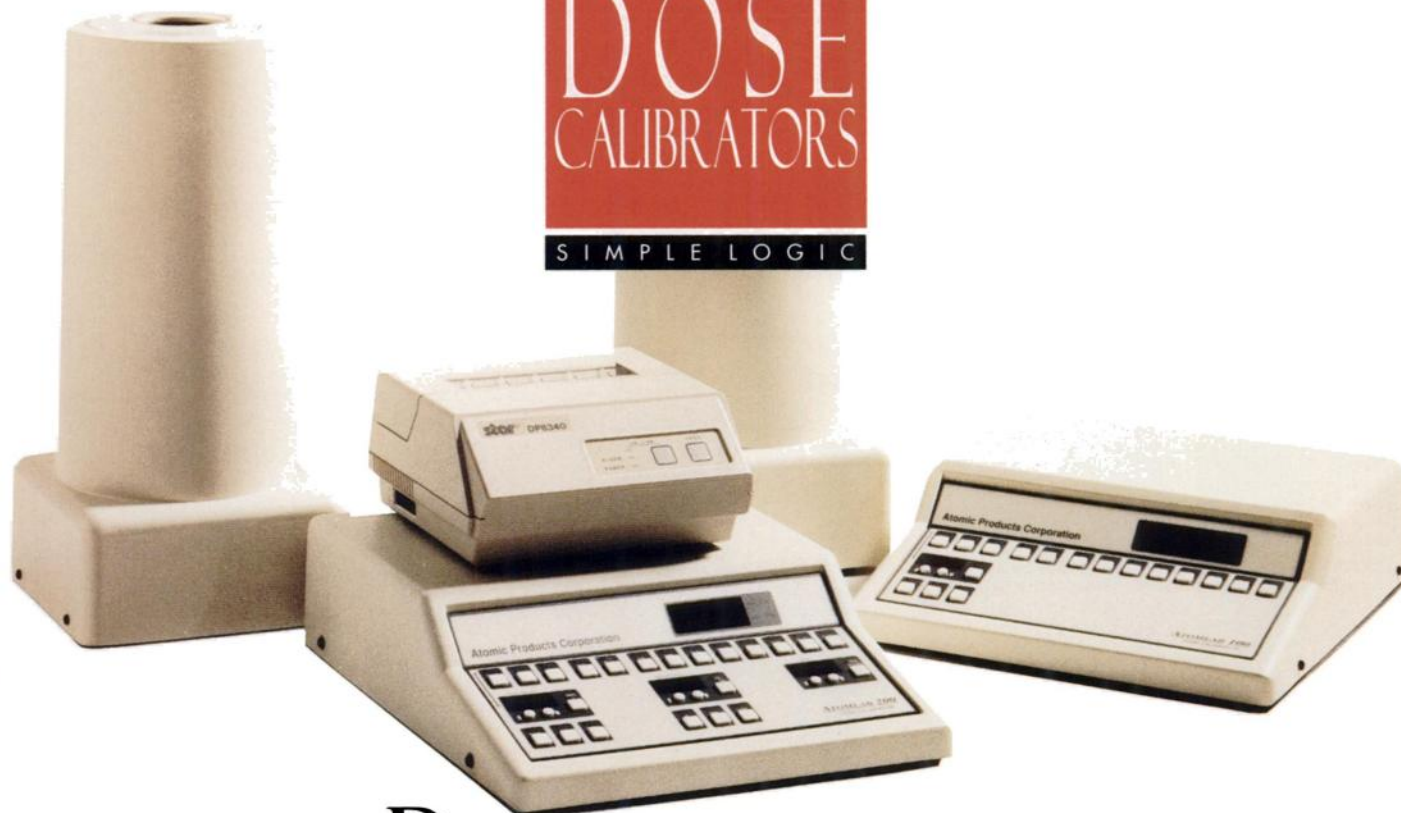
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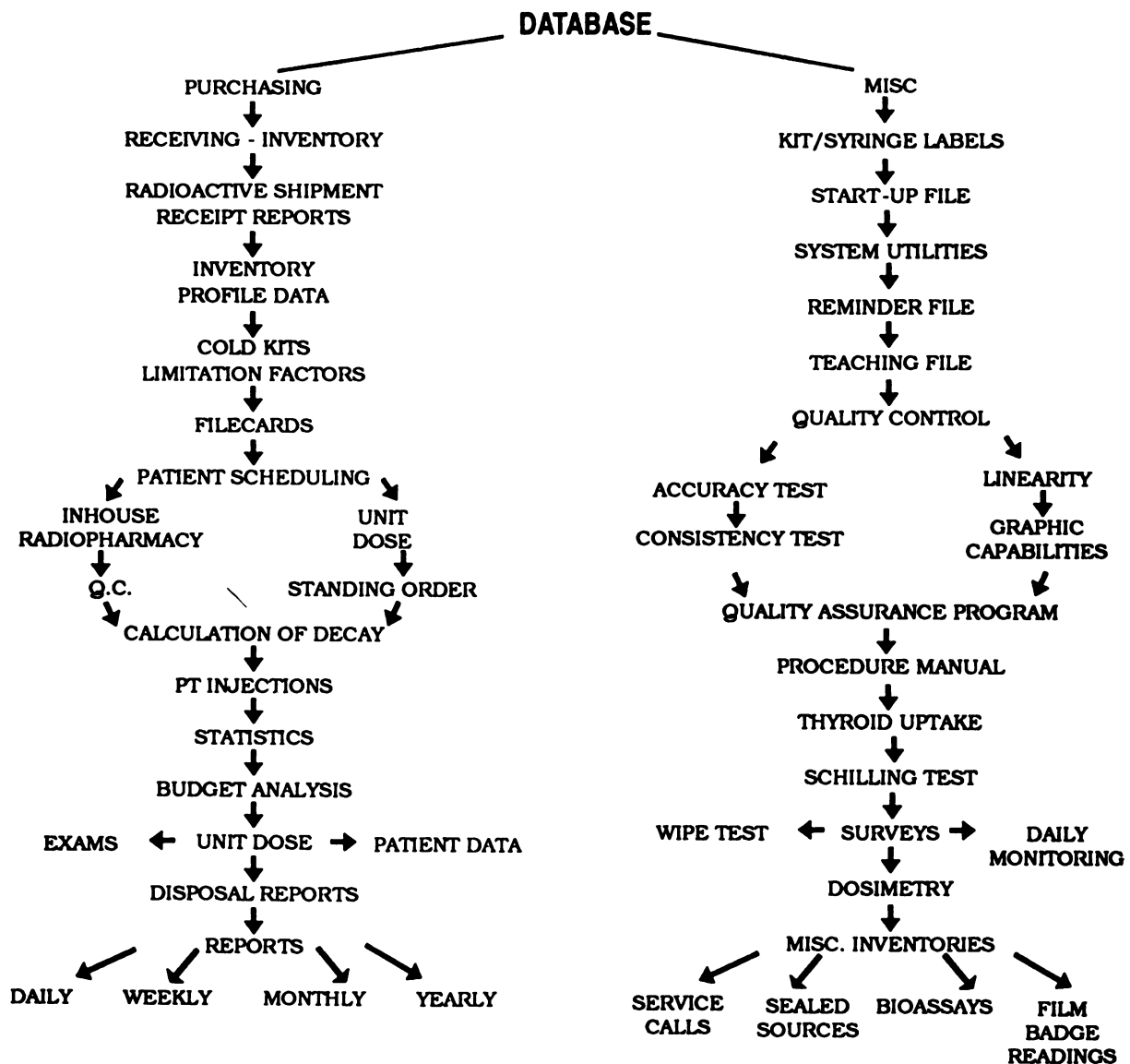
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- ☐ **General Electric**
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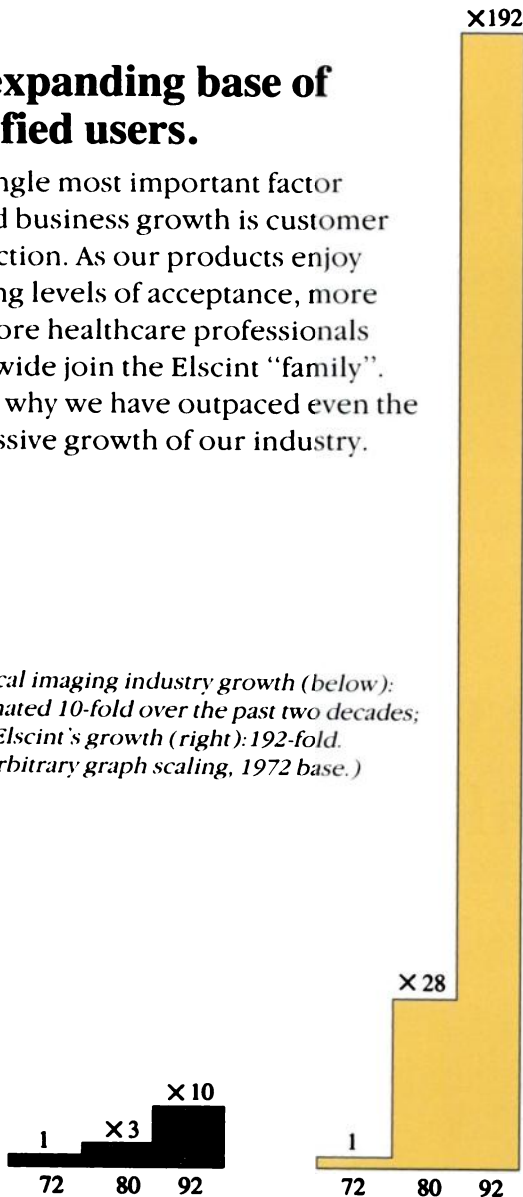


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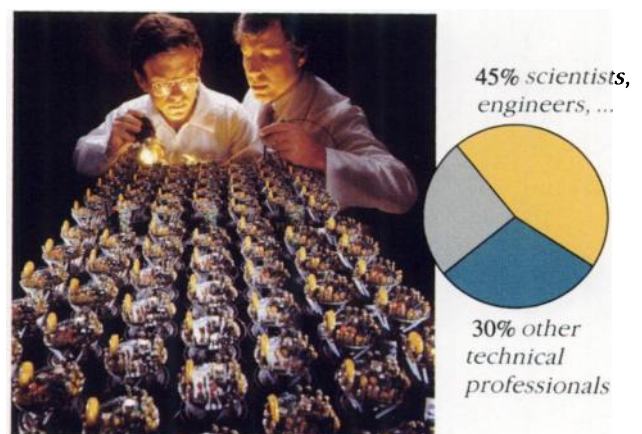
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Medical College of Wisconsin  
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# 40

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Annual Meeting  
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The 1993 Scientific Program Committee, Scientific Exhibits Subcommittee, and the Scientific & Teaching Sessions Committee solicit the submission of abstracts from members and non-members of The Society of Nuclear Medicine for the 40th Annual Meeting in Toronto, Ontario, Canada. Accepted Scientific Paper and Scientific Exhibit abstracts be published in a special supplement to the May issue of *The Journal of Nuclear Medicine* and accepted Technologist Section abstracts will be published in the June 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**
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- **Radiopharmaceutical Chemistry**
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  - Gastroenterology
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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*.

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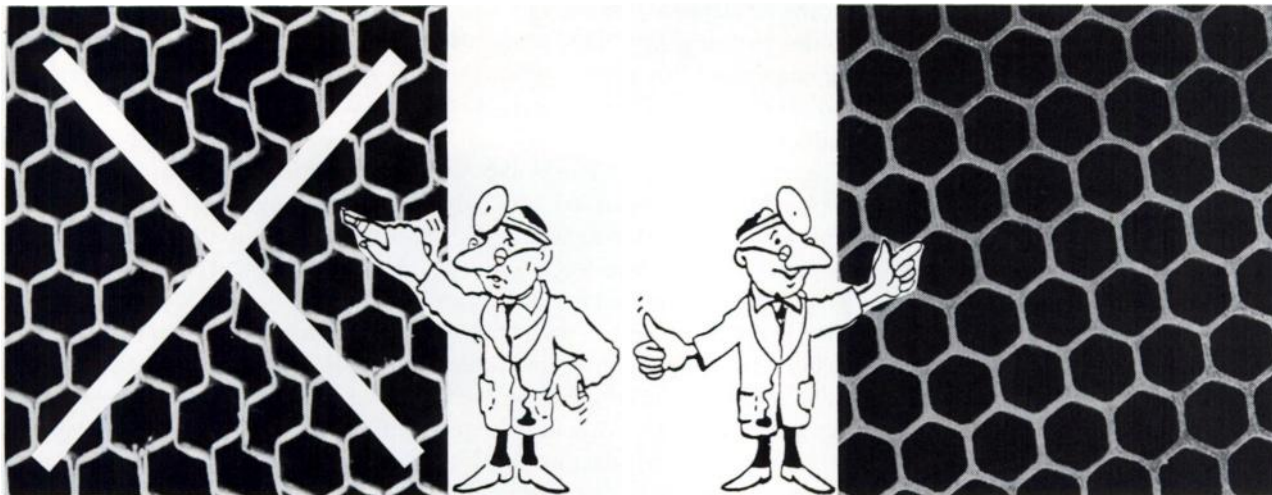
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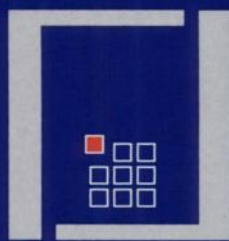
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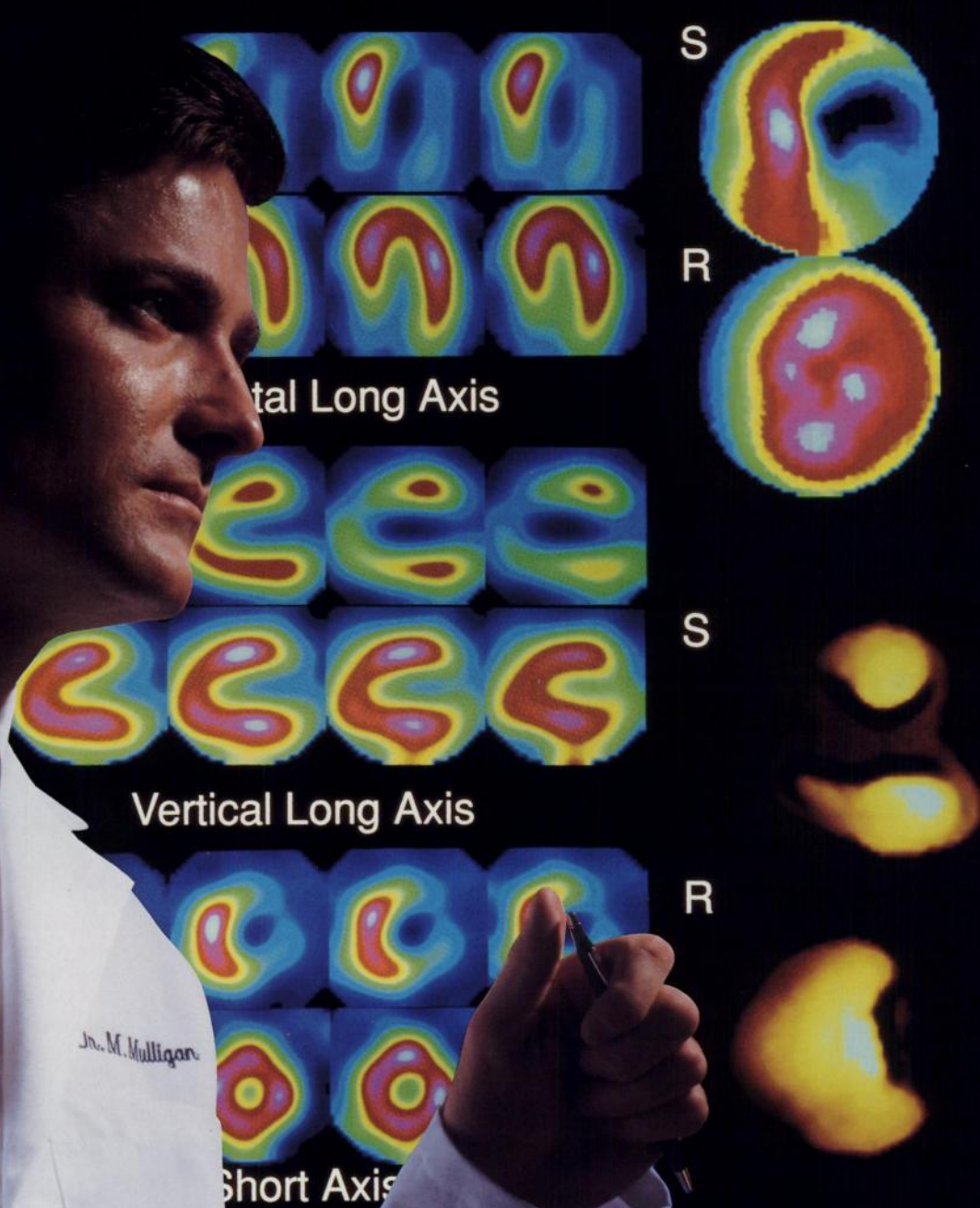
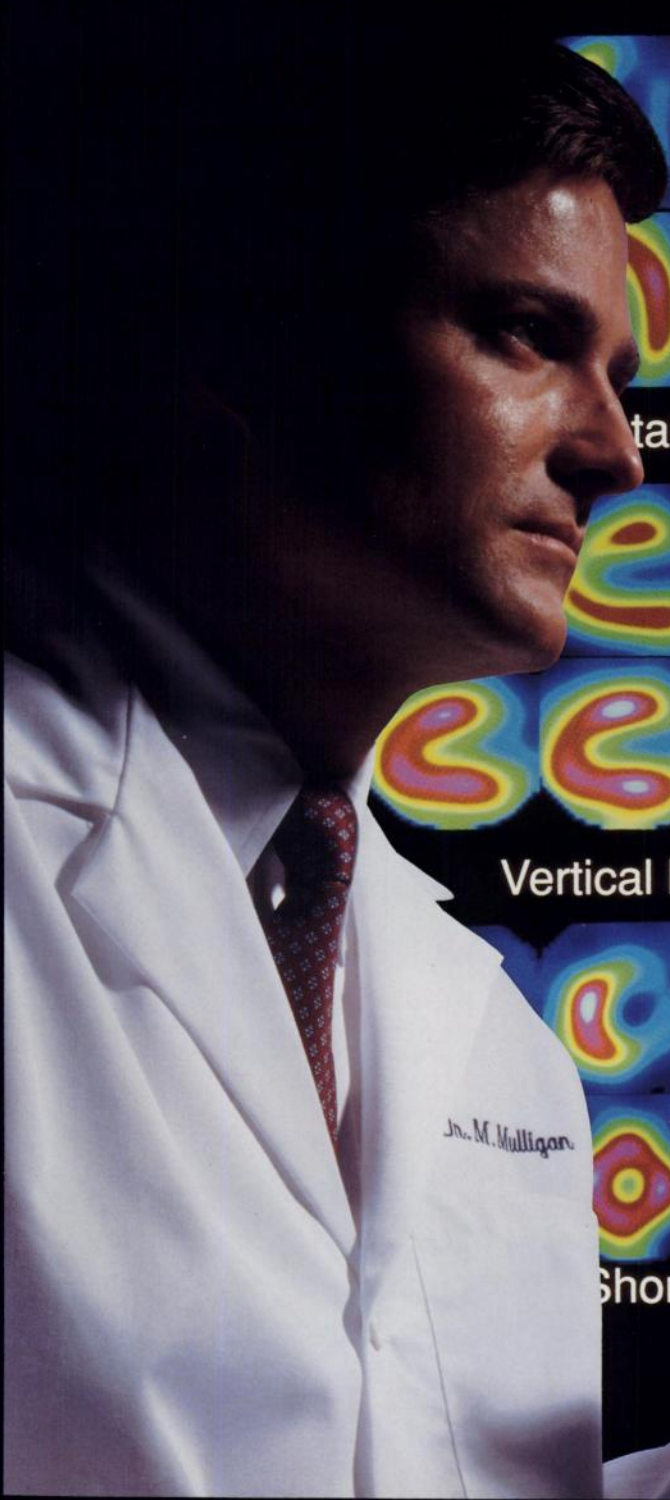
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**Title:** Desktop Computing in Nuclear Medicine

**Location:** Atlanta Airport Hilton, Atlanta, GA

**Date:** Monday-Tuesday, February 8-9, 1993

**Sponsor:** The Computer and Instrumentation Council of  
The Society of Nuclear Medicine

**Seminar Notes:** Registration includes a luncheon on Monday,  
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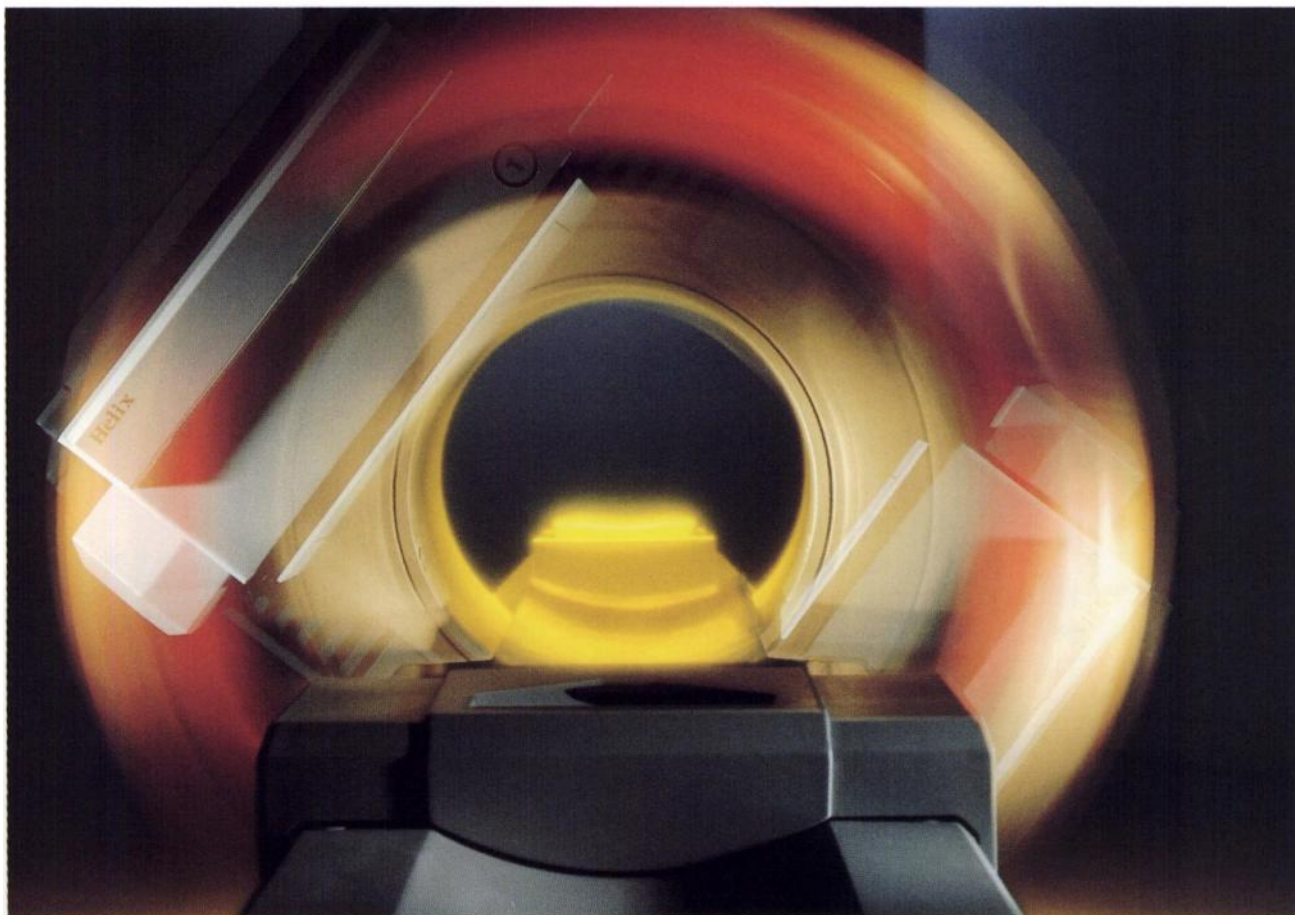


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<b>Item</b>		<b>Due Date</b>
<b>Abstract Forms</b>		
Scientific Papers	October Issue <i>JNM</i>	1/6/93
Scientific Exhibits	Contact SNM, Dept. of Meetings	1/6/93
Registration Form		5/7/93
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## **DU PONT PHARMA CARDIOVASCULAR NUCLEAR MEDICINE RESEARCH GRANTS**

### **CALL FOR PROPOSALS**

The Society of Nuclear Medicine Awards Committee announces that two grants for \$25,000 each are available for July 1, 1993.

The objectives of these grants are to: (1) Encourage physicians to enter the field of Cardiovascular Nuclear Medicine, and (2) Support high quality nuclear cardiology clinical research.

Funds can be used to support the research and/or salary of the investigator. Preference will be given to young physicians, or those new to the field of Cardiovascular Nuclear Medicine. Awards will be announced at the Annual SNM Business Meeting, June, 1993.

Please send for more information and an application to:

The Society of Nuclear Medicine  
SNM Awards Committee  
136 Madison Avenue  
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**Deadline: January 15, 1993**

### **Research and Development Fellowship**

## **MALLINCKRODT FELLOWSHIP**

Mallinckrodt, Inc. has announced an Annual Fellowship of \$30,000 for a physician fellow active in nuclear medicine research and/or development. The award is to further a research or development project, and applicants are asked to submit their curriculum vitae, a detailed account of their research project including prior accomplishments on the project, and future plans. Deadline for this year's award is January 8, 1993. Requested information, along with at least two letters supporting the application, should be forwarded to: William J. MacIntyre, PhD, The Society of Nuclear Medicine, 136 Madison Ave., New York, NY 10016-6760. The recipient will be announced at the Annual Meeting of The Society of Nuclear Medicine.

### **THE SNM/MEDI-PHYSICS AWARD FOR INNOVATION IN THERAPY WITH UNSEALED SOURCES**

The Society of Nuclear Medicine Awards Committee announces that a grant for \$30,000 is available.

The funds will be used to support research for therapy by the investigator chosen.

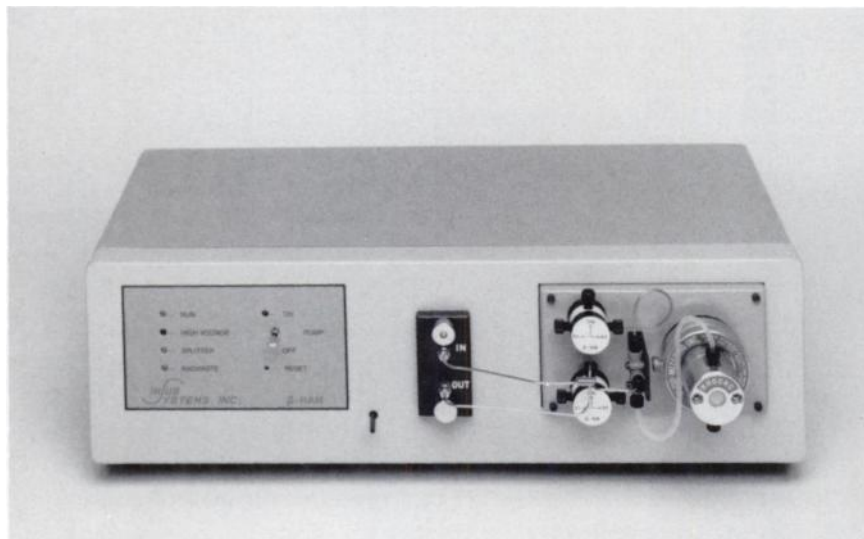
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**Deadline date: January 15, 1993**

*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. To receive product information, see page 75A.*

## Beta-Ram Model 2 Beta Detector



IN/US Systems, Inc. introduces the Beta-Ram Model 2 Beta Detector for radio-chemical HPLC. The Beta-Ram is an on-line radiactivity quantitation system of  $^3\text{H}$ ,  $^{14}\text{C}$ ,  $^{32}\text{P}$ , and  $^{35}\text{S}$ , other beta or soft gamma emitters for HPLC techniques. The new concepts in controlling the instruments allow the detector to be an integral part of any liquid chromatography data system. Flexible interfacing options eliminate the need for a dedicated controlling computer. IN/US System's communication software sets the detector counting parameters when run on the HPLC data station. However, the detector is compatible with other computer systems or chromatog-

raphy software. Unique features of the system include: AIM, an exclusive accelerated in-line mixing procedure which improves scintillator-eluent mixing; newly designed mirrored and optically enhanced counting cells; three analog inputs for mass detector; four analog outputs for chart recording and chromatography systems; detector shield for backgrounds typically less than 8 cpm; liquid connection fully exposed on the front panel for convenience and control of possible leaks; and the detector is compact and stackable. IN/US Systems, Inc., 5809 North 50th Street, Tampa, FL 33610-4809. 1-800-875-4687.

## Cardiac SPECT Pallet

Siemens Medical Systems, Inc. introduces its new Cardiac SPECT Pallet which enables optimal 180 degree cardiac SPECT imaging when used with the ORBITER gamma camera. Carbon fiber composition allows the pallet to virtually eliminate attenuation in the cardiac region with dimensions of 12.5"  $\times$  16" and a thickness of only 60/1000 inch. The pallet includes a steel support bar for reinforcement of the specially designed cardiac

region and may be repositioned to allow imaging of both prone and supine patients. A set of four pallet pads for patient comfort and a T-bar handholder to help support the patient's arms in an overhead position for less imaging obstruction are also included. An optional second support bar can be inserted along with the headrest to perform brain SPECT imaging studies. Siemens Medical Systems, Inc., Nuclear Division, 2501 North Barrington Road, Hoffman Estates, IL, 60195-7372. 708-304-7252.

## "Power-Up" Program

Computer Resources and Technology, Inc. announces the release of its new "Power-Up" Program to specifically meet the needs of the radiology profession. This software application will run on various hardware platforms from the PC environment to IBM's AS/400 series. Some of the product's features are: easy to use payment and billing entry screens; the ability to view patient account information at any time and the ability to add electronic claims as needed. Computer Resources and Technology, Inc., 20100 West Greenfield Avenue, Waukesha, WI 53186. 414-786-9171.

## Model 6000-532 Ionization Chamber



The Model 6000-532 Ionization Chamber is available from Victoreen, Inc. The unit's 400 cc phenolic chamber and 200 cm<sup>2</sup> window make it suitable for typical scatter measurements in x-ray facilities. It is compatible with most commercially available electrometers, but it was specifically designed to complement Victoreen Models 4000M+, Rad Check, and NERO noninvasive x-ray test devices. When used with one of these units, it enables the technician to perform routine x-rays using fewer instruments. Among the Model 6000-532's features are: 400 cm<sup>3</sup> chamber volume, 10 ft cable length, Triax or BNC/Banana cable termination and specified minimum detectability ( $^{137}\text{Cs}$ ). Victoreen, Inc. 6000 Cochran Rd., Cleveland, OH 44139. 216-248-9301.



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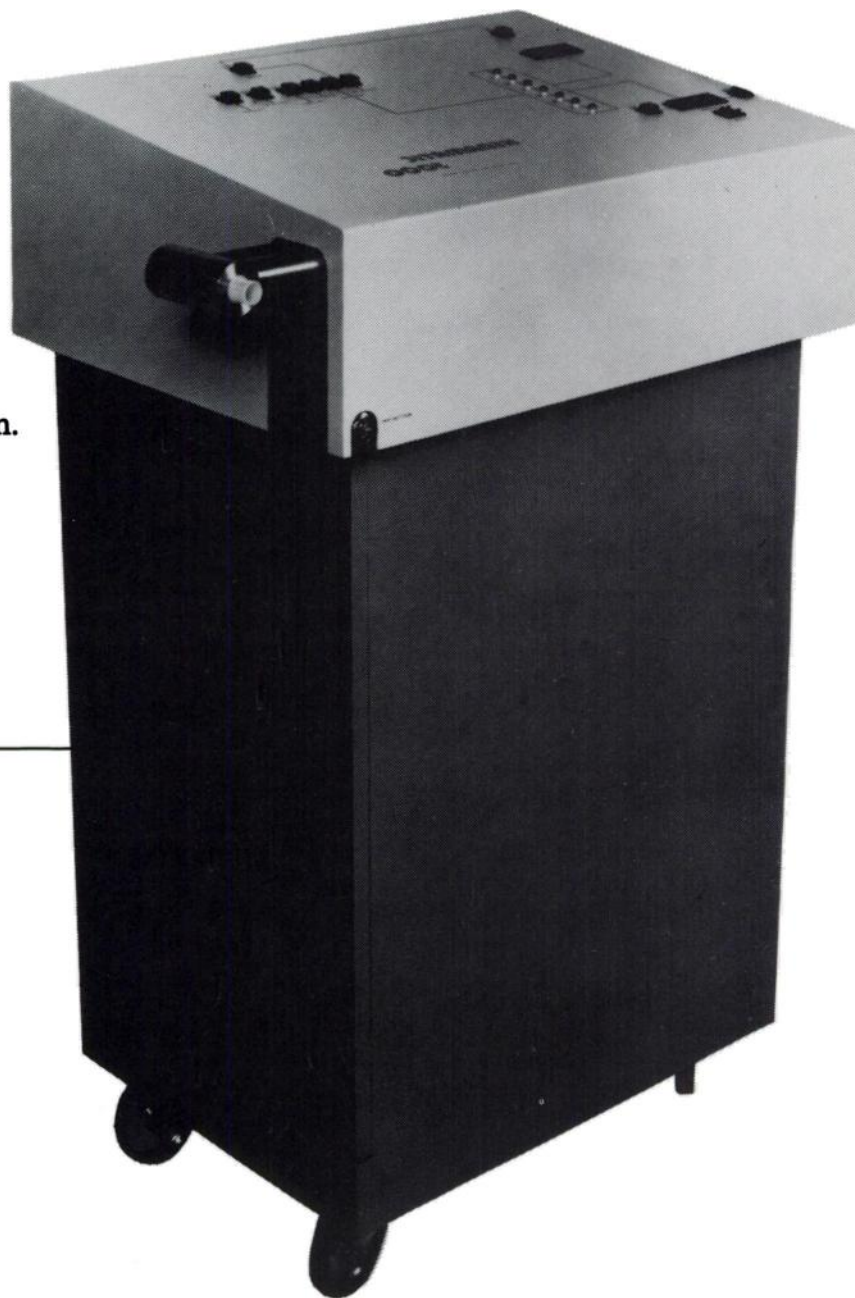
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**SINGLE VS. DUAL VS. TRIPLE-HEADED SPECT IMAGING: HOW MANY HEADS DO WE NEED?****Walter E. Drane, M.D. and Mike Nicole, CNMT**

Division of Nuclear Medicine

Department of Radiology

Shands Hospital and the University of Florida School of Medicine

As presented at: Southeastern Chapter of the Society of Nuclear Medicine  
October 19-21, 1990

The single-headed gamma camera has been the mainstay of the typical nuclear medicine department for many years. Over the past decade, the advantages of SPECT imaging over simple planar imaging have been well documented, and the versatility of a single-headed system capable of performing planar or SPECT studies has become readily apparent to both users and manufacturers. In fact, anyone planning the purchase of a new planar-only gamma camera will find the selection quite limited.

In spite of the large number of SPECT systems in place, SPECT imaging is extremely underutilized in community practice, presumably due to a number of potential factors, including the lack of SPECT knowledge and training, quality control problems with the standard SPECT systems, and a perception that SPECT is "too difficult".

Over the past several years, the biggest advance in gamma camera technology has been the development of effective

multi-headed devices. Prior to this time, several two-headed SPECT systems had been attempted, but they soon went "out of vogue" due to alignment and sensitivity registration problems. The new developments include the commercial availability of both two-headed and three-headed systems.

The two-headed, extra-large field-of-view (20" - 24" wide) gamma cameras are capable of both whole body (with simultaneous anterior and posterior image acquisition) as well as high resolution SPECT. Dedicated multi-headed SPECT cameras, most commonly using the triple-headed design, allow rapid, high resolution SPECT.

Advanced gamma camera correction circuitry and powerful, but relatively inexpensive computing power, have allowed both these types of systems to advance our SPECT capabilities.

**OVERALL BENEFITS OF MULTI-HEADED GAMMA CAMERAS**

There are certain general benefits to multi-headed gamma cameras. They are:

- Increased productivity  
A multi-headed camera increases the case per technologist ratio. This is important, since the availability of technologists is declining.
- High resolution SPECT imaging  
7 - 8 mm resolution, or even better with improved collimator design, is typical.
- Dynamic SPECT  
Rapid, sequential SPECT studies as short as 20 seconds each can be acquired.
- Efficient, dual-isotope or gated SPECT scans can be performed
- Spatial resolution and image quality are improved due to decreased motion artifacts  
The shorter imaging time results in less motion on whole body or SPECT scans.
- "Salvaging" of SPECT studies of uncooperative patients  
If each detector of a triple-headed system rotates 360° during a 20-minute SPECT acquisition and patient movement occurs in the latter part of the study, the data from the first 120° rotation of each head (with the output of each head summed together forming a single 360° rotation) can be reconstructed, thus "salvaging" the SPECT examination.
- The system can be operated in single, or multiple-head mode  
Most individuals worry about "down time". If there is a malfunction of one head of a multi-headed system, the malfunctioning head can be "shut down", with utilization of the remaining detector(s) until repair is performed.

## **BENEFITS OF AN EXTRA-LARGE FIELD-OF-VIEW ( $\geq 24"$ ) DUAL-HEADED GAMMA CAMERA, WHEN INTERFACED TO A POWERFUL, VERSATILE COMPUTER**

While multi-headed gamma cameras have certain general benefits as outlined above, extra-large field-of-view, dual-headed gamma cameras have certain unique advantages as follows:

- 15-minute bone scan  
Most nuclear medicine departments derive a large portion of their income from bone scintigraphy. Any development that makes this process faster and more efficient is of great benefit. An extra-large field-of-view, dual-headed gamma camera allows the performance of high resolution, anterior and posterior whole body scans, including the extremities, in 10-20 minutes. Further, digital processing and display by a versatile computer system with contrast and background adjustments, and "zoom" capability greatly decreases the need for "spot" imaging.
- Rapid whole body imaging  
5-minute whole body blood pool scans for testing biodistribution of new radiopharmaceuticals or rapid, whole body imaging of other agents such as gallium, indium, or iodine are possible.
- Quantitation/geometric mean determinations  
This function is particularly useful for differential renal function, GI nuclear medicine, etc.
- The system remains a versatile device for both high resolution SPECT and planar scanning

## **COST EFFECTIVENESS OF A DUAL-HEADED SYSTEM**

In addition to its clinical advantages, a dual-headed system is more cost effective than a single-headed system. It can more than double capacity with no additional space or technologist requirements as shown below:

	<b>Single-Headed System</b>	<b>Dual-Headed System</b>
Capacity:	= 8 studies per day	= 20 studies per day
Cost:	= \$300,000	= \$350,000 - \$500,000

## **ADVANTAGES OF A TRIPLE-HEADED SPECT SYSTEM**

The triple-headed SPECT systems have their own unique advantages as follows:

- Marked increase in throughput  
As an example, thallium SPECT acquisition in 8 minutes versus 24 minutes for a single-headed system.
- Superior image quality for equal acquisition time  
Examples are remarkably high resolution, high count bone SPECT, or cerebral perfusion imaging in 20 minutes.



## ADVANTAGES OF A TRIPLE-HEADED SPECT SYSTEM (CONTINUED)

- New capabilities
  - (a) Dynamic SPECT (rapid sequential SPECT studies)
    - for dynamic mapping of regional perfusion of the heart and brain (new BATO agents)
    - for evaluation of cavernous hemangiomas combining the resolution of standard SPECT with the specificity of progressive RBC accumulation seen on planar studies
  - (b) Efficient, simultaneous dual-energy SPECT
    - for simultaneous SPECT of  $^{99m}\text{TcO}_4 / ^{201}\text{Tl}$ , for parathyroid localization, simultaneous SPECT of  $^{111}\text{In}$ -antimyosin and  $^{210}\text{Tl}$ , etc.
  - (c) Positron imaging of the heart and other organ systems where sub-centimeter resolution is not required

The efficiency of the standard detector system for imaging positrons is only about 10% that of  $^{99m}\text{Tc}$  imaging. The triple-headed system makes the counting efficiency loss less significant. Positron SPECT can be performed with resolution of 1.8-2.0cm ("cold" lesion in "hot" background), adequate for cardiac work using  $^{18}\text{F}$ FDG.
  - (d) Efficient acquisition of SPECT gated blood pool scans and gated myocardial perfusion scanning (thallium or isonitriles)
  - (e) Because of the increased counting efficiency and gantry stability, sequential SPECT acquisitions (whole body SPECT) can be performed as the patient is translated through the gantry. Whole body SPECT allows bone SPECT studies of the entire axial skeleton in about 45 minutes. This is of particular value for "whole body" gallium (or labeled white blood cell) SPECT for infection or lymphoma evaluation, or for monoclonal antibody whole body surveys.

## DUAL-HEADED VS. TRIPLE-HEADED SYSTEMS: WHICH ONE DO WE NEED?

The dual-headed systems have only 67% of the counting efficiency of the triple-headed devices. However, they allow complete "sampling" of data in regard to SPECT of large areas (chest, abdomen, pelvis) which may prove important as more "quantitative" SPECT is attempted (i.e., for estimating monoclonal antibody dosimetry, etc.). Also, the opposing detector arrangement allows geometric mean correction, which is important for gastrointestinal functional analysis, differential renal or lung function, and biokinetics analysis of new radiopharmaceuticals.

In addition, standard whole body imaging still utilizes anterior and posterior views which is best performed by the dual-headed arrangement.

A final relative advantage of the dual-headed system is again in the area of "quantitative" SPECT. Absolute attenuation measurement can be performed by attaching a "flood" source to one of the detectors and producing a SPECT image of the transmission data seen by the opposing head. This type of measurement would be more difficult with the triple-headed configuration.

Thus, a dual-headed SPECT/whole body system is a "safer" investment for the smaller, or community hospital department than a triple-headed system, since the cost of the scanner can be recouped rapidly by performing whole body scans. Its advanced SPECT capabilities can be explored and marketed until the volume of studies can justify a dedicated SPECT device.

The triple-headed devices have a smaller field-of-view compared to most dual-headed devices. The smaller field-of-view and the detector arrangement limits these devices somewhat in regard to whole body imaging. However, one of these devices is capable of whole body work, with acquisition of three simultaneous whole body views (one whole body posterior view and both 60° anterior oblique views) acquired simultaneously.

As above, there may be limited data sampling of large areas of the body with triple-headed devices, but in clinical practice this fact is insignificant. The increased counting efficiency and higher intrinsic resolution of the triple-headed devices compared with the dual-headed systems give these devices slightly better SPECT results.

## DUAL-HEADED VS. TRIPLE-HEADED SYSTEMS: WHICH ONE DO WE NEED? (CONTINUED)

This counting efficiency advantage particularly comes into play with less common or more esoteric types of SPECT studies that frequently need high count rates (gated cardiac blood pool SPECT, rapid dynamic SPECT, whole body SPECT) or suffer from intrinsically low count rates (SPECT studies of  $^{111}\text{In}$ -white blood cells,  $^{131}\text{I}$  or  $^{123}\text{I}$ -MIBG, radiolabeled monoclonal antibodies,  $^{131}\text{I}$  metastatic thyroid surveys, etc.). Attempts at imaging positrons with

non-PET equipment also benefit from the increased counting efficiency.

Dual and triple-detector systems are complementary, and ultimately both types of gamma cameras are important in nuclear medicine departments. Their presence and utilization will undoubtedly spark the development of many other as-of-yet unimagined uses.

## WHY NOT MORE HEADS? AREN'T 4 HEADS BETTER THAN 3?

A dual-headed SPECT system can be used to image both the head and the torso. A triple-headed SPECT system provides a relatively large field-of-view, while permitting close positioning for either head or torso work. However, four or more detectors force a compromise between detector size for torso imaging and the ability to position these detectors close to the head. If the field-of-view is small enough to create a small square for close imaging

of the head, torso imaging is compromised. If the field-of-view is increased for torso imaging, close positioning of the detectors for head imaging is lost.

Ring detector systems suffer from the same problem and, therefore, are typically dedicated to either head or body work. As such, more than three heads on the system limits its versatility.

## MINIMUM REQUIREMENTS OF A NUCLEAR MEDICINE DEPARTMENT

Detailed below is a comparison of the past and future minimum needs of a nuclear medicine department; in the past when only single-detector technology was available and in the future with the advent of multi-detector systems:

### Past:

- Single-headed SPECT/whole body system
- Single-headed SPECT system
- Single-headed SPECT or non-SPECT system ( $\pm$  cardiac SFOV)
- Cost: ~ \$800,000
- Capacity: 24 studies per day

### Future:

- Dual-headed SPECT/whole body system
- Triple-headed SPECT system
- Single-headed SPECT or non-SPECT system ( $\pm$  cardiac SFOV)
- Cost: ~ \$1,150,000
- Capacity: 36-44 studies per day

**The increased capacity comes without any increase in technologists or space.**

## SUMMARY

Multi-headed gamma cameras are the "wave of the future". Purchase of such a system can be easily rationalized through significantly increased efficiency (increased capacity per unit of space or technologist), and increased capabilities (dynamic SPECT, time-efficient gated or dual-isotope SPECT, high resolution SPECT, etc.). The superior quality of the images from these devices also serves as a good "marketing" tool for nuclear medicine services. In summary, multi-headed gamma cameras are here to stay.



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### Fellowship

**FELLOWSHIP IN BRAIN SPECT IMAGING.** The Department of Radiology at the Brigham and Women's Hospital/Harvard Medical School, has an opening for one year fellowship, and an optional second year, in brain SPECT imaging. The department has a high-resolution SPECT system dedicated to brain imaging four rotating-head gamma cameras capable of SPECT imaging and workstations for MRI/CT/SPECT superimposition. The department does approximately 1,000 brain SPECT examinations per year, including perfusion, tumor seeking, and blood pool studies. Ongoing research areas include dementia, substance abuse, tumor detection and therapy, and cerebrovascular disease. Please send curriculum vitae to: B. Leonard Holman, MD, Chairman, Department of Radiology, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115. Brigham and Women's Hospital/Harvard Medical School is an affirmative action/equal opportunity educator and employer.

**Postdoctoral FELLOW.** Under the direction of PhD medical physicist to conduct research on: 1. Three-dimensional segmentation of single photon emission computed tomography (SPECT) images using directional second derivative. 2. interactive image reconstruction for case of non-uniform attenuation using MAP reconstruction with Gibbs priors. Help the physicist with clinical operation of department, teaching nuclear med. tech. students, writing and validating software, acquiring images from SPECT systems, performing statistical analysis, writing-up results for submission to journals, and presenting results at scientific meetings. **MINIMUM QUALIFICATIONS** include: A PhD in physics, engineering, mathematics, computer science or equivalent; knowledge of VMS and UNIX operating systems; knowledge of Fortran, C, and IDL programming languages; knowledge of digital signal processing, digital image processing and image reconstruction, and Monte Carlo methods. Hours are Monday-Friday, 40 hours/week (9am to 5pm). Salary: \$500.00/week. If interested, send resume to Case-21092, PO Box -8968, Boston, MA 02114.

### Physician

**CHIEF, NUCLEAR MEDICINE SERVICE.** The Dayton Veterans Affairs Medical Center and Wright State University School of Medicine, Dayton, Ohio, seek a board-certified nuclear medicine physician for the position of chief, nuclear medicine service. The appointee must qualify for a faculty appointment that will be proposed at a level commensurate with training and experience. Candidates must have a record of administrative

and leadership accomplishments, an M.D. or equivalent degree and be licensable to practice medicine in Ohio. Certification or eligibility for certification by American Board of Nuclear Medicine is required. Strong interest in related medical education and research is preferred. Salary is competitive and special pay enhancement is available.

Candidates should submit curriculum vitae and the names of three references to: Steven Cohen, MD, Chief of Staff, VA Medical Center, 4100 West Third Street, Dayton, OH 45428. All applicants received by October 31, 1992 will be considered; if the position is not filled therefrom, applications will be considered as received until the position is filled. The Dayton VA and Wright State University are equal opportunity and affirmative action employers.

**NUCLEAR PHYSICIAN.** The Department of Medicine, McMaster University, and the Hamilton Civic Hospitals invite inquiries and applications for a position of Nuclear Physician in a 846-bed teaching hospital and full-time university appointment. The Service of Nuclear Medicine is fully integrated into the Hamilton-wide Regional Program in Nuclear Medicine with a complement of nuclear physicians at both the Hamilton General Division and the Henderson General Division—the two hospital division of the Hamilton Civic Hospitals. Candidates should be eligible for certification in Nuclear Medicine of the Royal College of Physicians and Surgeons of Canada. Experience in internal medicine or cardiology is an asset. The successful candidate will have a full-time academic appointment and be expected to participate in teaching at both the undergraduate and postgraduate levels. Research is strongly encouraged especially in Oncology and Thromboembolism. Duties will be primarily at the Henderson General Division, the site of the Hamilton Centre of the Ontario Cancer Treatment & Research Foundation. This announcement is directed to Canadian citizens and permanent residents. Enquiries or applications, with curriculum vitae, should be submitted to: Dr. C.N. Best, Head, Service of Nuclear Medicine, Hamilton Civic Hospitals, 237 Barton Street East, Hamilton, Ontario, Canada L8L 2X2

**NUCLEAR MEDICINE PHYSICIAN.** The department of Nuclear Medicine of the University Hospital Gasthuisberg, Leuven, Belgium, a 2,000 bed hospital near Brussels, is seeking a certified nuclear medicine physician for a 2-year full-time position as resident. A definite position as staff member can be offered afterwards. Knowledge of the Dutch language is required. The department has 8 gamma camera's, a brain dedicated SPECT apparatus, a PET center with cyclotron and a section of radio-pharmacy. Besides in vivo explorations, in vitro tests are performed. For more details contact the head of the department: Prof. Dr. M. de Roo, Tel 32 16 213714, Fax: 32 16 213759

### Radiologist

**NUCLEAR RADIOLOGIST**—Immediate opening for Director of Nuclear Medicine in large private hospital in Charlotte, NC. 15-person subspecialty-oriented radiology group seeks fellowship-trained ABR & ABNM certified colleague to practice nuclear medicine and some general radiology. Reply to Henry T. Adkins, P.O. Box 221249, Charlotte, NC 28222.

**NW Rocky Mountains: RADIOLOGIST-NUCLEAR MEDICINE.** Highly respected eight person group with strong subspecialty interests seeks highly qualified individual. Fellowship or academic experience preferred. Nuclear Medicine boarded or ABR special competency strongly desired. Position includes all aspects of nuclear medicine in a comprehensive advanced department. Practice is located in Boise, Idaho, which has many recreational and cultural amenities. Reply to Paul Traugher, MF or J. Tim Hall, MD, Department of Radiology, St. Alphonsus Regional Medical Center, 1055 No. Curtis Rd., Boise, ID 83706. (208) 378-2161.

**NUCLEAR RADIOLOGIST:** Radiologist with Nuclear Medicine/Nuclear Radiology Boards or eligibility, to join 14 member private practice radiology group in Seattle suburb. Send curriculum vitae to A. Azose, MD, Nuclear Medicine Department, 400 South 43rd Street, Renton, WA 98055.

The Creighton University School of Medicine, Omaha, Nebraska has instituted a search to fill the position of Chair of the Department of Radiology. Significant research accomplishments and publications, demonstrated clinical skills, and a commitment to teaching at both the student and resident level are the characteristics which will be most valued by the Search Committee. The Department include a nationally recognized PET Center with

emphasis on both basic research and clinical applications.

Nominations are welcome. Applicants should submit a curriculum vitae to: Michael H. McGuire, MD, Professor and Chairman, Department of Surgery, Radiology Search Committee Chair, Creighton University School of Medicine, 601 North 30th Street, Omaha, NE 68131. Creighton University is an Equal Opportunity Employer.

### Residency

**NUCLEAR MEDICINE RESIDENCY.** July 1993. Comprehensive imaging/RIA/therapy program in 3 hospitals (private, county, VA) with 2800 total beds. Mobile imaging for 216 ICU beds. Large pediatric population. Strong cardiovascular emphasis. State-of-the-art instrumentation including SPECT and computer processing. Training includes introductory rotations in NMR, PET and CT/Ultrasound. Contact: Warren H. Moore, MD, Department of Radiology, Baylor College of Medicine, One Baylor Plaza, Houston, TX 77030-3498. Baylor College of Medicine is an equal opportunity/affirmative action employer.

**NUCLEAR MEDICINE RESIDENCY.** The Division of Nuclear Medicine, Department of Radiology, The New York Hospital-Cornell Medical Center, New York City offers a 1 or 2 year residency available July 1, 1993. The Division has a completely new 25,000 sq. ft. facility with state-of-the-art equipment, and is staffed by three full-time physicians, two basic scientists, a radiopharmacist and a computer programmer. The residency program includes all aspects of nuclear medicine as well as thyroidology, RIA and clinical research. Electives can be arranged. For further information, please contact: Barbara L. Binkert, MD, Director of Residency Program, Division of Nuclear Medicine, New York Hospital-Cornell Medical Center, 525 east 68th Street, New York, NY 10021 or call (212) 746-4580.

**NUCLEAR MEDICINE TRAINING PROGRAMS.** State University of New York at Buffalo. The Department of Nuclear Medicine at SUNY/Buffalo offers the following residency training programs: 1. two-year nuclear medicine residency; 2. five-year track programs combining nuclear medicine with radiology or internal medicine or neurology or psychiatry leading to board eligibility in both specialties; and 3. one-year nuclear medicine programs for qualified radiologists. These programs offer a comprehensive exposure to all aspects of nuclear medicine including PET and allied imaging fields and research. For further information and applications for July 1, 1993, please contact: Joseph Prezio, MD, SUNY/Buffalo Nuclear Medicine, 105 Parker Hall, 3435 Main Street, Buffalo, New York 14214. AA/EOE.

### Technologist

**NUCLEAR MEDICINE CHIEF TECHNOLOGIST.** The Division of Nuclear Medicine of the Department of Radiology at the Hospital of the University of Pennsylvania in Philadelphia is seeking a Chief Nuclear Medicine Technologist interested in clinical nuclear medicine, teaching, administration and research.

The Hospital of the University of Pennsylvania is a 700-bed major referral center. The Division of Nuclear Medicine is equipped with the state-of-the-art equipment, including dual head and triple head SPECT instruments. More than 11,000 procedures are performed annually which cover the entire spectrum, including some complicated and unusual studies. There is an accredited School of Nuclear Medicine Technology with eight students accepted annually. Ongoing research includes studies of various central nervous systems disorders, coronary artery disease, pulmonary embolism, G.I. tract and cancer.

The applicant must be a Certified Technologist. The Hospital of the University of Pennsylvania is an Equal Opportunity Employer. Please contact Ann Ruffo, Director of Personnel and Technical Services, Department of Radiology, Hospital of the University of Pennsylvania, (215) 662-6954.

**NUCLEAR MEDICINE TECHNOLOGIST** positions available nationwide. Confidential searches. All fees employer-paid. Dunhill of Bel Air, P.O. Box 267, Bel Air, MD 21014; (800) 753-6693; Fax: (410) 836-0953; EOE.

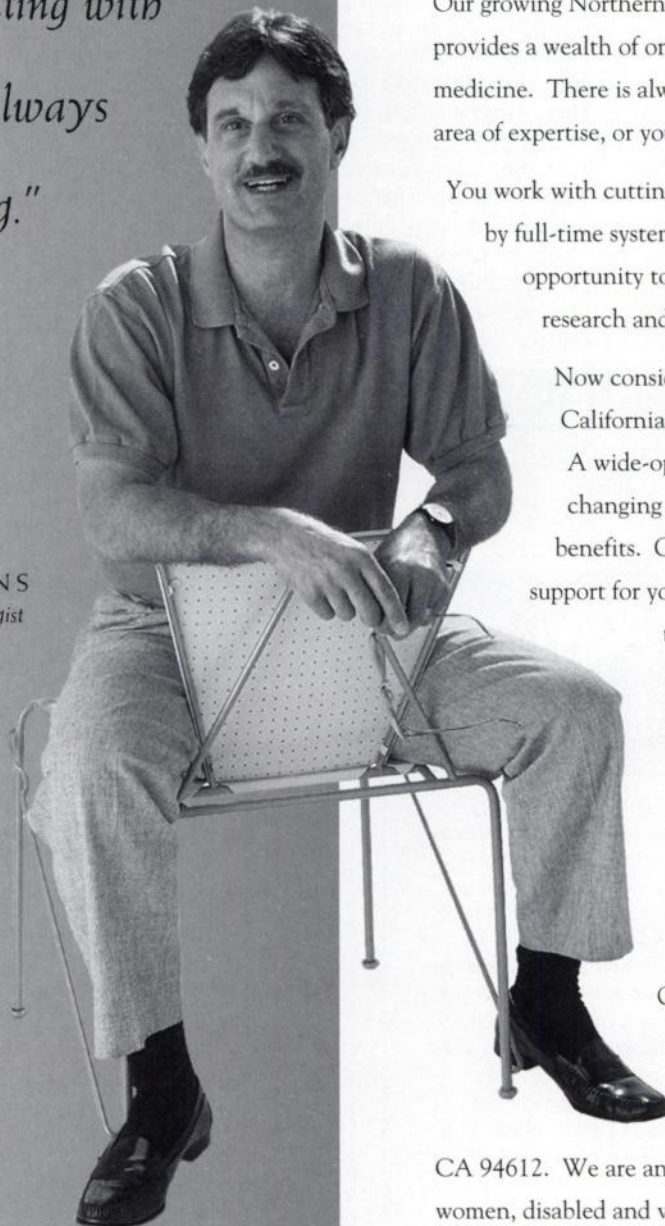
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scientists on the NIH campus will be encouraged.

Applicants should hold the MD or PhD degree and should have completed clinical training in diagnostic radiology or nuclear medicine. Applications from individuals currently in US residency programs may also be considered for research fellowship positions. US citizenship or permanent residency is required for this full-time appointment.

Candidates should submit a Curriculum Vitae, at least two letters of reference and a preliminary statement concerning their area of research interest to Dr. Joseph A. Frank, Acting Director.



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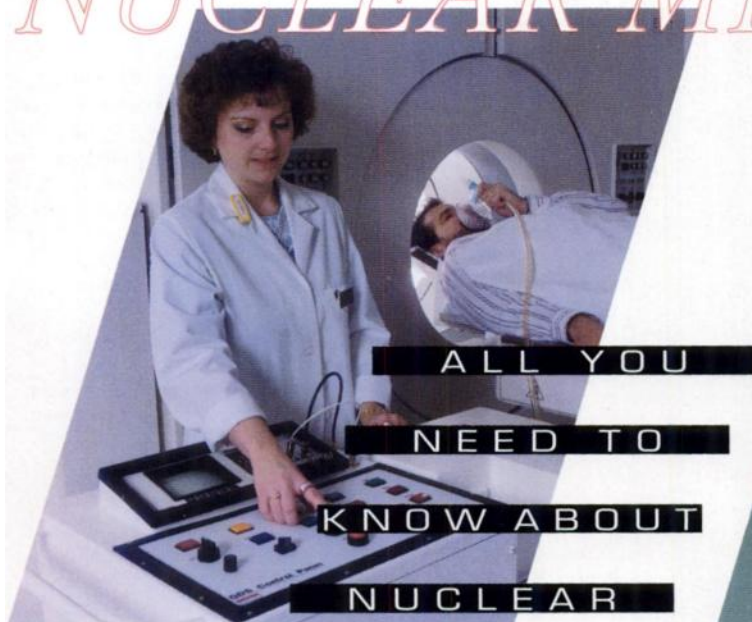
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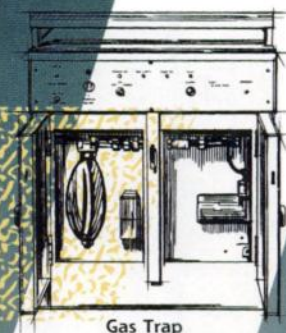


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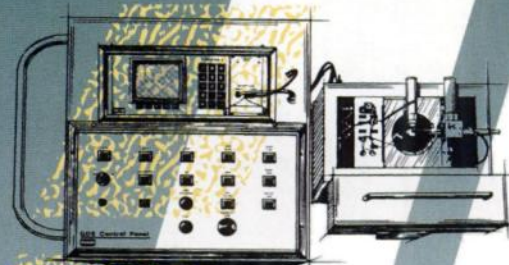
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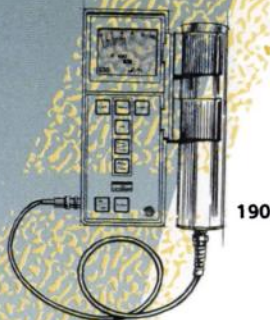
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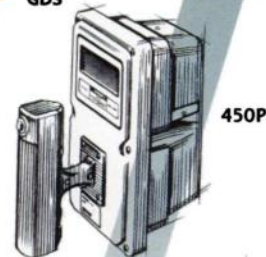
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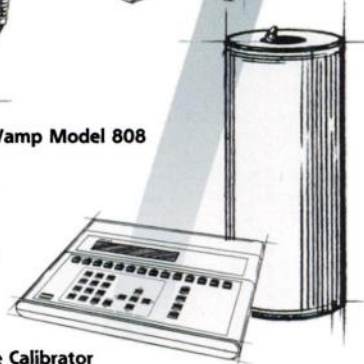
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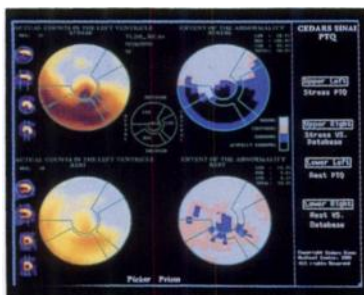
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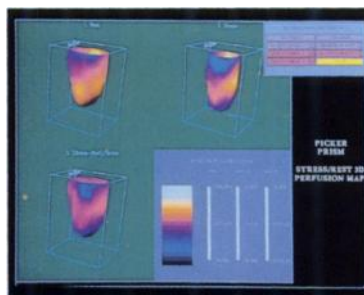
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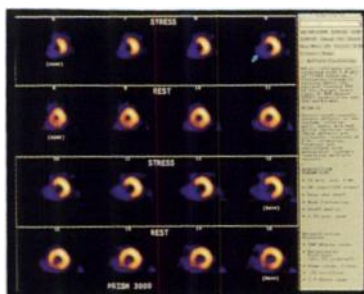
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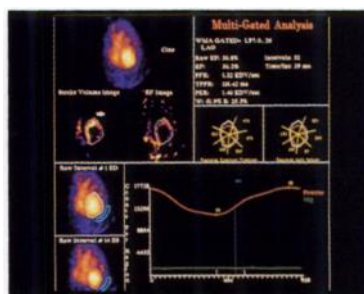
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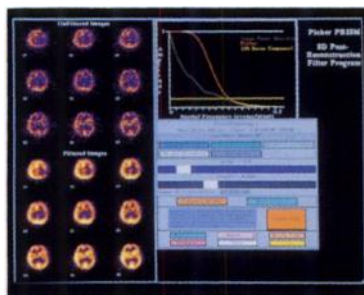
3-D Perfusion/Motion Map™



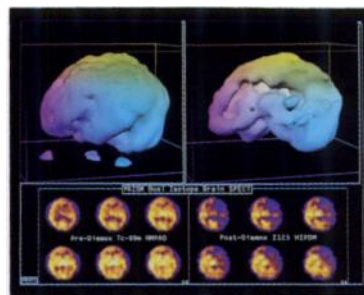
Oblique cardiac slices at stress and re-distribution



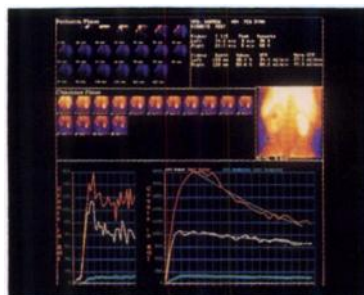
MGA+ (multi-gated analysis) Program



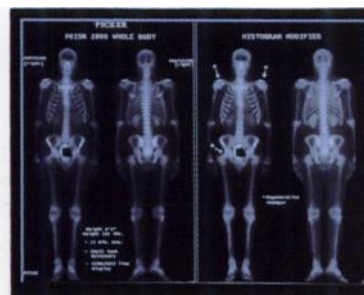
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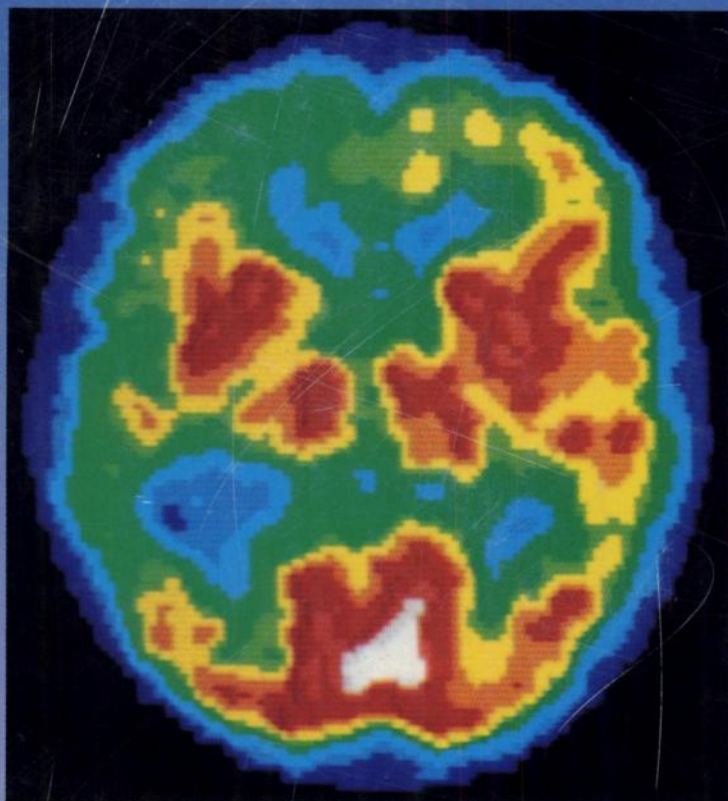
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