

Winter 1985

## Focal Spot, Winter 1984/85

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# FOCAL

SPOT

## M A G A Z I N E

Mallinckrodt Institute of Radiology

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Indexed



New Space  
New Research  
New Hope



# New Space, New Research, New Hope

*The three-towered Clinical Sciences Research Building rises ten stories high and houses over 180 research and equipment laboratories.*





The last ten years has brought vast changes for all of the branches of medicine, but nowhere have changes been as great as in radiology. As the field has exploded, so have the technical innovations, teaching requirements, and research achievements at Mallinckrodt Institute of Radiology.

It is at Mallinckrodt Institute where researchers first applied NASA technology to gain color-coded maps of the body in magnetic resonance imaging; where radiotherapists and physicists together pioneered the use of hyperthermia as a treatment for cancer; where PET scanning was developed and has become a clinical reality; and where computer innovations allow radiologists and physicians to look at x-ray images of the body without having to use x-ray film.

These and other important achievements have led Mallinckrodt to stretch beyond the borders of its original brick building. Erected in 1931, the building stood eight stories high, with one floor below ground level, and its total space amounted to 57,000 square feet. The institute's early staff of four radiologists and one physicist concentrated its efforts in general diagnosis, offering a few special procedures like cystoscopy or interventional radiology. A small section of the institute was dedicated to treatment with radiation.

Fifty-four years later, the institute has grown to become the nation's largest center for diagnostic and therapeutic radiology. With expansion of the original structure and the opening of new facilities at Barnard, Barnes, Wohl, Children's, and Jewish Hospitals, Mallinckrodt Institute is now a sprawling center which could fill the breadth and span of seven football fields.

In the recently completed Clinical Sciences and Research Building (CSRB) and the East Building at

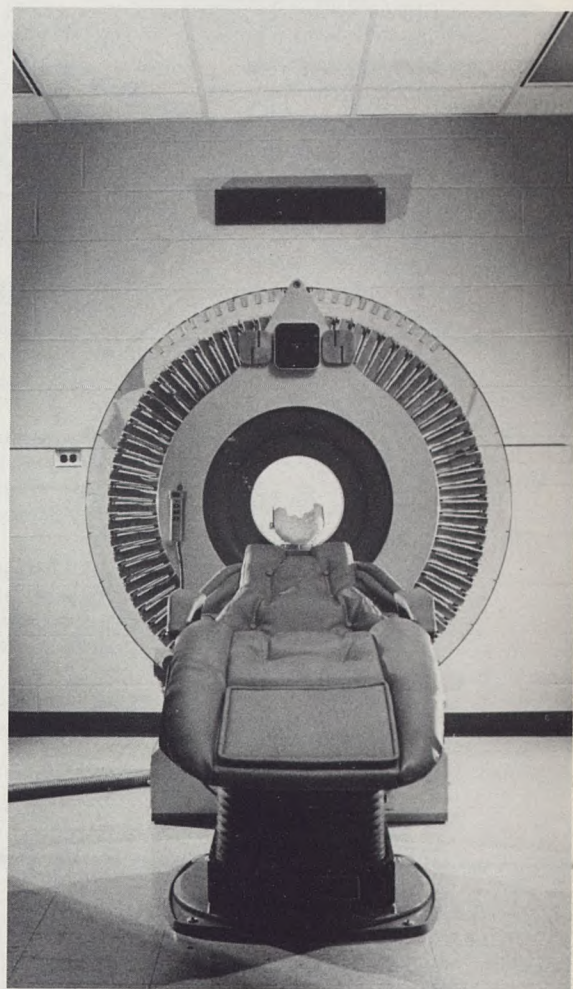
Washington University Medical Center, Mallinckrodt has expanded once again to make room for new research and increased activity in other departments.

## CSRB

At the center of the medical center, the CSRB offers space for the expansion of Mallinckrodt Institute and other departments. Mallinckrodt Institute, gaining 35,000 square feet, will occupy portions of the fourth and fifth floors in the north tower of the CSRB. This new space will enable further progress in research in four areas of the institute: radiation oncology, radiation sciences, nuclear medicine, and computer science and electronic imaging.

### Cancer Research: Consolidating Patient Data

Keeping pace with the targets of cancer research, Mallinckrodt's division of radiation oncology has expanded and relocated in the CSRB, the personnel responsible for providing radiotherapists with sufficient data for clinical research. **Medical records personnel** maintain the computerized Tumor Registry System, which contains important demographic, clinical, and therapy information on every patient treated in the division. The **biometry group** performs computer-related functions associated with the radiotherapists' research projects: searching the tumor registry to extract patients meeting specific criteria; preparing data collection forms; and using the statistical software package to analyze patient data. With increased data at hand, the division's clinical investigators can accelerate their efforts toward the optimal management of the cancer patient and come closer to the division's goal: to improve the control of tumors and provide patients with higher survival rates.



*The PETT VI, on the fourth floor of the CSRB North Tower, will be used for development of new radiopharmaceuticals in nuclear medicine and positron emission tomography (PET) research.*

### Biomedical research

Continuing a strong tradition in biomedical research, the divisions of radiation sciences and nuclear medicine will expand animal and laboratory research activities in the new facility. The PETT VI will be dedicated to animal studies in collaborative PET research between the two divisions and skilled investigators in neurology, oncology, cardiology, and pulmonary medicine.

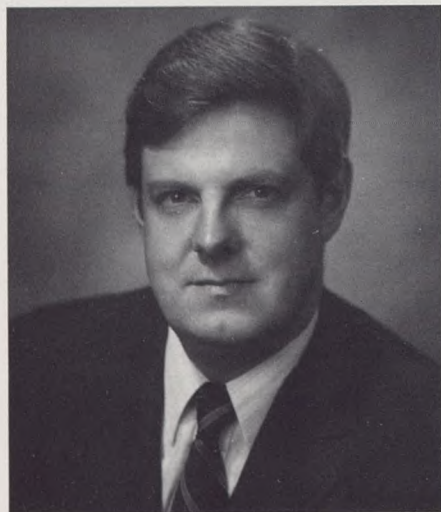
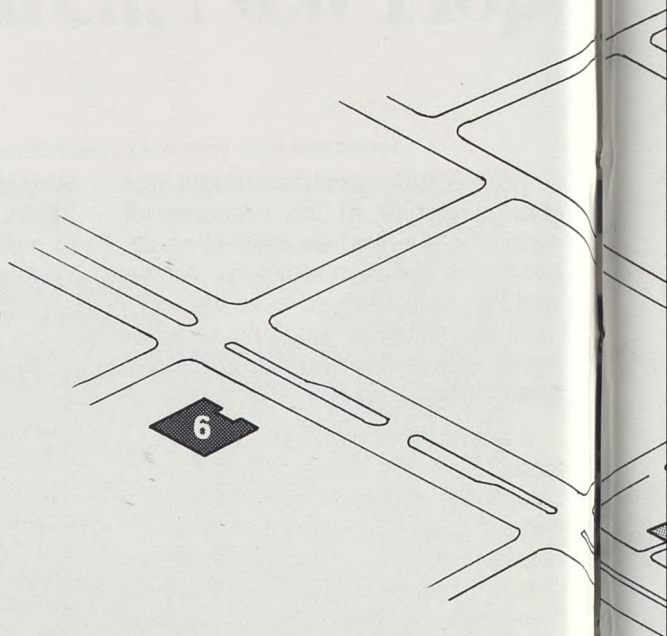
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# Mallinckrodt Institute of Radiology

## GUIDE TO FACILITIES

1. MALLINCKRODT INSTITUTE OF RADIOLOGY  
Original Institute: Ground—12th Floor  
West Addition: Ground—5th Floor  
5th Floor: MRI Clinical Facility
2. WOHL HOSPITAL  
4th Floor: Diagnostic X-ray Facility (Internal Medicine)
3. CHILDREN'S HOSPITAL  
1st Floor, North Wing: Complete Diagnostic Radiology Facility (24-hour)
4. JEWISH HOSPITAL  
Ground Floor, West: Radiation Oncology Department
5. CLINICAL SCIENCES RESEARCH BUILDING  
4th Floor, North Tower: Nuclear Medicine, Radiation Sciences, Computer Science  
5th Floor, North Tower: Radiation Oncology
6. 4511 FOREST PARK  
2nd, 3rd, 4th, 5th Floors: Radiation Oncology research and clinical functions
7. EAST BUILDING  
Basement: Film Warehouse  
1st Floor: MRI Research and Clinical Facility  
2nd Floor: School of Radiologic Technology, Film Warehouse, Photography/audiovisual Laboratory  
3rd Floor: Billing and Accounting Department
8. BARNARD HOSPITAL  
1st Floor: Cancer Information Center (Radiation Oncology)  
3rd Floor: Hyperthermia Research and Treatment Center (Radiation Oncology) and Digital Radiology  
6th Floor: Physics Section (Radiation Oncology)
9. WEST PAVILION  
1st Floor: Chest X-ray Facility (Admitting)  
9th Floor: Cardiovascular Radiology and Nuclear Medicine  
10th Floor: Outpatient Diagnostic X-ray Facility  
11th Floor: Diagnostic X-ray Facility (Orthopedics)
10. QUEENY TOWER  
2nd Floor: Diagnostic X-ray Facility



Michael J. Welch, Ph.D.

"We'll be working on the development of new and improved radiopharmaceuticals for use in nuclear medicine and PET studies," says radiochemist **Michael Welch, Ph.D.**, "These include labeled monoclonal antibodies for imaging of human tumors; new agents for measuring metabolism; and detecting stroke, myocardial infarction, clots, and other blood diseases."

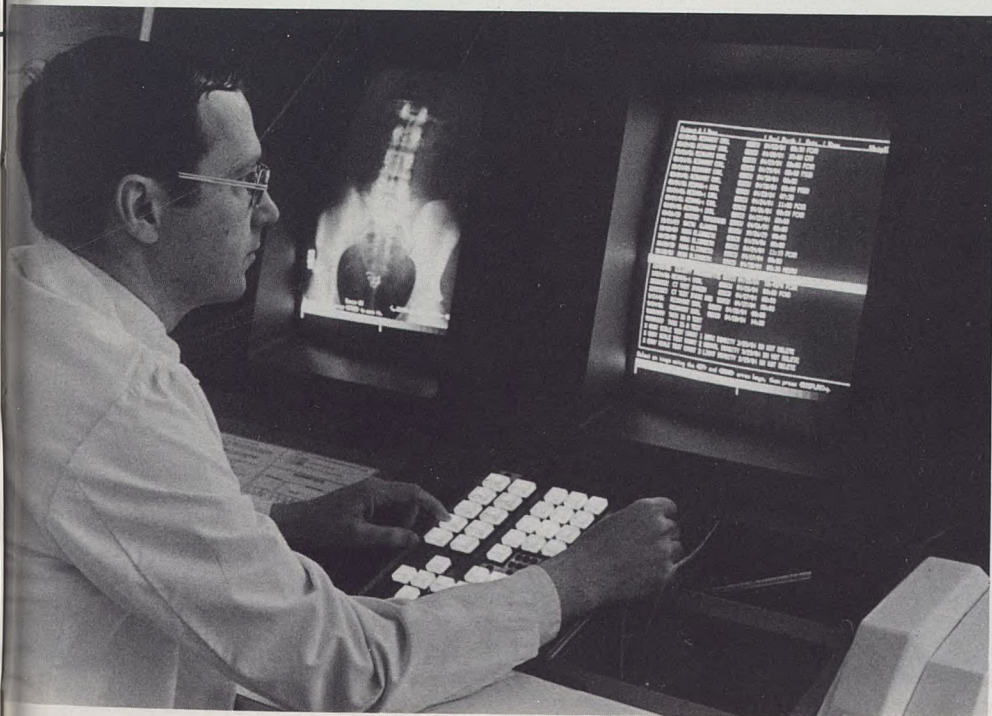
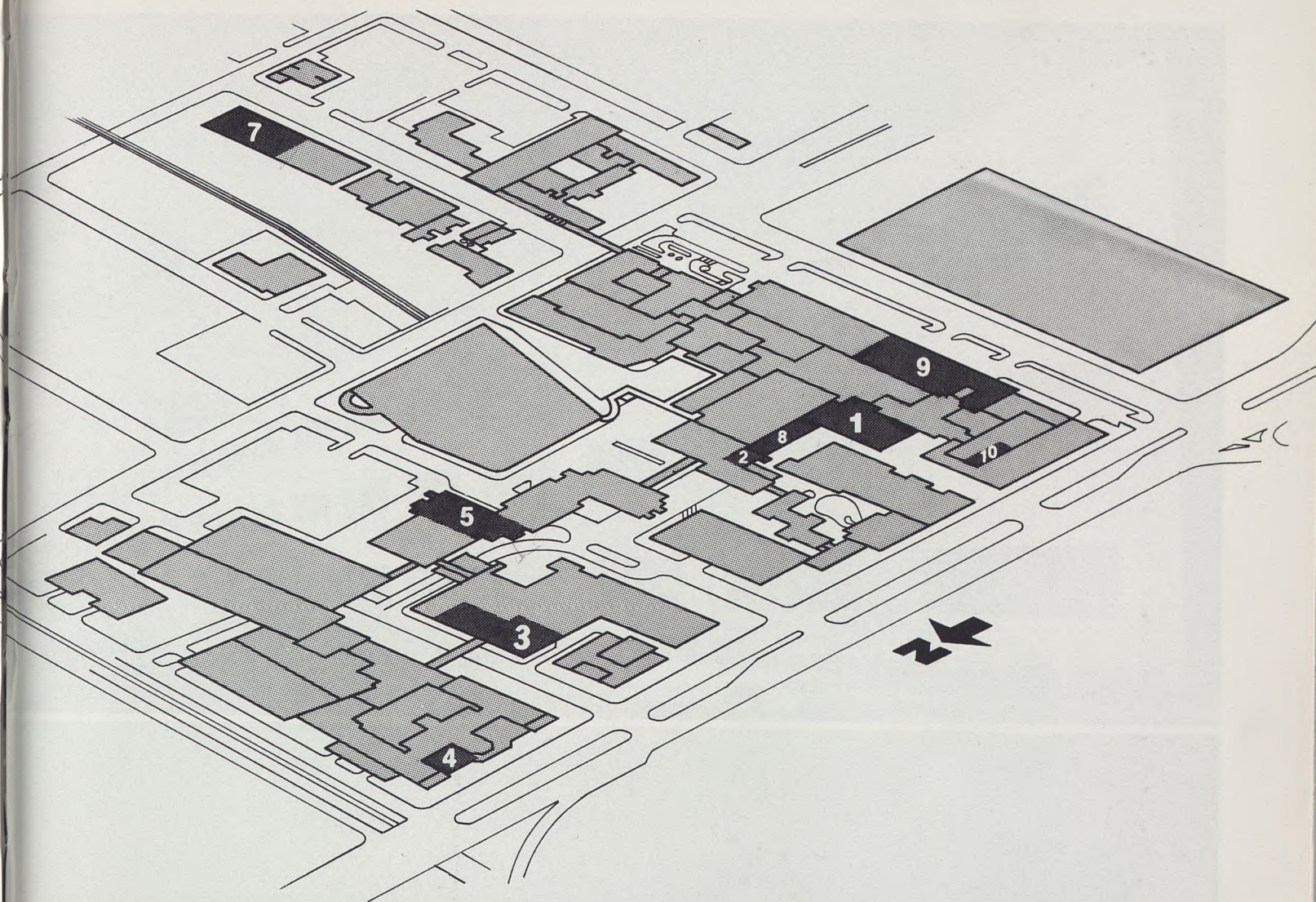
### Sending X-rays through the Wire

"We're setting up a unique system in the new computer facility the institute is developing in the CSRB. This system will allow us to send, store, and display medical images from the new

facility to computer terminals at various points in the medical center," says **Dr. Gilbert Jost**, chief of Mallinckrodt's diagnostic computer section. "Images will be sent through computer cables just as phone calls run through telephone wires. Once established, this system—called the Electronic Communications Center (ECC)—will allow physicians to view images on terminals at their desks." The ECC will begin full operation in the near future when the CSRB computer network is integrated with the institute's current computer base on the twelfth floor of MIR.

The CSRB facility will also enable Mallinckrodt to increase its current computer capabilities which provide



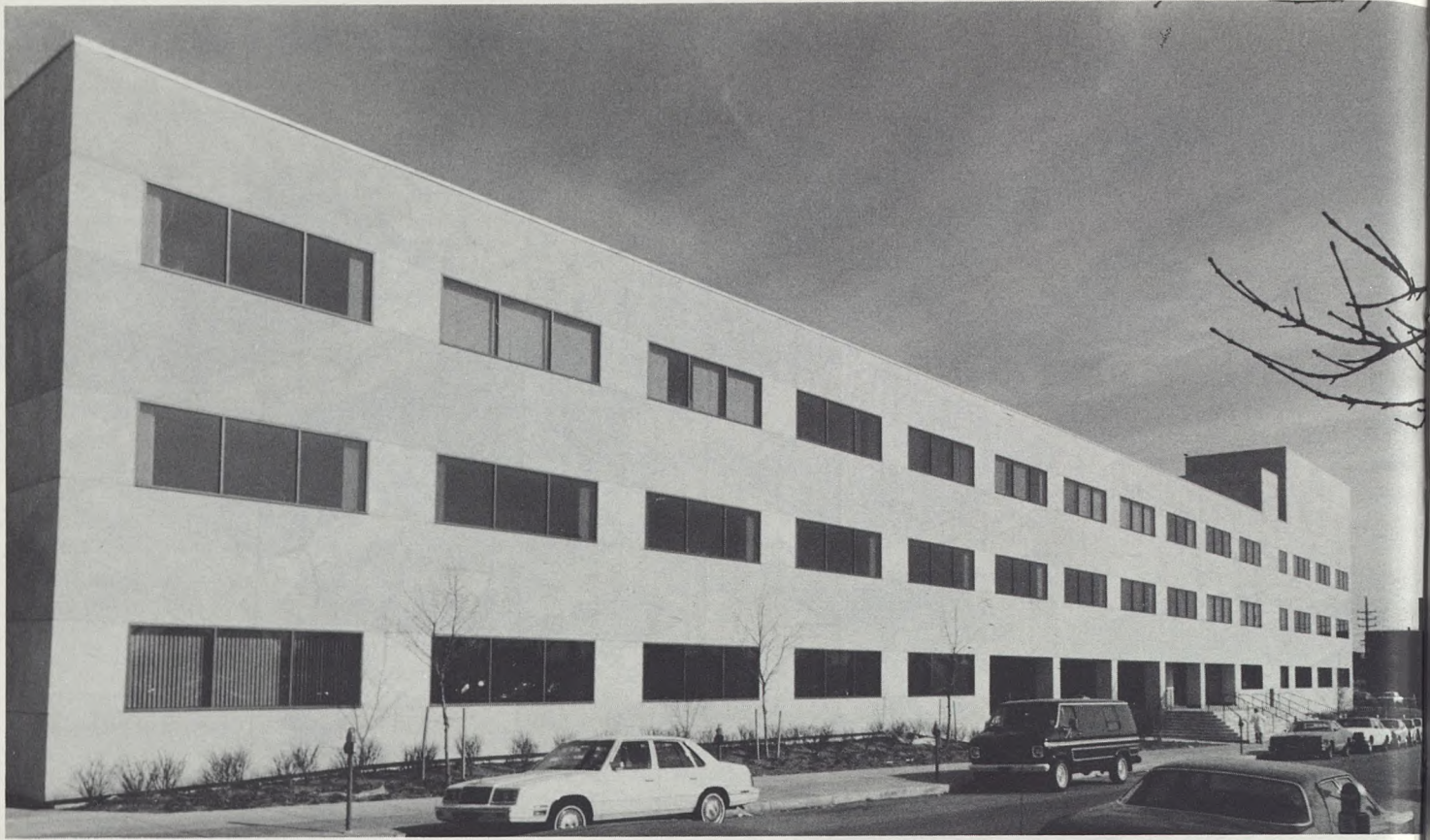


physicians and administrators with immediate access to x-ray examination reports and patient information as well as electronic mail and word processing. Over 100 new computer terminals, supported by the CSRB facility, will be added to Mallinckrodt's existing network. With twelve main systems supporting 275 terminals, MIR is the largest radiology computer facility in the world.

*With the completion of Mallinckrodt Institute's new computer facility at the CSRB, physicians will soon be able to view images at terminals located throughout the Washington University Medical Center.*

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*MIR's magnetic resonance imaging center, designed by Smith & Entzeroth, Inc. Architects, offers a state-of-the art setting in the East Building's first floor.*



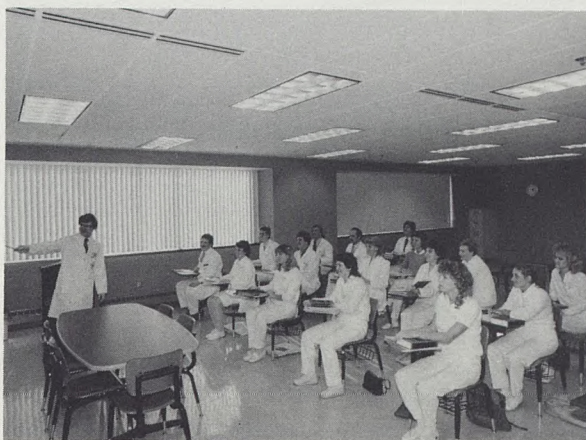
## NEW SPACE, NEW RESEARCH, NEW HOPE

### MIR EAST

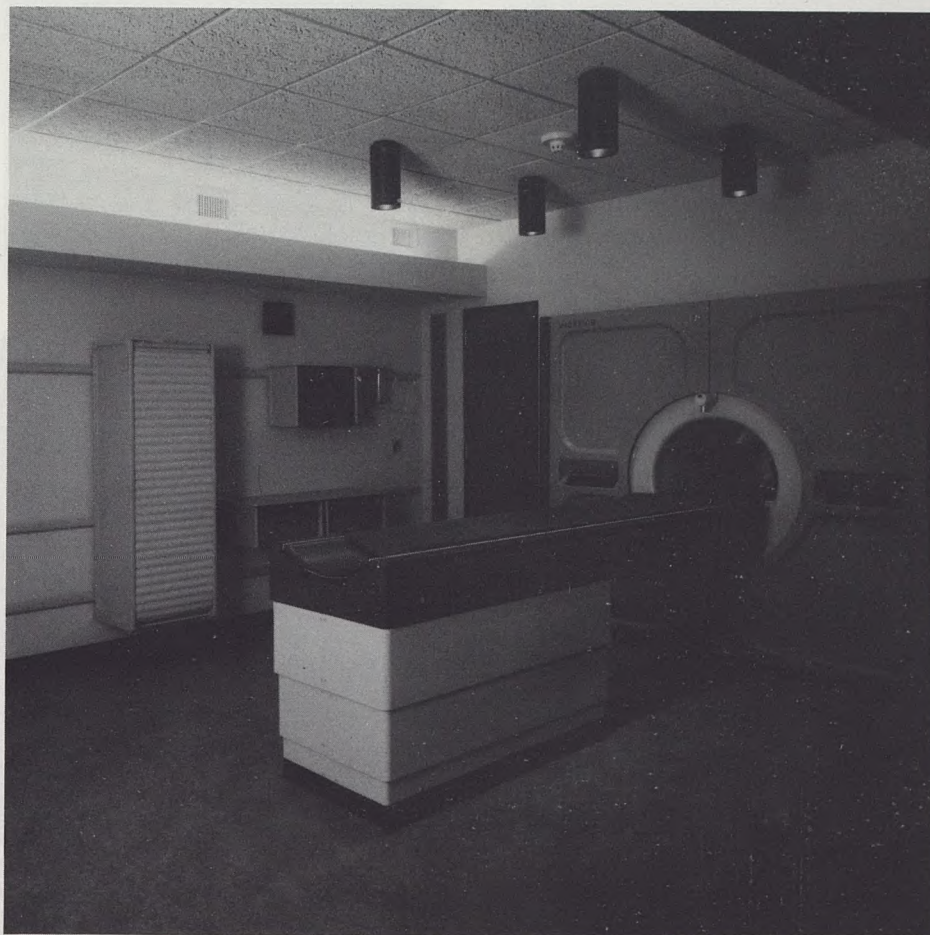
Mallinckrodt Institute has the largest allotment of space in Washington University Medical Center's newly renovated East Building, located at 4525 Scott Avenue. Distributed over three floors, MIR East includes a new magnetic resonance imaging center, a new warehouse for the storage of x-ray film, facilities for the School of Radiologic Technology, an advanced medical photographic/audiovisual laboratory, and an expanded billing and accounting department.

On the first floor of the East Building, Mallinckrodt's magnetic resonance imaging (MRI) center is designed in the shape of a semi-circle with the MR scanner and complementary facilities at its hub. These facilities include the control, computer, and equipment rooms as well as an additional suite for the institute's third MR scanner. A teaching environment, the control and computer rooms are walled in glass so students and visitors can watch the operations at the center without interfering with ongoing work. Natural light, earth tones, and neutral colors create a pleasant environment in the support and patient waiting areas surrounding the MRI center core.

The institute's MRI center is one of the first in the country employing a magnet with 2.0 tesla strength (operating at 1.5 tesla) for scientific research. Four times more powerful than the magnet housed on the fifth floor of the institute (primarily used in clinical studies), the new MR scanner will allow scientists to gain greater image clarity, detail of small anatomic structures, and new data on the biochemical nature of the human body. Because of the device's higher magnetic field strength, physicians and scientists will be able to begin research on atoms other than protons; sodium and phosphorous are two particularly-interesting



Chief technologist, Gary Brink, R.T.B.S., FASRT, conducts a course for first-year students in the new classroom of the MIR School of Radiologic Technology in the East Building.



A 1.5 Tesla Magnet and control and computer rooms make up the hub of the institute's new MRI center in the East Building.

*continued*



## NEW SPACE, NEW RESEARCH, NEW HOPE

atoms which are important in the study of the body's biochemistry.

Housed in both the basement and second floor of the building's north wing, the new film warehouse takes up nearly 20,000 square feet and diagnostic x-ray films, cine films, CT, ultrasound, and other medical images fill shelves which run the width and length of the building. These images record the diagnostic histories of some 365,000 individual patients treated at MIR in the last five to ten years.

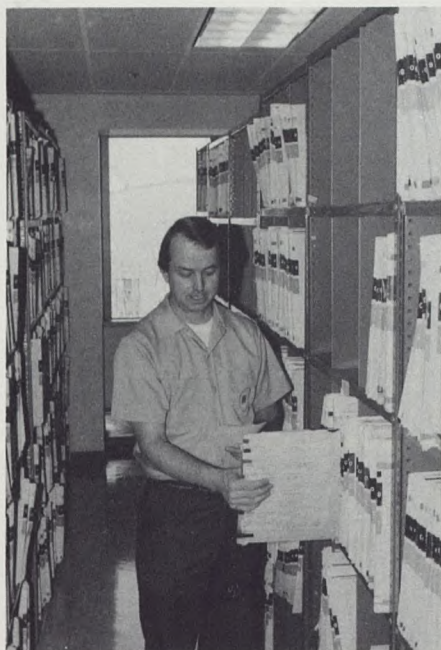
Within a spacious, window-lined office on the third floor of the East Building, the institute's billing and accounting department has also gained additional staff, a main computer system, and its own network of terminals. The department is currently reorganizing the institute's billing system, making it more centralized and convenient for patients.

Triple its previous size, the medical photographic/audiovisual laboratory now occupies over 2,000 square feet and features two darkrooms, a video

studio, an automated film processor, and other advanced photographic equipment. The photographic laboratory annually produces thousands of slides, prints, and transparencies for use by MIR staff members in scientific lectures, papers, publications, and exhibits.

With a new classroom, administrative offices, and conference facilities, the MIR School of Radiologic Technology now has a centralized teaching location within the institute. Where previously a lack of space limited the scheduling of daily classroom activities, the school's new facilities allow the course schedule to be extended throughout the entire day. The result is an additional day of clinical training for students in radiologic technology.

"We have been able to add space by the very generous gifts from our benefactors, research funds, and clinical practice," says **Dr. Ronald G. Evens**, director of the institute. "Our belief is that new space offers new promise."



*Mallinckrodt's new film warehouse facility in the East Building streamlines the storage and transfer of patients' x-ray films and medical images.*



*For medical photography/audiovisual laboratory supervisor, Norm Hente, right, and photographer, Tom Murry, the move to the East Building has meant trading cramped quarters for a spacious, modern laboratory.*



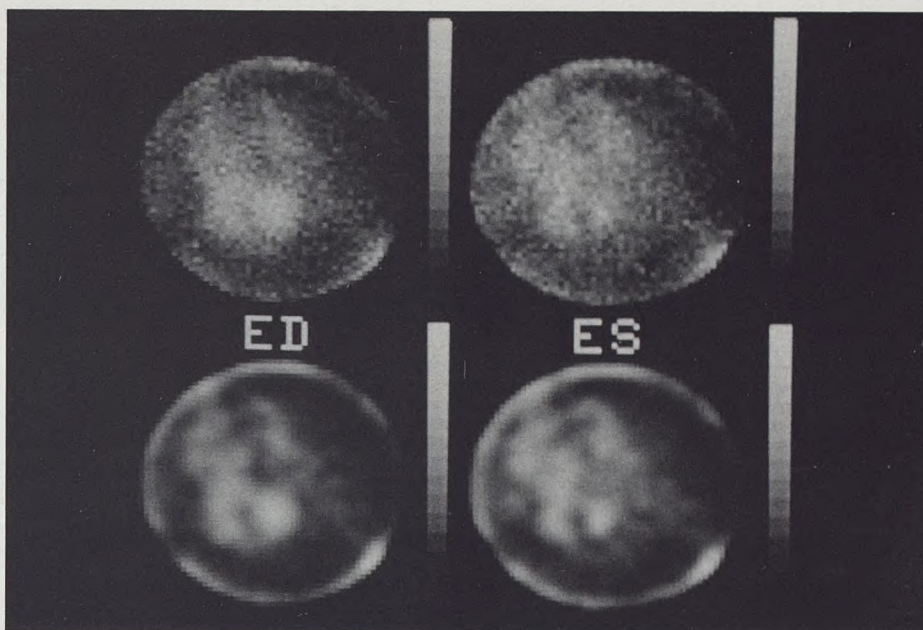
## Nuclear Medicine: Testing for an All-Digital MIR

In radiological centers across the country, the computer can likely be found in departments as far apart as billing and diagnostic ultrasound. It aids in the scheduling of exams, keeps track of the whereabouts of a patient's x-ray films, and makes recent studies and reports readily available. In medical imaging, the digital computer is essential for computed tomography, magnetic resonance, digital angiography, and heart studies in nuclear medicine.

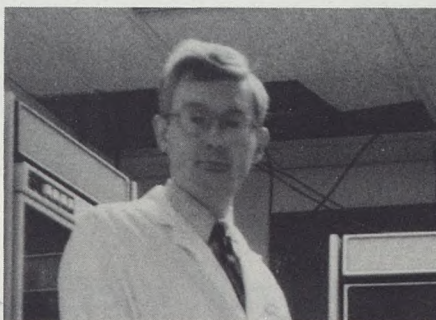
Radiologists anticipate that a department-wide digital imaging network would lend even more benefits to the medical world. Digitally-retained images would substantially reduce the cost of x-ray film, could be transmitted to areas where they are needed, and displayed in many different locations simultaneously. The problem of lost or unavailable studies would also be eliminated. Integration of diagnostic information is a significant benefit, with images from multiple modalities readily displayed together. Furthermore, images could be digitally processed to improve interpretation.

Part of an institute-wide project headed by MIR's computer section chief, **Gilbert Jost, M.D.**, a pilot study in the institute's division of nuclear medicine is investigating the possibility of fully-digital operation at Mallinckrodt.

"Using nuclear medicine as a proving ground is natural and relatively simple; the quantity of our data is small and thus, easy to store and process. From what we gain here, particularly in digital acquisition and analysis, we



*These images describe results gained from digital filtering of gated cardiac studies in MIR's division of nuclear medicine. Representing end-diastole, maximum filling of the ventricles, the images on the left are unfiltered (above) then filtered (below). Representing end-systole, minimum volume of ventricles, the images on the right are again shown unfiltered (above) and filtered (below).*



can show what can be done for the institute on a larger scale," says nuclear medicine radiologist **Tom R. Miller, M.D., Ph.D.**

### Digitizing Process

Transforming nuclear medicine studies from analog into digital form is a complex engineering process which requires the direction of Dr. Miller, along with computer scientist, **Kondapuram S. Sampathkumaran.**

Comprised of thousands of dots, arising from gamma rays detected by the imaging device, nuclear medicine images have a grainy appearance like that of a newspaper photograph. They lack clear detail because of radioactive scatter, noise gained from radioactive decay, and error involved in display in the gamma camera's two-dimen-

sional format.

Dr. Miller says, "What we want to do—with digital cameras, computers, and appropriate programming—is change the dots into numbers. First, electric voltages in the camera, representing the position of each gamma ray 'dot,' need to be converted into numbers, or digitized, then stored in computer memory. Digital images may give radiologists the ability to gain more precise diagnostic information because an image's background, contrast, and certain inhibiting factors like noise and distortion can be manipulated.

"Because it reduces these degrading influences, filtering may make interpretation of images more accurate; we believe this is the case with our gated cardiac studies. Other image processing techniques can also be of great value. For instance, the physiology of an organ may be more readily understood by generating 'functional' images representing important physiologic quantities rather than simple tracer uptake," says Dr. Miller, "Once these investigations are done, our images will be displayed on conventional television monitors and physicians will be able to instantaneously call up the studies they need."

According to Dr. Miller, the division will be fully digital this summer. ■





*A clinician's view of the magnetic resonance imaging system.*

## Scientist Explores Magnetic Resonance Imaging

It was not by chance that the installation of Mallinckrodt's first magnetic resonance imaging machine in the summer of 1983, coincided with the arrival of **W. Thomas Dixon, Ph.D.**, assistant professor of radiation sciences. Brought to MIR "to maximize the capabilities of the new imaging modality," Dr. Dixon has already expanded the diagnostic potential of magnetic resonance through his discovery of a modified spin echo technique that enables MRI to differentiate fat and water.

In the fall of 1983, Dr. Dixon discovered that when the timing of pulse sequences used in conventional magnetic resonance imaging is altered, the nuclei of hydrogen atoms (or pro-

tons) attached to fat behave differently than the nuclei of hydrogen atoms attached to water. By shortening the time interval between application of radio pulses (a  $90^\circ$  pulse and a  $180^\circ$  pulse), he was then able to perform computer analysis of the radio signals at a time when the water magnetization and the fat magnetization would point in opposite directions—thereby separating the two substances.

These results have been shared with other institutions and are now the basis for similar MR studies across the country. At Mallinckrodt, **Drs. Joseph Lee, Jay Heiken, and David Ling** utilized Dixon's innovation to successfully detect tumors in liver tissue with fatty

infiltration.

Although his work at MIR is his first to involve medical imaging, Dr. Dixon has been experimenting with nuclear magnetic resonance (NMR) for nearly a decade. (NMR was first used for chemical analysis of solids and liquids in 1946, and was directed toward medical imaging in the 1970s.)

He was introduced to the principles of NMR by Oscar Lumpkin, a professor at the University of California in San Diego (UCSD). There, for his thesis, Dr. Dixon used NMR to study simple inorganic analogs, or models, of hemoglobin, observing how oxygen bonds to these molecules.

Upon completion of his Ph.D. in



physics at UCSD, Dr. Dixon came to St. Louis to pursue postdoctoral training in Dr. Jacob Schaefer's laboratory at Monsanto World Headquarters. Working with Monsanto chemists for three years, he used NMR to measure the movement of molecules in various types of plastic. To everyone's surprise, it was discovered that parts of the molecules in the toughest, bullet-proof forms of plastic, flip completely over, like a fish in a frying pan, almost every microsecond; whereas those in brittle polymers are rigid. The conclusion: the greater the movement of molecules in a solid, the tougher would be the substance they compose.

At Mallinckrodt Institute for the past eighteen months, Dr. Dixon has experimented with the software programming of the .35 Tesla superconductive imager. Most of his work has involved modification of the pulse sequences which produce magnetic resonance images. As he explains, "It is possible to control the order, timing, and strength of the pulses in the sequences and to change these three factors in ways that are likely to optimize the image

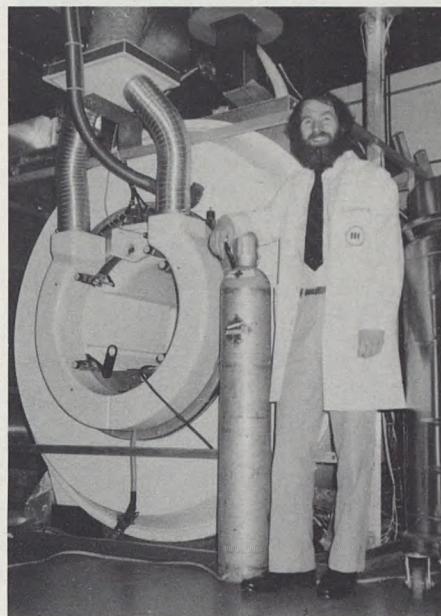
contrast of various types of tissue."

He adds, "Since the compounds which compose human tissue have different radio wave frequencies, we are able to separate these compounds by frequency, just as a prism separates the colors of light into a spectrum." Called spectroscopic imaging, the technique clearly differentiates fat and water—fat having a lower frequency of radio wave than water. Eventually, Dr. Dixon hopes to separate other, more rare compounds such as glycogen or lactate, a component of oxygen-deprived tissue.

Tanks of oil and water are the "patients" usually seen by Dr. Dixon and his associate, **Leila Du**, a graduate student in physics. The results of their research are relayed to radiologists for clinical application.

With a large, 1.5 Tesla magnet already in place in the East Building and an adjacent fully-equipped laboratory facility under development, the new year promises to be exciting for MR research. Grateful for the support of **Dr. Ronald Evens** and the privilege of working with equipment of this cal-

ibre, Dr. Dixon looks forward to experimenting with MR "hardware," the machinery itself, and using the higher strength magnet to obtain clinically useful information from spectroscopy. ■



Dr. Thomas Dixon at the back of the new 1.5 Tesla superconductive magnet.

## Spectroscopic Imaging of the Liver

Last year, three radiologists at Mallinckrodt, **Drs. Joseph K.T. Lee, Jay P. Heiken, and David Ling**, directed application of Dixon's modified MR pulse sequence toward visualization of the liver. Vastly improving MR's capability to detect fatty infiltration of the liver and hepatic metastases, the technique enabled these physicians to clearly distinguish normal from tumorous liver in patients who had a co-existing fatty liver condition.

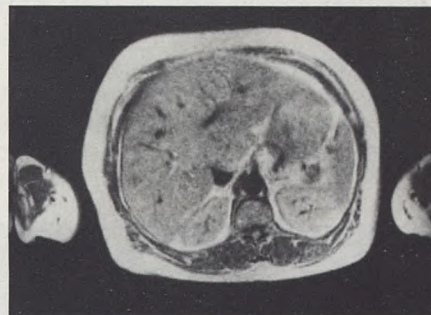
In the study, fourteen patients with hepatic metastasis were imaged with MR using both the conventional spin echo (SE) technique and the opposed phase of the proton spectroscope method as described by Dixon. The opposed image showed more lesions than the conventional SE technique in five cases and provided better contrast between the liver parenchyma and metastases in two. Four of these seven patients had associated fatty infiltration of the liver.

When compared to CT (computed tomography), the opposed image either

showed more lesions or provided better contrast in six patients, four of whom had fatty infiltration.

The newly developed imaging technique proved to be particularly useful in clinical situations where a liver tumor was suspected, but, due to fatty infiltration, final diagnosis by other radiological studies was incomplete. For example, with one patient, an MR scan determined that a mass feared to be a tumor was, in reality, a core of fatty tissue for which no treatment was required. In another case, an MR scan located a tumor which could not be seen on earlier CT scans. Presence of the tumor was subsequently verified by ultrasound and an appropriate treatment program was begun.

This research, the first of its kind in the nation, was discussed November 27 in Washington, D.C. during the 70th Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA). It was published in **Radiology**, Volume 153, pages 195-201. ■



Conventional MR image shows mild inhomogeneity to the liver. No discrete lesion is present.

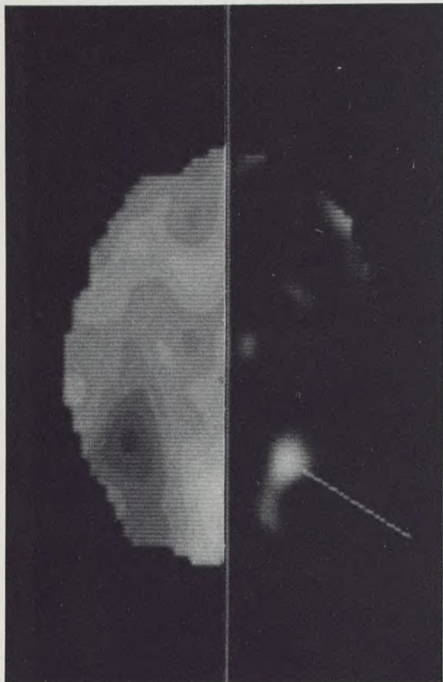


Dixon method obtained at the same level shows numerous high intensity lesions throughout both lobes of the liver. More lesions are identified on this image than the CT study. ■



# PET Imaging: Pinpointing

by Ria Munoz



This revolutionary PET image, from the laboratory of Mallinckrodt neurologist Marcus E. Raichle, M.D., is the first medical image of a biochemical abnormality in the brain of a patient with panic disorder. The bright white spot, on the lower right side of the image, depicts a very localized area of asymmetry in cerebral blood flow in the parahippocampal area of the brain. The left side of the image is a map of cerebral blood flow; the right side is a map of asymmetries in cerebral blood flow between each hemisphere.

The first clinically successful PET (positron emission tomography) scanner was developed twelve years ago by **Michel M. Ter-Pogossian, Ph.D.**, and a team of investigators at Washington University Medical Center. Since then, biomedical scientists at the university have continued to gain greater capabilities with the research instrument. In collaborative work with the department of neurology and neurosurgery, Mallinckrodt Institute's division of radiation sciences now receives over \$1,000,000 per year in federal and private grant funds for studies of stroke, epilepsy, Parkinsonism, and psychiatric diseases, such as depression and panic disorder, as well as normal brain physiology. This article reports on a recent advancement in PET image analysis, **stereotactic localization**, and its application to current research at Mallinckrodt.



Dr. Michel M. Ter-Pogossian, head of MIR's division of radiation sciences and the "father of PET," with the division's team of scientists specializing in studies of the brain: Dr. Marcus Raichle, kneeling; right, Drs. Mark Mintun, Bill Powers, Joel Perlmutter, Eric Reiman, Peter Herscovitch, and Peter Fox.

## Positron emission tomography.

Commonly referred to as PET, it is a medical imaging method revealing function and not anatomy.

Using unique radiopharmaceuticals, PET is able to trace the behavior of molecules distributed within the body. Normal molecules travel along specific "pathways." Highly-specialized radiopharmaceuticals, comprised of positron-emitting isotopes combined with a chemical compound, will also follow these well-traveled highways.

Serving as a kind of radioactive "lane-marker," the radiopharmaceutical is detected by the PET scanner from which detailed maps of regional radioactivity are computed. When these maps are analyzed mathematically, the function and activity of the heart, lung, brain, and even specific populations of nerve cells can be studied. These maps are PET images.

PET imaging can show how fast an organ of the body (such as the brain) absorbs glucose and how it converts it into energy through the utilization of oxygen. It can also track the flow and volume of blood and pinpoint areas of the brain at risk for a stroke. In heart studies, PET is able to reveal what happens to local metabolism of heart muscle before and after a heart attack.

Though achievements in PET research provide so much previously hidden information about the body, scientists have had to overcome a significant limitation.

**Marcus E. Raichle, M.D.**, a neurologist in Mallinckrodt's division of radiation sciences, says, "In the PET studies we have done, we couldn't identify specific anatomic structures. We had a good idea but we didn't know the specific place we were looking at in our images. If a neuroscientist studying panic disorder, or another brain abnormality, found a specific abnormality on a PET scan, there was no way another scientist could repeat the same study.



# Disorders in the Brain

"Without the ability to compare studies from one lab to another, or one patient to another, studies designed to pinpoint specific disorders in the brain couldn't be done. We couldn't test strong hypotheses connecting these disorders with particular neurologic and psychiatric diseases."

It was this problem that inspired other neurologists in the division of radiation sciences, **Drs. Joel Perlmutter and Peter Fox**, with Raichle to develop a quantitative method able to produce needed anatomical localization within PET images.

"We basically borrowed a neurosurgical technique, stereotaxis, which is used for highly localized brain surgery. Stereotaxis, a mathematical method based upon coordinates along three different axes running through the brain, is used to define the position of any anatomical structure within the brain," says Dr. Perlmutter.

"Applying this to PET, we first make a lateral radiograph of the patient's

skull which gives us not only a picture of the bones of the skull but also records the orientation of the PET images in relation to the brain. From the radiograph, we can mathematically determine locations of specific anatomical regions in PET images of the brain. We can also measure the activity in different parts of the brain."

Neuroscientists at Mallinckrodt call the new technique a major advance which will affect the future of PET imaging. Since its development a year and a half ago, this advancement has so far resulted in a major medical achievement by researchers at Mallinckrodt Institute and other departments of the Washington University Medical Center.

## Panic Disorder

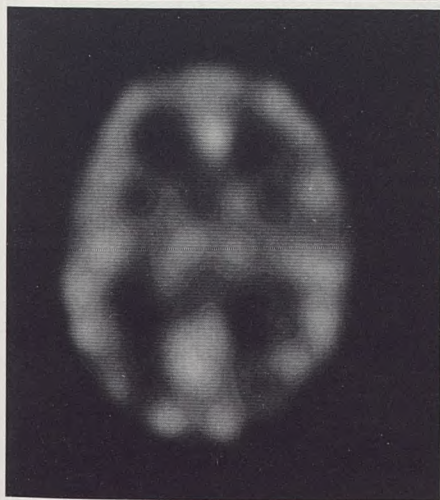
In a study comparing normal subjects and patients with panic disorder, **Drs. Eric M. Reiman**, Raichle, Kevin Butler, **Peter Herscovitch**, and Eli

Robins for the first time were able to identify a specific region of the brain with abnormal activity in patients with panic disorder, an illness which for years has puzzled psychiatrists and physicians.

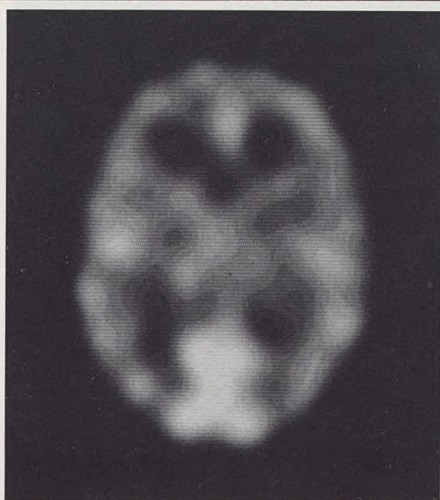
Characterized by recurring anxiety attacks in the absence of frightening stimulus, panic disorder is a common psychiatric illness. Recent findings from the National Institute of Mental Health report the disorder affects as much as 9% of the nation's population. Another study reports the disorder affects 10-14% of the patients seen by cardiologists.

"Psychiatrists all along have known that some patients with panic disorder have an attack when sodium lactate is infused intravenously. This suggested a biochemical basis for the disorder," says Dr. Raichle.

"Until we used PET with stereotactic localization, we didn't know where the functional problem was. We were able to tell our computers to specifically



*This series of PET images, demonstrating functional activity within the visual area of the brain, illustrates a step-by-step application of stereotactic localization. The first image shows the distribution of blood flow in a subject who's eyes are closed and covered.*



*A second blood flow image, from the same subject, made 10 minutes later while the subject viewed a pattern of flashing lights. Blood flow in visual cortex, seen here at the bottom of the picture, is markedly increased.*



*The last image, demonstrating the change occurring between the first two images, further defines the exact location of activity in the human visual system. From this image, the new stereotactic technique is used to pinpoint the location of this activity in the visual system.*

*continued*



search the brain for regions of abnormal activity. Using our newly developed technique, we found that there was an abnormality in the brain and that it was limited to the part of the brain thought to play an important role in the expression of emotional behavior."

## Parkinson's Disease

In a current study of patients suffering from unilateral Parkinson's Disease (PD), Dr. Perlmutter employed the stereotactic technique and was able to make an important finding.

Studying twelve different patients with the disorder, he found consistent abnor-

mal activity in the globus pallidus, a region deep within the basal ganglia which is located at the base of the brain. For some patients, regional activity was high; for others, activity was below the level of normal subjects.

This discovery is significant because physicians have long theorized that the basal ganglia, comprised of several small parts, controls coordination and smoothness in movement. In further research, Dr. Perlmutter will attempt to understand the region's function and the role the globus pallidus plays in PD and its three major symptoms: tremor, rigidity, and slowness of

movement.

## Dopamine Receptors

In the last twenty years, physicians have learned that the lack of dopamine in the brain triggered Parkinsonism. Though drugs containing dopamine have been developed and are now administered to patients with PD, their effectiveness is limited. After prolonged treatment, some patients are no longer responsive to medication. Drugs must be withheld for a short duration of time in order for patients to regain sensitivity and even then, some patients do not respond.

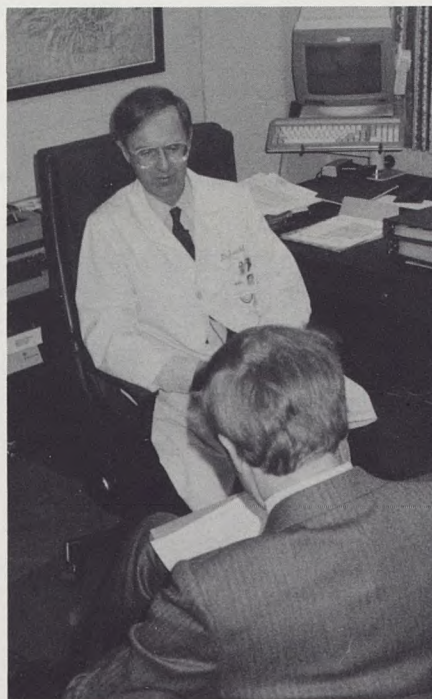
## Marcus E. Raichle, M.D.

Through his work in positron emission tomography, **Marcus E. Raichle, M.D.**, has greatly increased physicians' and other scientists' understanding of the human brain.

A biomedical leader, he is credited with important achievements in the development of quantitative tracer techniques improving the diagnostic potential of PET in studies of normal function, as well as disease processes in the human brain. His work includes studies of brain metabolism, blood flow, biochemistry, and pharmacology which may lay the foundation for a more rational approach to the diagnosis, treatment, and prevention of brain disease. The recent discovery of a biological abnormality in panic disorder by Mallinckrodt Institute's team of PET neuroscientists was an important step in this direction.

For these important contributions to the use of atomic energy in medicine and positron emission tomography in biomedical research, Dr. Raichle last December was awarded the Sarah L. Poiley Memorial Award from The New York Academy of Sciences. Dr. Raichle shares the Poiley Award with Dr. Michael E. Phelps, Jennifer Jones Simon Pro-

fessor of Biophysics at the UCLA Medical Center, in Los Angeles, California.



*Mallinckrodt neurologist Marcus E. Raichle, M.D., answers questions from news reporter Daniel Rutz, of Cable News Network (CNN), on the recent finding of a biochemical abnormality in a study of panic disorder made by Raichle and other researchers at Washington University Medical Center.*

Beyond his duties as a professor of radiology, neurology, and biomedical engineering, Dr. Raichle is also principal investigator at the Stroke Center and senior McDonnell Fellow at the McDonnell Center for Studies of Higher Brain Function at Washington University Medical Center. He currently serves on the editorial boards of **Brain**, **Annals of Neurology**, and the **Journal of Cerebral Blood Flow and Metabolism**, and is a former study section member and frequent advisor to the National Institutes of Health. Active in professional societies, he is a member of the American Academy of Neurology, the American Neurological Association, the International Society of Cerebral Blood Flow and Metabolism, the American Physiological Society, and the Society for Neuroscience.

Dr. Raichle joined the faculty at Washington University in 1971 as a research instructor in neurology. After receiving his medical degree from the University of Washington (Seattle) in 1964, he gained further training in neurology as well as his introduction to neurological research at the Cornell University Medical Center in New York City. ■



# Dr. Ter-Pogossian Receives Pioneer Lecture Award

"We aren't really sure what's going on," says Dr. Perlmutter.

"Dopamine acts as a chemical messenger between nerve cells (telling the brain what to do). After leaving one nerve cell, dopamine must attach to a specific receptor on the receiving cell in order to transmit its message. It seems that once drug administration begins, dopamine receptors may require more and more dopamine in order to function.

"We want to determine if dopamine receptors in specific areas of the brain have changing sensitivity. Can treatment make receptors less sensitive? Does disease progression change receptors? To answer these questions, we need PET images which can focus on a very specific part of a nerve cell. This can only be done with stereotaxis."

Dr. Perlmutter and **Dr. Mark Mintun**, a resident in the division of nuclear medicine at Mallinckrodt, are currently developing a technique for measuring the activity of dopamine receptors.

## Other Investigations

In other projects of the division of radiation sciences in Mallinckrodt Institute, PET imaging combined with stereotaxis is enabling researchers to answer unresolved questions about the human brain. In studies of the normal human brain, physicians are now able to closely observe activity in the parts of the brain controlling vision, hearing, language, and thought. Information gained from Dr. Perlmutter's initial studies on dopamine may lead to the discovery of receptor abnormalities in other movement disorders and psychiatric diseases such as schizophrenia. The new technique is also being employed in challenging investigations of stroke, epilepsy, and other neurologic and psychiatric diseases. Still other secrets of the brain may be revealed in studies being done at other centers for PET research, where scientists have already begun to adapt their procedures and equipment to make use of this Mallinckrodt development. ■

**Michel M. Ter-Pogossian, Ph.D.**, director of the division of radiation sciences and professor of radiation sciences in radiology and biophysics in physiology at Washington University Medical Center, has received the distinguished Herrman L. Blumgart Pioneer Lecture Award.

This award was created by the New England Chapter of the Society of Nuclear Medicine in honor of the late Dr. Blumgart, widely known as the "father of clinical nuclear medicine." Since 1978, it has been presented annually to outstanding innovators in the field of medical instrumentation.

Dr. Ter-Pogossian, a reknown physicist and nuclear scientist, is recognized for his key role in the introduction and use of radioisotopes (radioactive substances) for biomedical research and also in the development of PET (positron emission tomography) scanners, which plot the path of these radioactive substances in living tissue.

In 1951, Dr. Ter-Pogossian was a partner in the construction of one of the first scanning devices capable of detecting concentrations of radioactive material in living matter. Since then, his research has progressively advanced the practice of nuclear medicine.

He was one of the first to use radioisotopes to detect brain tumors, and was the first in the world to report the biomedical application of the sodium iodide detector for the diagnosis of these tumors. An early promoter of stationary imaging devices, Dr. Ter-Pogossian was pivotal in the development of gamma devices.

As a result of successful preliminary studies conducted by Dr. Ter-Pogossian using radioactive oxygen, the Washington University Medical Center was the first medical facility in the United States to install a biomedical cyclotron. The cyclotron produces the short-lived radioisotopes which identify, or label, molecules in the body for observation.



*Michel M. Ter-Pogossian, Ph.D.  
Recognized for innovations in medical instrumentation.*

In 1978, Washington University became the first medical center to utilize two biomedical cyclotrons.

Dr. Ter-Pogossian and his colleagues at WUMC developed positron emission tomography—the instrumentation needed to analyze the data which results from placing radioisotopes on molecules important in the study of the body's physiology. During the past ten years of experimenting with PET, they have developed multiple techniques for measuring blood flow, blood volume, oxygen metabolism, and glucose metabolism. The Super PET, currently used in studies of the heart, represents the potential for the ultimate in PET imaging.

Dr. Ter-Pogossian received his doctorate in physics from Washington University. A member of the staff at Mallinckrodt Institute since 1950, he has published nearly 200 papers and over 50 book chapters regarding his work. In 1976, Dr. Ter-Pogossian was honored with the Paul C. Aebbersold Award, the highest recognition for science bestowed by the Society of Nuclear Medicine. ■



# Expanding Horizons Together

## Radiologists and Urologists Conquer the Stone

With ever-increasing success, radiological skills and technology are being used to reduce or eliminate the need for painful, traumatic, and costly medical procedures. This trend continues at the Washington University Medical Center where, as a result of collaboration between the division of urology and Mallinckrodt radiologists, 99% of all kidney stones are now removed without open surgery.

MIR radiologists and Barnes' urologists have worked together since 1982, to remove renal and ureteral calculi (stones) in a procedure called **percutaneous nephrolithotomy**; terminology borrowed from Latin and Greek words meaning "a doorway through the skin into the kidney used to remove stones." They have successfully performed the procedure on over 65 patients who would otherwise have undergone painful renal surgery requiring a 6-inch incision and four to six weeks convalescence.

Developed in 1977, the percutaneous procedure is an innovative extension

of already accepted endourological techniques. Continued expansion of its use at the medical center was ensured by the academic appointment in October 1984 of **Ralph V. Clayman M.D.**, a urologist who has given impetus to the development and use of the technique worldwide.

Percutaneous stone removal involves three functions: establishing a tract into the kidney, dilating the tract, and removing stones through the tract.

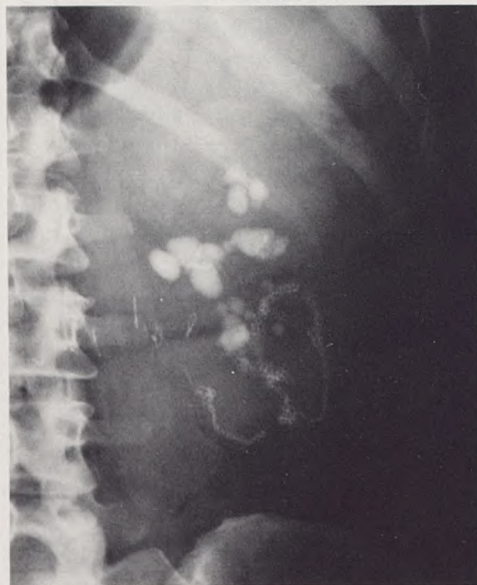
Radiologists accomplish the first step by inserting a small 18-gauge nephrostomy needle through the muscles of the back (requiring a one-half-inch incision) into the kidney. A .038-inch guidewire is then passed through the needle and maneuvered into the renal pelvis or ureter.

According to Dr. Clayman, "Accurate placement of the guidewire—over which hollow dilators, catheters, working sheaths, and the nephrostomy tube are successively inserted—is the most important part of the whole procedure." Since it is best to approach the kidney

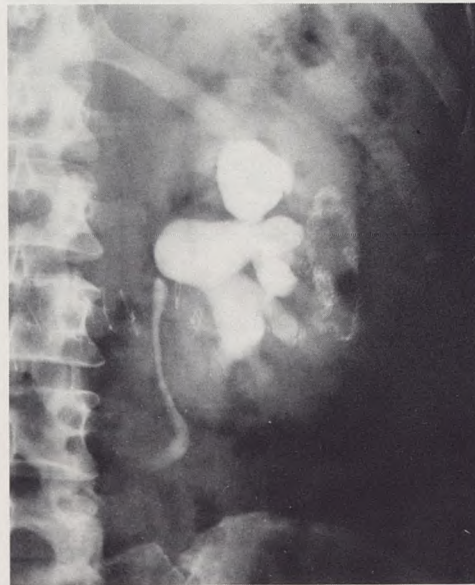
stones "straight on," it is imperative that the nephrostomy tube be placed directly on the stone, or as near to it as possible," says Dr. Clayman.

Monitoring the slow, painstaking insertion of the guidewires, catheters, and other instruments requires fluoroscopy, a radiological imaging technique that visualizes the entire collecting system. Once the nephrostomy tube is in place, the urologist essentially has a conduit through which a variety of instruments may be inserted—and through which intact or fragmented stones may be removed.

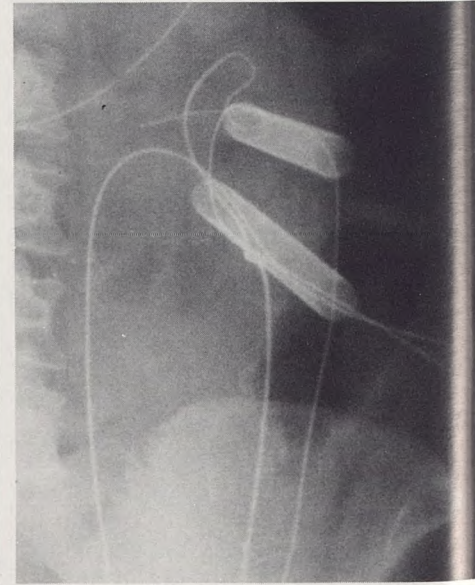
A nephroscope is guided into the kidney by the urologist to enable precise visualization of stones. Stones which are no larger than one-half of an inch in diameter are usually removed intact with instruments designed to either trap the stone in a manually-controlled basket, or to dislodge and hold the stone in a forceps-like grasper. Calculi that are too large to be grasped and removed intact are disintegrated with ultrasonic energy. Pieces of the stone



1. Intravenous urogram showing left kidney with multiple stones and evidence of previous surgery.

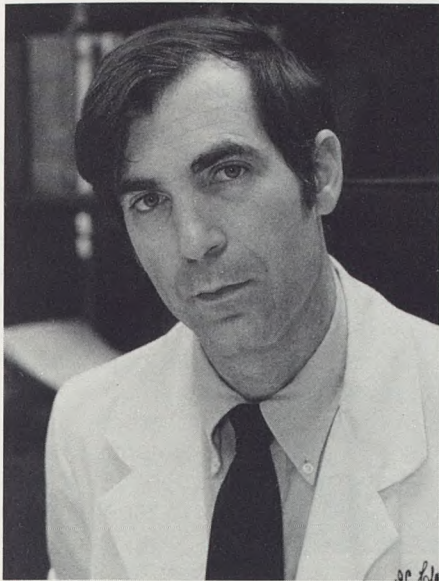


2. View of the collecting system where the stones lie—rendered opaque by the contrast medium.



3. Guidewires, catheters, and two sheaths in place after all stones have been removed intact by percutaneous nephrolithotomy.

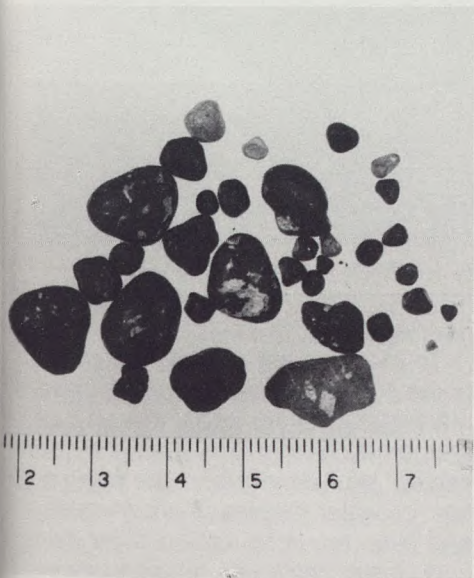




Ralph V. Clayman, M.D.  
 Recipient of 1983 Gold Award from the  
 American Roentgen Ray Society

are then removed by suctioning, or by using the basket or grasper.

In 1984, Dr. Clayman co-authored with Dr. Wilfrido R. Castaneda-Zuniga, associate professor of radiology at the University of Minnesota, the first textbook covering this subject to be writ-



4. Scale with one-half inch gradients indicating the relative size and shape of the 32 stones removed.



Outlined in black are the collecting systems, both left and right. Each contains a single large stone which almost fills the entire renal pelvis. In several treatment sessions, the two stones were disintegrated with an electrohydraulic lithotripter and percutaneously removed. Superimposed on the urogram are pictures of the actual stone fragments that were removed, in proportion to the metric scale provided.

ten in the United States. Termed a virtual "cookbook of endourology" by one of their colleagues, **Techniques in Endourology: A Guide to the Percutaneous Removal of Renal and Ureteral Calculi**, is devoted entirely to the methodology of percutaneous stone removal and is as much a text for radiologists as it is for urologists.

Of the radiologists' role in stone removal, Dr. Clayman contends "radiologists have developed the best expertise at handling guidewires and placing nephrostomy tubes." Between 1955 and 1970, years before the principles of nephroscopy were directed toward renal stone removal, "the radiological materials and techniques necessary for performing percutaneous nephrostomy and tract dilation evolved to the point that radiologists can now access the upper urinary tract in nearly all patients."

Dr. Clayman received the Gold Award in 1983 from the American Roentgen Ray Society for a movie detailing this procedure. He organized the first course on percutaneous lithotripsy in 1982, and is considered an authority on the subject worldwide.

In the short time since its inception, the percutaneous technique has made renal surgery for stone removal literally obsolete. Compared with surgery, which had been the only means of treating stones for over 100 years, the endourological procedure is far less traumatic to patients and may result in a lower rate of stone recurrence.

Used in conjunction with the lithotripter, or "kidney-stone busting" machine recently acquired by Barnes Hospital, the technique should enable all patients to be treated in the most successful, least stressful manner.

At MIR, where he recently joined the staff as an associate professor of radiology, Dr. Clayman collaborates with **Bruce McClennan, M.D.**, professor of radiology and chief of the abdominal section, and **Philip Weyman, M.D.**, associate professor of radiology. Their collaboration fulfills the speculation which Dr. Clayman makes in the introduction to his textbook that "Nephrolithotomy beckons to the urologist and radiologist to expand their horizons together, to create and advance their combined fields of medicine to the patient's benefit." ■



## CT "Dissects" Fossil Skulls

A colony of monkeys raised in Puerto Rico and a handful of prehistoric skulls stored in Kenya may someday contribute to the world's knowledge about man's origins and cognitive development. If so, credit will be due to a unique research project underway at Mallinckrodt Institute, involving collaboration between two Washington University Medical Center staff members: **Glenn C. Conroy, Ph.D.**, professor of anatomy and anthropology, and **Michael W. Vannier, M.D.**, assistant professor of radiology.

Working with CT (computed tomography) during evening and weekend hours, Drs. Conroy and Vannier recently made a valuable breakthrough in the paleontological study of fossil skulls. By applying the highly successful three-dimensional imaging technique developed by Vannier to aid in craniofacial reconstructive surgery, they visualized in three dimensions, for the first time, the intracranial cavity of fossil skulls embedded in stone—a view which enables the precise measurement of brain size and shape.

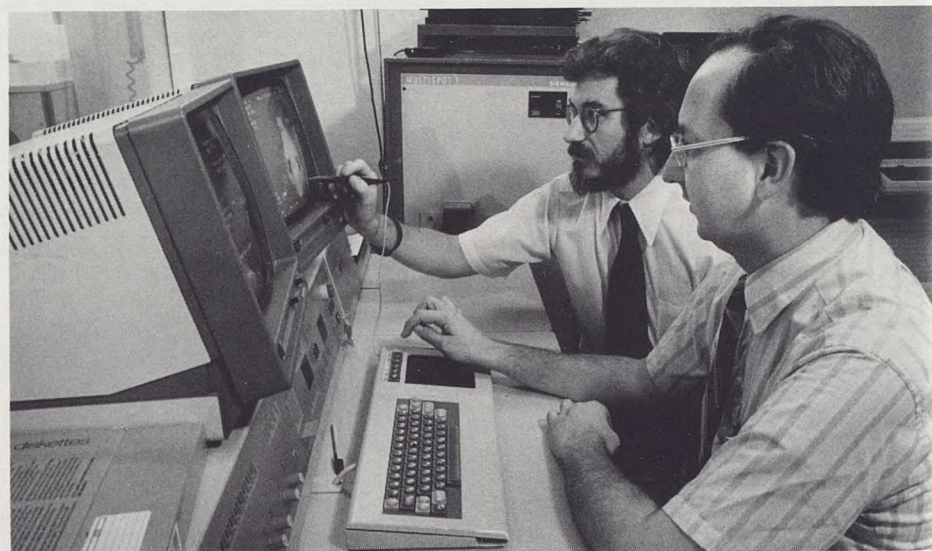
A relatively large brain in proportion to total body size is one of the distinguishing characteristics of *Homo sapiens*. For this reason, intracranial (brain case) measurements have long been a part of fossil studies and are often a criteria in the definition of "human" beings.

"From the fossil record," explains Conroy, "anthropologists try to determine when primates began to develop a larger brain than other mammals. They also study brain size in relation to the evolution of the strain of higher primates which are called the Homidae and include man."

During the past two million years, the human brain case tripled in size; expanding from 500cc to modern man's average cranial size of 1500cc. From the shape of the brain, it is apparent that, over time, this growth was



*A latex skull endocast obtained from the Cayo-Santiago collection shows the surface features of a monkey's (*M. Mulatta*) brain. Skulls from this unique collection, numbering more than 600, have been used to produce endocasts that are being studied by Conroy and Vannier at MIR.*



*Drs. Glenn Conroy (left) and Michael Vannier examining CT images of fossils.*

accompanied by elaboration of particular sections of the brain including the frontal and temporal lobes. Conroy hopes that the research with Vannier at MIR will help "to relate the comparatively rapid and localized expansion of the human brain to the development of human attributes which don't fossilize, such as social behavior, language, and technical skill. We try to infer from the fossil record if brain size and shape had anything to do with these other

developments."

To measure the cranial capacity of primate fossils, anthropologists have historically relied upon the use of mathematical formulas involving the exterior skull dimensions, the application of water displacement theories, and even the construction of models and plaster casts with missing pieces restored in estimated proportion. Conventional x-rays have been of limited value in fossil studies because they



## Dr. Hsiu-san Lin Begins Ninth Year of Lung Cell Research

do not reveal the dimensions of intracranial structures.

Seeking a more reliable method of fossil measurement, Conroy realized the potential of Vannier's three-dimensional imaging with CT. In the summer of 1983, Conroy and Vannier attempted CT scanning of fossils embedded in stone. According to Conroy, 'Not only did CT 'see through' the mineralized bone to generate a picture of the fossil interior, but the scanning device was also capable of distinguishing fossil bone from rock.'

A nondestructive procedure, CT enables visualization of the few unbroken primate skulls currently in existence. Of even greater value for anthropologists who are trying to establish a well-documented fossil record of human evolution, advanced CT reconstruction methods developed at MIR are capable of producing complete intracranial images from skull fragments. (Fragments of primate skulls are found in far greater abundance than intact skulls.)

Successful results obtained with a valuable 30-million-year old mammal skull were recently published in **Science** and **Science News**, and presented in Kenya, South Africa, New York, and Berkeley. Of worldwide interest, this research has been awarded a grant from the National Science Foundation and is featured in the Japanese, Italian, and English editions of **Science '85**.

In the coming year, Conroy and Vannier plan to use the technique on prehistoric primate skulls (on loan from museums around the world) and to study the asymmetry in brains of monkeys raised in the Cayo-Santiago Primate Center in Puerto Rico. Dr. Conroy explains that "data about the effects of heredity upon brain shape and development may be obtained from these monkey skulls, numbering more than 600, because the genealogy of the colony has been recorded since the Center was first established." ■

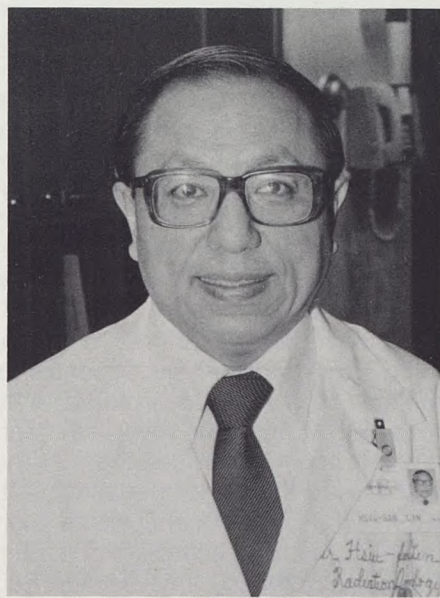
**Dr. Hsiu-san Lin, Ph.D., M.D.**, professor of radiology in the division of radiation oncology at MIR, was recently awarded a three-year grant from the National Heart, Lung, and Blood Institute (NHLBI) to study the reproduction of cells which provide first-line defense against bacterial and viral infections in the lungs. In the amount of \$374,900, this grant is the third award from the NHLBI during the past nine years to fund Dr. Lin's ongoing research into the nature and production of these lung cells, called **alveolar macrophages**, and the effects of radiation therapy and chemotherapy on them.

Dr. Lin's original theory that a majority of alveolar macrophages are produced in the lung itself and can replicate themselves in the lung is

contrary to a prevailing theory throughout the world that macrophage cells originate in bone marrow and are carried to the lungs through the bloodstream. His results are now confirmed by other researchers in the United States and his theory of macrophage production widely accepted.

Extended grants from the NHLBI have enabled Dr. Lin to substantiate his biological, cell-oriented research with clinical applications in the treatment of cancer. From his theory that the lungs play a significant role in the production of macrophages, Dr. Lin developed related studies to verify that medical complications resulting from cancer treatments are reduced by minimizing radiation and cytotoxic damage to the macrophage cells which provide biological defense of the lungs. This research lends support to current modifications in radiation therapy involving smaller, more frequently applied dosages of radiation; as opposed to one single large dose. With the smaller dosages, it is possible to spare normal cells—a factor which is measurable in terms of the subsequent reproduction of macrophages.

Dr. Lin, a certified therapeutic radiologist, is both a trained scientist and a trained clinician. He received his medical degree from the National Taiwan University in Taiwan, China in 1960. After completing a residency in internal medicine at Cook County Hospital in Chicago, he obtained a Ph.D. in microbiology and immunology at the University of Chicago. He has been on staff at Barnes since 1971, and has served as a visiting scientist at the University of Oxford in England. Dr. Lin has authored over 55 publications regarding his research. ■



Hsiu-san Lin, Ph.D., M.D.  
Awarded grant from the National Heart, Lung,  
and Blood Institute



## Dr. Purdy Receives Grant for Radiation Treatment Project

**James A. Purdy, Ph.D.**, professor and chief of physics in the division of radiation oncology at MIR, was recently awarded a \$360,000 research contract from the National Cancer Institute as part of a collaborative effort to



*James A. Purdy, Ph.D.  
President of the American Association of  
Physicists in Medicine*

develop guidelines and methodology for optimum radiation treatment planning—with particular emphasis on accurate dose calculation.

In conjunction with researchers from the University of Pennsylvania School of Medicine, Memorial-Sloan Kettering Hospital, and the Massachusetts General Hospital at Harvard University, Dr. Purdy's research group will establish objective criteria which reflect "the best" that the nation can offer in high energy photon (radiation) treatment of cancer. Parameters of this three-year project were defined at the first joint meeting, to be held in Washington, D.C., on January 31-February 1.

Dr. Purdy and his co-investigators at Mallinckrodt, **John W. Wong, Ph.D.**, assistant professor of physics, and **Bahman Emami, M.D.**, associate professor of radiation oncology, are developing a computerized treatment planning system that can perform optimum dose calculations for individual patients based on a three-dimensional view of the body. The system will utilize anatomical detail and tissue density information provided by computed tomography (CT) to evaluate the delivery of radiation from every possible orientation.

Unlike conventional treatment planning based on flat, two-dimensional images, the new three-dimensional program is feasible only with high speed numerical processing. For the duration of this experimental project, Computerized Medical Systems, Inc., a St. Louis-based computer treatment planning company, has provided an advanced computer system which includes an array processor that allows calculations to be performed at many times the speed of conventional treatment planning systems.

The **Biomedical Computer Laboratory** and the **Computer Systems Laboratory** at Washington University Medical Center are also assisting in

this project in the development of specialized integrated circuitry for performing high speed computations and the development of special three-dimensional display. This initial phase of the project is scheduled for completion within one year.

During the second year of the study, Dr. Purdy and his colleagues will record the best radiation therapy programs that their methodology can devise for treating 25 individual cases drawn from Mallinckrodt's patient population. Similar research will be conducted at the three collaborating universities; each will use the unique three-dimensional imaging methodology that they design to hypothetically treat a similar number of their cancer patients.

To establish comparable results, all of the tumors designated for study will be located in seven predetermined sites in the body. In the final year, patient data stored on computer disks will be exchanged among the universities so that each has the opportunity to "treatment plan" all of the cases.

The ultimate objective is to reach a consensus regarding the optimum criteria, guidelines, and methodology available for treating tumors at each of the seven sites with radiation.

Dr. Purdy received his doctorate in nuclear physics from the University of Texas in Austin. Prior to joining the staff at Mallinckrodt Institute of Radiology in 1973, he studied medical physics at the M.D. Anderson Hospital and Tumor Institute with a National Institute of Health Fellowship. Dr. Purdy has been chief of the radiation physics section in the division of radiation oncology since 1976, and has published over 100 articles and abstracts concerning his research.

On January 1, Dr. Purdy was installed as president of the American Association of Physicists in Medicine. With a membership of over 2,000 physicists, the AAPM is the largest organized body of medical physicists in the world. ■



## The Julia Hudson Freund Memorial Lecture



*Carlos Perez, left, presents Dr. John Durant, Freund Memorial Lecturer, with a certificate from Washington University recognizing his excellence and leadership in the field of clinical oncology.*

# “Multidisciplinary Cancer Center can benefit Science, Medicine, and Community”

On Thursday evening, December 6, **John R. Durant, M.D.**, physician and president of the Fox Chase Cancer Center in Philadelphia, delivered the third Julia Hudson Freund Memorial Lecture—hosted annually by the MIR division of radiation oncology. In being chosen for this honor, Dr. Durant follows two other reknown leaders in the area of clinical oncology, Emil Frei III, M.D. and Bernard Fisher, M.D.

This year's lecture, which was entitled “Multidisciplinary Cancer Centers—Pluses and Minuses,” reflected Dr. Durant's extensive background in the development of comprehensive cancer treatment and research centers. Having served as director of the Comprehensive Cancer Center in Birmingham, Alabama, for almost 14 years prior to assuming his present position at Fox Chase, he reviewed the issues surrounding such centers from the perspective of the medical community, as well as from the perspective of the public.

According to Dr. Durant, the time is right for the development of multidisciplinary cancer centers. Public support for them is enthusiastic due to “the focus on cancer as a national health priority and the growing awareness of a need for intensified programs in cancer research and treatment.”

Dr. Durant has found that the con-

cept of cancer centers is often problematic for physicians who are involved in clinical research. These physicians prefer solo research endeavors, funded by individual RO 1 grants, over the kind of collective and cooperative research which is fostered by a multidisciplinary center. They do not want to be programmed into a “bullseye” approach to clinical science; an approach which presents a hierarchy of projects targeted at a unified goal.

Dr. Durant noted that administrators and medical school deans who oppose multidisciplinary centers often prefer to maintain centralized control over funds and the unified loyalty of staff members. They view the development of a strong oncology department having its own income and autonomous programs as a threat to overall administrative and financial resources.

In support of interdisciplinary cancer centers, one of the most important arguments offered by both physicians and administrators is the link that such centers provide between laboratory research and clinical practice. Multidisciplinary centers not only encourage research in various disciplines, they provide connections between biological research and treatment of disease.

Following the old adage that “two heads are better than one,” cancer centers also stimulate new programs

and provide researchers with what Durant terms “a way to excellence.” They “are almost certainly a way to keep the field moving because new concepts and disciplines emerge more easily from a group of talented people working together than from individual people doing the same thing,” says Durant.

For the public, cancer centers offer reassurance that there is no better care available anywhere. The perception is generally that cancer centers, like medical centers, consolidate the efforts of an entire team of skilled specialists, thereby resulting in greatly improved care.

With Chicago being the site of the cancer center nearest to St. Louis, plans are currently under consideration to bring together all existing cancer resources within the Washington University Medical Center. In his concluding remarks, Dr. Durant stated that the real value of such a center would be in the use of research as a step to understanding the problem of cancer and applying it to real-life patient situations. The patient must be valued, urged Durant, not merely as a research statistic but for his “soul,” his individual worth, and the multidisciplinary center must serve as a means of solving the cancer puzzle in a way that will benefit science, medicine, and the community. ■



## Diagnostic and Therapeutic Radiologists Collaborate on Cancer Care

Collaboration between the divisions of diagnostic radiology and radiation oncology, a vital link in the provision of quality cancer care, is the focus of a series of six conferences organized for the MIR staff by **Drs. Robert Levitt** and **Todd Wasserman**. Given at Friday noon hour on a bimonthly basis, these special conferences are mutually beneficial, providing an opportunity for diagnostic radiologists to learn which anatomic regions are most important to radiation oncologists in the treatment of various cancers, and for therapeutic radiologists to review the flexibility and limitations of the diagnostic test. The series of talks, according to Dr. Wasserman, is an effort towards the promotion of collaborative clinical research efforts.

During the third conference, "Head and Neck Tumors," held in Scarpellino Auditorium on November 16, **Drs. V. Rao Devineni** and **Klaus Sartor** analyzed case studies of sinus and nasopharyngeal tumors to illustrate the importance of working together to develop optimum treatment programs.

After describing craniofacial anatomy, Dr. Devineni, a radiation oncologist, noted the difficulties in determining the exact location and size of tumors in sinus cavities—tumors which are often hidden by bony, outside structures. Dr. Sartor, a neuroradiologist, demonstrated case examples showing the capability of computed tomography (CT) to visualize these tumors and outline the extent of invasion of adjacent structures such as the orbit and the intracranial cavity.

Detailed information from CT scans is invaluable to oncologists because it serves as a guideline for minimizing the amount of tissue initially exposed to radiation and also provides evidence for measuring the effects of treatment. For this reason, quality care is dependent upon maximum communication between radiologists and oncologists.

Each of the six conferences is conducted by a radiation therapist and diagnostic radiologist with expertise in the particular tumor being discussed. Primary lung tumors, Hodgkins disease, head and neck tumors, and breast tumors were topics for the first four conferences, and the schedule for the remaining conferences is as follows: "Bladder/Prostate," April 12, and "Metastatic Disease Unknown Primary," May 31.

"We are greatly encouraged by the positive comments we have received following each conference," agree Drs. Levitt and Wasserman. ■

## MIR/Jewish Hospital Cancer Facility Gains Funds

A joint project of Mallinckrodt Institute's division of radiation oncology and Jewish Hospital at the Washington University Medical Center, the Jewish Hospital department of radiation oncology recently received a \$250,000 donation from the Jewish Hospital Auxiliary for the construction of new and expanded clinical facilities for the treatment of cancer.

Offering seven times more space than the radiation oncology department's current clinical area, the new facility will include four treatment rooms, expanded sections for patient examination and support staff, and a recently purchased low energy linear accelerator Varian Clinac 6, the most modern of its kind. The department is devoted to the management of patients with cancers by radiation alone, or in combination with drugs or other therapies, and its clinical facility is currently equipped with a Varian Ximatron

simulator and other advanced radiotherapeutic equipment. Currently under construction, the new facility will be located on the ground floor of Jewish Hospital's new Ambulatory Care building which is scheduled to open in the spring of 1986.

The new clinical facility may also provide for a unique use of radiation in the St. Louis area. With members of the Jewish Hospital and Washington University staff, **Dr. Todd Wasserman**, chief of the Jewish Hospital department of radiation oncology and chief of lymphoma service at Mallinckrodt Institute, is proposing the development of an intraoperative radiation therapy facility. If approved, the MIR/Jewish Hospital facility would be the most modern and best designed intraoperative radiation facility in the country.

Enabling the use of radiation at the time of an operation, the proposed intraoperative radiation facility will attempt to control localized cancers of the abdomen, pelvis, and thorax. This use of radiation allows for better targeting of the dose to the tumor and sparing of more normal tissues. Dr. Wasserman says he also hopes to develop a special unit in the facility, where specialized clinical research trials, organized with four other active centers for intraoperative radiation in the United States, could be conducted.

The Jewish Hospital Auxiliary was responsible for financing Jewish Hospital's first radiation oncology unit and this new contribution is a major gift, representing virtually all of the volunteer organization's project funds for the next three years. Donna Nussbaum, spokesperson for the Jewish Hospital Auxiliary, explains, "We are very proud of the achievements the department has made in cancer treatment and research at Jewish Hospital. The department is held in high esteem and because of this, the auxiliary board of directors believes it deserves our continued support." ■



# NEWS UPDATE

## A Free Public Seminar

### Breast Cancer Detection

In the game of Trivial Pursuit, winning means knowing the correct answers to whatever questions arise. The same can be said about winning in the fight against breast cancer; women need to know the right answers.

Women should know if they are at high risk of contracting breast cancer, how the disease can be detected, the methods of surgical treatment and reconstructive surgery that are currently available, and the alternatives to surgery. Many women do not understand the medical advantages of detecting and treating a lump in its earliest stages.

These and other answers will be provided at a free seminar on breast cancer sponsored by the Barnes Hospital Auxiliary in cooperation with Mallinckrodt Institute of Radiology (MIR) and the Barnes Hospital Health Education and Screening Center. The panel of medical specialists from MIR and Barnes will include: **Ronald G. Evens, M.D.**, director of MIR and radiologist-in-chief at Barnes; **Judy M. Destouet, M.D.**, head of mammography at MIR; **Robert R. Kuske, M.D.**, radiation oncologist; **Robert H. Lund, M.D.**, general surgeon; **Barbara S. Monsees, M.D.**, radiologist; and **Laura Wierseman, R.N., M.S.N.**, surgical nurse specialist. **Mrs. Kenneth Rothman**, a 1985 Globe-Democrat Woman of Achievement and a breast cancer patient, and **Mrs. Marlin Perkins**, noted lecturer, author, and a member of the national board of directors of the American Cancer Society, will also participate in the seminar.

The morning seminar lasts three and a half hours and is offered on two separate dates: Friday, April 12, and Saturday, April 20, from 8:30 a.m. to 12:00 p.m. Free sheltered parking will be provided. More information may be obtained at the MIR public relations office at 362-2866. ■



## ACR Seminar New Practice Management in Radiology

New kinds of management in the practice of diagnostic and therapeutic radiology and how to market them was the focus of the 11th annual ACR Seminar, "Practice Management after TEFRA and DRGs—Understanding HMOs, PPOs, and Imaging Centers," held in New Orleans, Louisiana, on February 7-8.

Radiologists, hospital administrators, and business consultants at the meeting discussed various topics which included: radiologic management after TEFRA and DRGs; new forms of practice (HMOs, PPOs, and Imaging Centers) and how radiologists fit into these patterns; and financial accounting and cost containment for hospitals and radiology, either as a private practice

or department. The director of MIR, **Dr. Ronald G. Evens** discussed, or participated in, the following: "Financial and Cost Accounting for Radiology," "The Hospital Budget, with Particular Emphasis on the Department of Radiology," "Prospective Payment Policies—DRGs," "Radiology and an HMO Experience," and "Panel on Radiology Practice—1984."

As chairman of the ACR Committee on Practice Management, Dr. Evens has been the prime innovator for this and other seminars over the last ten years on efficient administration and financial management in radiology practice. ■



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## From the Business Administrator

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Robert Wagner  
MIR Business  
Administrator

### Mallinckrodt Employees to Benefit from Breast Screening Program

Employees, and their dependents, of Mallinckrodt Institute and Barnes Hospital are now eligible to receive a substantial discount on the fee for a complete breast examination including a mammogram performed at Mallinckrodt's outpatient facility (10 West Pavilion). A recent agreement between the two institutions stipulates that employees will be charged only \$75 for the mammogram, rather than the regular fee of \$107, and will receive physician consultation at Barnes' Breast Screening Clinic free of charge (the regular \$40 fee for consultation will be waived).

Appointments at the Breast Screening Clinic can be made by calling ext. 2-1390 or by visiting the clinic, in the ground floor lobby of West Pavilion. Mallinckrodt employees should indicate their employment status when scheduling an appointment and must present their employee I.D. and insurance information at the time of the visit.

In the future, Master Card and VISA may be accepted as payment for employee breast screening. Approval has not been granted at this time. ■

### Conferences/ Symposia/Meetings/ Seminars/Courses

**William A. Murphy, M.D.** gave a lecture entitled, "Percutaneous Spinal Biopsy for Tumor and Infection in the Lumbosacral Spine" for the Washington University Continuing Education Course, "Low Back and Sciatic Pain: Evaluation and Treatment" on Dec. 7.

**Jay P. Heiken, M.D.**, presented "MRI of the Chest, Abdomen, and Pelvis" at a postgraduate workshop in Magnetic Resonance Imaging and Spectroscopy at Baylor College of Medicine, Houston, Texas, Dec. 14.

Two Mallinckrodt physicians, **Drs. Bruce L. McClennan** and **David McNaney**, spoke at a meeting of the Greater St. Louis Society of Radiologists, held on Jan. 15, in St. Louis. "New Low Osmolality Iodinated Contrast Material—Update," was the title of Dr. McClennan's talk and Dr. McNaney, a radiation oncologist, discussed "Post-operative Radiotherapy for Malignant Parotid Tumors."

**Mokhtar H. Gado, M.D.**, made the following presentations: "The Different Appearance of Recent vs. Old Infarcts on MRI," "The Difference Between Malignant and Inflammatory Disease of the Sinuses by MRI," and "Evaluation of the Orbital Muscles by Longitudinal and Transverse Reformating of CT Images in Strabismus Patients" for the Annual American Society of Neuroradiology Meeting, Boston, Massachusetts, on June 2-7; "The Spine" at the Computed Body Tomography Conference, Lake Tahoe, Nevada, Aug. 27-30; "Applications and Needs for MRI," for the MR Imaging and Advisory Group, Calgary, Alberta, Canada, on Sept. 24; "Stellar and Perisellar Lesions," "Lumbar Disc Disease," "Lumbar Stenosis," "Myelographic and Metrizamide CT of Cervical Cord," and "Anatomy and Functional Anatomy" for the Harvard Postgraduate Course in Neuroradiology, Boston, on Oct. 1-3; "Neuroradiographic Procedures in CT and MRI" for

the MSRT/ISSRT Annual Meeting, St. Louis, Oct. 5; "Evaluation of Spinal Cord," "Comparison of CT and NMR in Posterior Fossa Tumors," "Lumbar Stenosis," "CT Evaluation of Tumors of the Paranasal Sinuses" for the Advanced Neuroradiology seminar, Orlando, Florida, Oct. 11-13; "Detailed MR Studies of the Head and Spine" for the Magnetic Resonance Conference at Boone Hospital Center, Columbia, Missouri, Oct. 20; "CT and MR of Sellar Turcica" and "The Importance of MR in Otolaryngology" for the 11th Annual Course on CT and MR Imaging of the Head, Neck and Spine, Rush-Presbyterian-St. Luke's Medical Center, Chicago, Nov. 1-2.

**Barry A. Siegel, M.D.**, spoke on the "Diagnosis of Pulmonary Embolism" at a meeting of the Tidewater Radiological Society, Norfolk, Virginia, on Sept. 5.

**Todd L. Wasserman, M.D.**, made the following presentations: "Current Use of SR-2508, A New Radiosensitizer" and "Early Stage Large Cell Lymphomas of the Head and Neck Region with Radiation Alone" (an update on Washington University Medical Center research) at the European Society for Therapeutic Radiology and Oncology, Jerusalem, Israel, on Sept. 10-14; "Therapy of Early Stage Large Cell Lymphomas" for the Johns Hopkins Cancer Center, Baltimore, Maryland, Oct. 22; "Cancer Treatments—New and Conventional" for the Jewish Hospital of WUMC Auxiliary Meeting, St. Louis, Oct. 28; "Spinal Cord Compression" at the Fixman Cancer Conference, Jewish Hospital of WUMC, St. Louis, Nov. 21; "Therapy of Liver Metastases" for the St. Louis Society of Internal Medicine, St. Louis, Nov. 20; and "Spinal Cord Compression" for the Department of Neurology Neurosurgery, WUMC, St. Louis, Dec. 12.

**Louis A. Gilula, M.D.**, gave a refresher course entitled, "Radiographic Approach to Wrist Pain" for a meeting of the International Skeletal Society in Philadelphia, Pennsylvania, Sept. 12-15; presented "CT of the Foot" for the San Diego Postgraduate Radiology Course, San Diego, California, Oct. 22; and gave the following talks, "Radiographic Evaluation of Hand and Wrist" and "Radiographic Evaluation of



# UPDATE

Ligamentous Injuries of the Wrist and Hand" for the Clinical Congress of the American College of Surgeons Meeting, at San Francisco, Oct. 23-24.

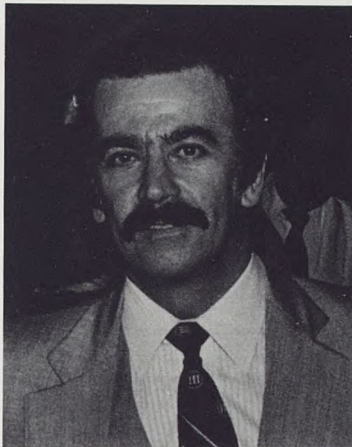
**Carlos A. Perez, M.D.**, made the following presentations at various meetings and conferences: "Hyperthermia: A Potentially Effective New Modality for Cancer Therapy" for the Second Annual American Cancer Society State of the Art Lecture, at New Orleans, Louisiana, Sept. 20; "Radiotherapy in Carcinoma of the Lung (Non-oat and Small Cell)" for the Taubman Symposium, Tulsa, Oklahoma, Oct. 17; "Carcinoma of the Cervix" for a meeting of the California Radiation Therapy Association, Los Angeles, Oct. 24; "Gynecological Cancers—Diagnosis and Treatment" for the Jewish Hospital of Washington University Medical Center (WUMC) Auxiliary Meeting, St. Louis, Oct. 28; "Radiotherapy of Lung Cancer" for the Cincinnati Cancer Conference III: Lung Cancer, Cincinnati, Ohio, Nov. 2-3; "Hyperthermia and Radiation Therapy" for the Multi-Modality Oncology Conference at Barnes Hospital, St. Louis, Nov. 10; and "Hyperthermia in the United States: Summary Progress Report" for the First Annual Meeting of the Japanese Society of Hyperthermic Oncology, Kyoto, Japan, Nov. 20.

**Klaus Sartor, M.D.**, made the following presentations: "MR Imaging in Sellar and Suprasellar Mass Lesions" for the Annual Meeting of the German Society of Neuroradiology, Lindau/Lake Constance, Germany, Sept. 20-22 and "CAT Scan of Lumbosacral Spine" for the Washington University Continuing Education Course, "Low Back and Sciatic Pain: Evaluation and Treatment," St. Louis, Dec. 7.

**Michael W. Vannier, M.D.**, at the "Hyperthermia for Cancer" Seminar held at Princeton University, Lawrenceville, New Jersey, Oct. 13, discussed "3-D Imaging and Solid Modeling of Tumors, Based on CT Scans." Dr. Vannier was one of the seminar's eight speakers from medical institutions recognized for their investigations of hyperthermia as cancer therapy. The seminar was sponsored by The Academy of Medicine of New Jersey.

**Alexander Nakeff, Ph.D.**, serving as a session chairman, presented "Multivectorial Analysis of Megakaryocytic Cell Development" for a meeting on Megakaryocyte Differentiation and Synthesis of Platelet Proteins held in Bordeaux, France, Oct. 17-19.

## Workshops



**Carlos A. Perez M.D.**, with co-author Stephen A. Sapareto, M.D., presented the paper, "Thermal Dose Expression in Clinical Hyperthermia and Correlation with Tumor Response/Control" at the Workshop Conference on Hyperthermia in Cancer Treatment, Tucson, Arizona, Mar. 19. The paper also appeared in the October 1984 issue of **Cancer Research**.

**Bruce L. McClennan, M.D.**, discussed imaging methods at a workshop on "Renal Disease" for **Patient Care** magazine, Denver, Colorado, Sept. 14-15.

**Joseph K.T. Lee, M.D.**, served as a panel member for a workshop on magnetic resonance imaging at the National Cancer Institute, Bethesda, Maryland, Oct. 11-12.

## Visiting Professors/ Guest Lecturers

**Michael W. Vannier, M.D.**, an invited speaker, presented separate talks on "Three Dimensional Reconstruction of CT Images" and "Processing of Magnetic Resonance Images" for the First European Meeting on New Trends in Medicine sponsored by Milano Medicina, Milan, Italy, on Nov. 23-Dec. 1.

**Joseph K.T. Lee, M.D.**, served as visiting professor/guest faculty member at the following meetings and/or institutions: Clinical Tutorial in MRI, 3rd Annual Meeting of Society of MR in Medicine, New York, Aug. 13-17; ACR Symposium on Computed Body Tomography, Lake Tahoe, Nevada, Aug. 27-30; Symposium on Abdominal Trauma, WUMC, Sept. 14; Department of Radiology, National Institutes of Health (NIH), Bethesda, Maryland, where he spoke on "Proton Spectroscopic Imaging of the Liver" Nov. 16; 10th Annual Scientific Meeting of the Greater New York Chapter of the Society of Nuclear Medicine, Philadelphia, Pennsylvania, Oct. 19-21; and the Post Graduate Course on CT and MRI of the Body, New York University, New York, Dec. 17-22.

**Todd H. Wasserman, M.D.**, an invited lecturer, spoke on "Clinical Trials with Radiosensitizers in the United States" for the 4th International Conference on Radiosensitizer and Radioprotective Drugs, a small international meeting dealing with new radiosensitizer developments and chemical modification of the radiation effect, held in Fermo, Italy, Aug. 29-Sept. 5.

**Barry A. Siegel, M.D.**, presented several talks on nuclear medicine imaging while a visiting professor at the Eastern Virginia Graduate School of Medicine, Norfolk, Virginia, on Sept. 6-7.

**Mokhtar H. Gado, M.D.**, while a visiting professor, gave a presentation entitled "MRI of Head, Neck and Spine" at the Neuroscience Conference, Dallas, Texas, Sept. 14.

*continued*



# NEWS

**Louis A. Gilula, M.D.**, served as visiting professor and gave the following talks: "Overview of Musculoskeletal CT," "CT of the Foot," "Radiography of Wrist Trauma and Wrist Ligamentous Instabilities," and "Radiographic Approach to Bone Tumors" at Yale University Medical Center, Boston, Oct. 11-12.

**Bruce L. McClennan, M.D.**, serving as visiting professor, presented the J. Stewart Manchester Lecture speaking on "Uroradiologic Imaging—Update 1984" for the Nova Scotia Association of Radiologists at Dalhousie University, Halifax, Nova Scotia, Canada, Oct. 19.

**Carlos A. Perez, M.D.**, serving as a visiting professor/guest lecturer, made the following presentations: "Hyperthermia: Its Clinical Application and Results" for the University of Southern California (USC) Medical School, Los Angeles, Oct. 23; "Definitive Radiotherapy in the Treatment of Carcinoma of the Prostate," "New Approaches to the Management of Ewing's Sarcoma," "Radiation Therapy in the Treatment of Carcinoma of the Uterine Cervix," and "Radiation Therapy in the Treatment of Carcinoma of the Lung" for the Institute of Radiation Medicine, Santiago, Chile, Oct. 24-25; "Physical Principles and Clinical Applications of High Energy Photons and Electrons," "Advances in Combined Therapy of Cancer," "Radiation Therapy in the Definitive Management of Carcinoma of the Prostate," "Radiation Therapy and Surgery in the Management of Carcinoma of the Oral Cavity," and "Radiation Therapy and Surgery in the Treatment of Carcinoma of the Rectosigmoid" for Hospital Espanol and the Atomic Energy Commission of Argentina, at Buenos Aires and La Plata, Argentina, Oct. 27-28; and "Radiation Therapy and Surgery in the Treatment of Gynecologic Tumors—Endometrium and Cervix," "Combined Therapy," "Radiation Therapy and Surgery in the Management of Head and Neck Tumors," "Advanced Carcinoma of the Breast," "Carcinoma of Rectosigmoid," and "Small Cell Carcinoma of the Lung" for the Dedication Program of the Radiation Oncology Center at the University of Navarra, Pamplona, Spain, Nov. 14-17.

**Alexander Nakeff, Ph.D.**, discussed his experiments of the effects of anti-cancer agents on progenitor cells of bone marrow and megakaryocyte cell kinetics while a visiting professor at the University of Cologne and the Dr. Karle Thomae GmbH, Biberach, West Germany, on Oct. 22 and 24, respectively; the University of Szeged, Szeged, Hungary, Oct. 29; and the Department of Medicine, Royal Hallamshire Hospital, University of Sheffield, Sheffield, England, Nov. 7.

## Honors/Awards

The National Institute of Arthritis, Diabetes and Digestive and Kidney Diseases, NIH, DHHS has awarded a \$236,000 grant to **Alexander Nakeff, Ph.D.**, for his research on megakaryocyte proliferation and its control. Now in his eighth year of research, Dr. Nakeff is analyzing the regulation of platelet production by megakaryocytes, the mother cells of platelets residing in bone marrow. Platelets are blood cells which initiate blood clotting and maintain the integrity of blood vessels.

For his scientific exhibit, "Three Dimensional Analysis of the Wrist," **Michael W. Vannier, M.D.**, was awarded a certificate of appreciation at the annual Clinical Congress of the American College of Surgeons, San Francisco, Oct. 21-26.

## Statewide Award Goes to FOCAL SPOT

**Focal Spot** received honors for excellence as a special audience publication from the Missouri Association for Hospital Public Relations during its annual Muleshoe competition. The award was presented November 1 at the yearly convention of the Missouri Hospital Association (MHA).

## Appointments

**Louis A. Gilula, M.D.**, has been reappointed a member of the Executive Council of the International Skeletal Society for a second one-year term which began October 1984 and ends in the fall of 1985.

**Bruce L. McClennan, M.D.**, was appointed a member to the American College of Radiology (ACR) Committee on MR Education and Training for the 1984-85 college year ending in September this year. Dr. McClennan's appointment recognizes his many contributions to radiology while serving on various ACR commissions and committees.

**Alexander Nakeff, Ph.D.**, was appointed a member to the Review/Advisory Committee of the **International Journal of Cell Cloning** for the two-year term August 1984-86.



NAKEFF

PILEPICH

**Miljenko Pilepich, M.D.**, has been appointed a member of the National Cancer Institute Organ Systems Coordinating Center, a newly-established advisory committee made up of experts in cancer research and treatment. This committee will direct the National Cancer Institute's long-term planning and funding for cancer research.

**Todd H. Wasserman, M.D.**, has been appointed a member of the Program Committee for the 1985 Annual Meeting of the American Society of Therapeutic Radiology and Oncology (ASTRO) and the Organization and Program Committee for the 1986 meeting, "Interactions of Chemotherapy with Radiation," to be held in New England.

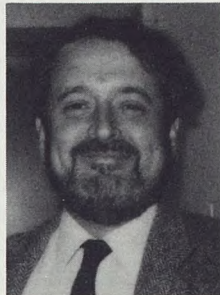


# UPDATE

## Elected



KOBEISSI

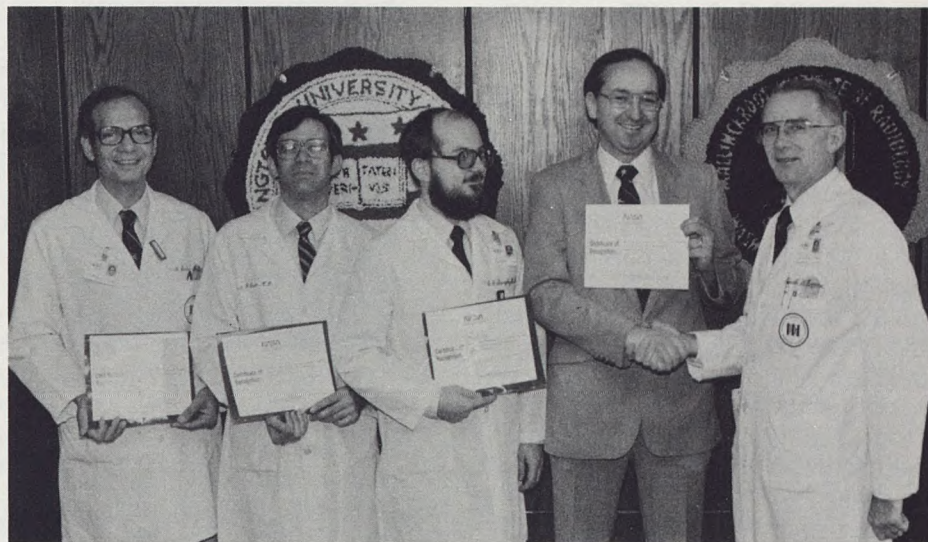


THOMAS

**Beverly Kobeissi, M.B.A.**, administrator in the division of radiation oncology, has been elected president and chairman of the board of directors of the Society of Radiation Oncology Administrators (SROA). Established in 1983, SROA is a national organization dedicated to improving administrative aspects of therapeutic radiology and serves as a forum for the exchange of information between physician and non-physician administrators from across the country. A founding member of SROA, Ms. Kobeissi has been administrator of radiation oncology at Mallinckrodt Institute since 1974. She earned her master's degree in business administration and a bachelor of science degree from Washington University and a masters of arts degree in sociology from the University of Missouri, St. Louis.

**Barry A. Siegel, M.D.**, was elected by the American Board of Radiology to serve as one of its representatives to the Board of Trustees of the American Board of Nuclear Medicine. Dr. Siegel assumed this new responsibility January 1st.

**Patrick R.M. Thomas, M.B.**, has been elected chairman of the Pediatric Oncology Group (P.O.G.) Brain Tumor Subcommittee on Medulloblastoma. Formed five years ago, the P.O.G. currently has 37 member institutions and 579 investigators representing the four major disciplines (surgery, radiation therapy, pathology, and chemotherapy). Dr. Thomas specializes in the treatment of pediatric tumors with radiation, and has treated a number of patients with medulloblastoma. Medulloblastoma is an extremely rare, highly malignant childhood tumor occurring in the cerebellum, the part of the brain responsible for coordination.



## NASA Award

*Dr. Ronald G. Evens, director of Mallinckrodt Institute, congratulates Dr. Michael W. Vannier, who with Drs. William A. Murphy, Jr., Robert Levitt, and Mokhtar Gado, gained NASA recognition for the creative development of multispectral analysis of magnetic resonance imagery. Mallinckrodt's innovation is to be featured in the Space Administration's quarterly publication, **Tech Briefs**.*

## MIR Calendar of Events

**MARCH 11, 1985**  
CITY-WIDE RADIOLOGY CONFERENCE  
Scarpellino Auditorium,  
Mallinckrodt Institute, 5:30 p.m.

**APRIL 8, 1985**  
LEROY SANTE LECTURE:  
Dr. Robert Stanley  
St. Louis University,  
5:30 p.m.

**APRIL 21-26, 1985**  
AMERICAN ROENTGEN RAY SOCIETY  
Boston, Massachusetts

**MAY 13, 1985**  
CITY-WIDE RADIOLOGY CONFERENCE  
Scarpellino Auditorium,  
Mallinckrodt Institute, 5:30 p.m.

**MAY 19-22, 1985**  
RADIOLOGIC BUSINESS MANAGERS  
ASSOCIATION  
Honolulu, Hawaii



# 70th Annual RSNA Meeting

## Over 1,000 Scientific Papers and Exhibits

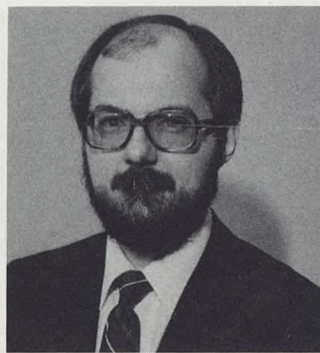
The largest medical meeting in the world, the Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA) featured more than 1,000 scientific papers and exhibits at its 70th annual meeting held in Washington D.C. on November 25-30. Reporting on significant advances in diagnostic and therapeutic radiology, the meeting's 1,000 presentations represented less than half of those submitted and a 28% increase in the number of papers presented last year.

Attendance was also high with 27,400 radiologists, other physicians, technologists, nurses, technical exhibitors, and guests from around the world having attending, or participating in the week-long meeting. Over 367 international manufacturers displayed the year's latest and most complete collection of radiologic equipment and services. In addition, there were over 200 scientific exhibits featuring outstanding research by individual scientists and research centers.

New research at Mallinckrodt Institute—including magnetic resonance (MR) detection of fatty infiltration of the liver; radiotherapeutic use of **iridium 192** in the treatment of CNS tumors; 3-D imaging of the wrist; the use of **hexabrix**, a new contrast media, in intravenous urography; MR imaging with gadolinium-labeled monoclonal antibodies; and high-resolution CT of the porta hepatis—was discussed, or demonstrated, in nearly fifty presentations made by staff radiologists and scientists.

## Update on MR Imaging

At what many considered to be the meeting's major scientific session, "**Magnetic Resonance: One Year Later;**" national authorities discussed



Dr. William A. Murphy, Jr.,

the new imaging method's capabilities and potential in diagnosis of various parts of the body. Representing Massachusetts General Hospital, the Cleveland Clinic, the medical centers of Duke University and the University of California, San Francisco, and Mallinckrodt Institute of Radiology, the six speakers, including Mallinckrodt physicians, **Drs. Joseph K. T. Lee and William A. Murphy, Jr.**, presented the following conclusions on MR imaging of the:

**Heart:** Cardiac gating combined with MR imaging provides excellent anatomic details about the cardiac chambers, coronary arteries, and the pericardium but MRI is not yet able to assess the degree of narrowing in the coronary arteries.

**Chest:** MR is superior to CT in evaluation of the hilum but equal or inferior in studies of the mediastinum, the detection of pulmonary nodules, and differentiation between calcified and non-calcified nodules.

**Musculoskeletal System:** The imaging modality is very sensitive in detecting aseptic necrosis of the hip and marrow disease, evaluating soft tissue tumors of the extremities, and examination of smaller joints in the body. MRI remains comparable to CT in the evaluation of bone tumors. In vivo spectroscopy shows promise in evaluation of muscle diseases.

**Digestive System:** MRI is able to diagnose hepatitis and can detect cavernous hemangioma but is equal to CT in overall accuracy for detecting hepatic cavernous hemangiomas. Proton spectroscopic imaging, developed by Dr. Tom Dixon at Mallinckrodt Institute, is a sensitive method for detecting fatty infiltration of the liver. And while MRI shows promise in the staging of rectal carcinoma, it has not proven useful in evaluation of the pancreas and the gallbladder.

**GU Tract:** In selected cases of renal neoplasms where CT is unable to determine the status of the vascular system, MR has been extremely helpful. In experimental models, the imaging method can differentiate acute rejection from acute tubular necrosis. It is also able to detect endometrial and cervical carcinoma by signal intensity difference rather than by morphologic criteria alone. Though the staging ability of MR in gynecological neoplasms is yet undetermined and the imaging method is not capable of differentiating prostatic carcinoma from benign prostatic hyperplasia, the future of MR in GU tract studies depends upon technological improvements as well as the development of paramagnetic contrast agents.

**Central Nervous System and Spine:** Studies in this area show MRI superior to CT in evaluation of multiple sclerosis; capable of providing exquisite anatomic detail of the spine and eye (when coupled with newly developed surface coils); and future estimations suggest that the method could replace CT in evaluation of ophthalmologic and spinal disorders. Though MR is a sensitive imaging method, it is not tissue specific, cannot provide views of calcification, and is inferior to CT scanning in detection of meningioma, evaluation of acute trauma, and differentiation of hemorrhagic infarct from non-hemorrhagic infarct.



## RSNA Awards Given to Mallinckrodt Exhibits

Mallinckrodt physicians received top RSNA awards for three different scientific exhibits on their investigations with CT, MR, and digital coronary imaging.

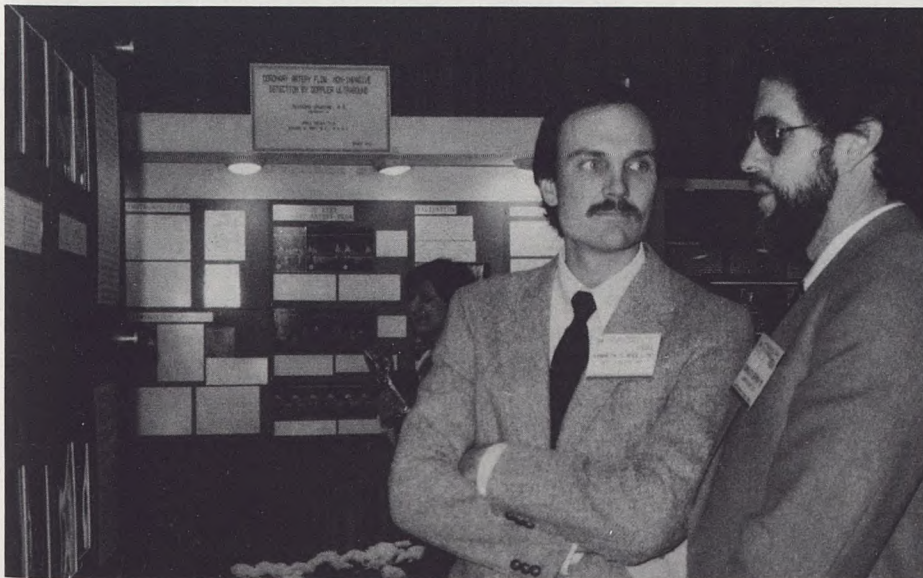
"High-resolution CT of the Porta Hepatis: Normal and Pathologic Anatomy" was one of three exhibits receiving RSNA's second-highest exhibit award, the Cum Laude. Using CT scan "slices" and photographs of specimen slices taken from cadavers as a basis for defining normal anatomy in the porta hepatis and hepatoduodenal ligament, **Drs. James Weinstein, Jay Heiken, Joseph K.T. Lee, Dennis Balfe, David Disantis, Philip Weyman, and Roy R. Peterson, Ph.D.** were able to illustrate this region with the CT in exquisite detail. Previously, the lack of fat, variability, and complexity in normal vascular and biliary structures have made this region difficult to identify with CT imaging. This exhibit last year received the ARRS Bronze Medal prize.

Images received in current MR imaging systems have so far only provided views in the standard imaging planes.

In their exhibit, "Oblique Magnetic Resonance Imaging of the Cardiovascular System," **Drs. Kenneth Rholl, Robert Levitt, Harvey Glazer, Fernando Gutierrez, Edward Geltman, Joseph K.T. Lee, William Murphy, and Roy R. Peterson, Ph.D.** presented new oblique projections gained with the application of advanced software. This exhibit, clearly defining the ventricular and atrial septa, the four heart chambers, and the aortic arch and its branches in normal volunteers and patients who have congenital and acquired heart disease, was awarded a Certificate of Merit.

In their exhibit entitled "Digital Coronary Arteriography," describing the advantages and limitations of digital techniques used in coronary imaging and demonstrating a practical application of digital coronary arteriography with nonselective and selective contrast injections, **Drs. J. Patton Neeley, Michael Vannier, and Fernando Gutierrez** were given Honorable Mention.

Standing beside the award-winning exhibit demonstrating oblique MR imaging of the cardiovascular system, Dr. Kenneth Rholl listens to the questions of another physician.



## SCIENTIFIC SESSIONS

**RC** Refresher Course

**SE** Scientific Exhibit

**WP** Works in Progress

### DIAGNOSTIC RADIOLOGY

#### Abdominal

**RC: Diagnostic Radiology of the Biliary Tract**, Robert E. Koehler, M.D., G. Leland Melson, M.D.

**The Utility of Ultrasound and CT for Detecting Acquired Renal Cystic Disease in Long-Term Chronic Hemodialysis Patients**, David Ling, M.D., G. Leland Melson, M.D., Bruce L. McClennan, M.D., David L. Windus, M.D.

**The Postoperative Hysterosalpingogram: Radiographic-Surgical Correlation**, Mark Schwimmer, M.D., Jay P. Heiken, M.D., Bruce L. McClennan, M.D., Ernst R.F. Friedrich, M.D.

**A Double-Blind Clinical Study Comparing the Safety and Efficacy of Hexabrix (32%) and Conray 325 in Intravenous Urography**, Bruce L. McClennan, M.D., Kenneth S. Rholl, M.D., David Ling, M.D.

#### Bone and joint

**Skeletal Tumors Session**, William A. Murphy, Jr., M.D., presiding.

**RC: The Imaging Gist for the Painful Wrist**, Louis A. Gilula, M.D.

**Radiologic and Pathologic Analysis of Benign Non-Pagetitic Vertebral Body Sclerosis**, Michael E. Katz, M.D., Steven L. Teitelbaum, M.D., Louis A. Gilula, M.D., Donald Resnick, M.D.

**SE: Three-dimensional Imaging of the Wrist**, Michael W. Vannier, M.D., W. Grant Stevens, M.D., Paul M. Weeks, M.D., Louis A. Gilula, M.D.

**SE: Pressure Erosions of Bone in Rheumatoid Arthritis**, Barbara Monsees, M.D., Judy M. Destouet, M.D., William A. Murphy, Jr., M.D., Donald Resnick, M.D.

#### Digital imaging

**Evaluation of a Teleradiology System**, R. Gilbert Jost, M.D., Stuart S. Sagel, M.D., Dixie J. Aronberg, M.D., Harvey S. Glazer, M.D., Robert G. Levitt, M.D., Allen P. Rueter, B.S., Daniel P. Schuster, M.D., Robert Stine, M.D., Ronald G. Evens, M.D.

*continued*



## RSNA

**IA-DSA of Renal Transplants**, Daniel Picus, M.D., J. Patton Neeley, M.D., Bruce L. McClennan, M.D., Philip J. Weyman, M.D., Jay P. Heiken, M.D.

**SE: Digital Coronary Arteriography**, J. Patton Neeley, M.D., Michael W. Vannier, M.D., Fernando R. Gutierrez, M.D.

**SE: Intra-arterial Digital Subtraction Angiography of Renal Transplants**, J. Patton Neeley, M.D., Daniel Picus, M.D., Bruce L. McClennan, M.D., Philip J. Weyman, M.D., Jay P. Heiken, M.D.

### Neuroradiology

**RC: The Neuroradiology Evaluation of Brain and Spine Surgery**, Mokhtar H. Gado, M.D.

### Pediatric radiology

**RC: Pediatric Uroradiology**, William H. McAlister, M.D.

**Real-Time Sonography and Crania CT of Intracranial Infection in Infants**, Michael P. Ward, M.D., Anne Claiborne, M.D., Gary D. Shackelford, M.D., William H. McAlister, M.D., Marilyn J. Siegel, M.D.

### COMPUTED TOMOGRAPHY

**RC: CT of the Retroperitoneum**, Joseph K.T. Lee, M.D.

**RC: CT of the Mediastinum**, Stuart S. Sagel, M.D.

**CT Evaluation of Pleural and Chest Wall Invasion in Primary Lung Carcinoma**, Harvey S. Glazer, M.D., Jeff Duncan Meyer, M.D., Dixie J. Aronberg, M.D., Jon Moran, M.D., Robert Levitt, M.D., Stuart S. Sagel, M.D.

**CT of Chest Wall Lymphoma**, Gary Press, M.D., Harvey S. Glazer, M.D., Todd Wasserman, M.D., Dixie J. Aronberg, M.D., Joseph K.T. Lee, M.D., Stuart S. Sagel, M.D.

**SE: High-resolution CT of the Porta Hepatitis: Normal and Pathologic Anatomy**, James B. Weinstein, M.D., Jay P. Heiken, M.D., Joseph K.T. Lee, M.D., Dennis M. Balfe, M.D., David J. DiSantis, M.D., Philip J. Weyman, M.D., Roy R. Peterson, Ph.D.

### MAGNETIC RESONANCE

Plenary Session on "Magnetic Resonance... One Year Later," Joseph K.T. Lee, M.D., panel member, William A. Murphy, Jr., M.D., panel member.

**Ob/Gyn Session**, Joseph K.T. Lee, M.D., presiding.

**MR Imaging of Gynecologic Neoplasms**, Janette L. Worthington, M.D., Dennis M. Balfe, M.D., Joseph K.T. Lee, M.D., Alan Jacobs, M.D., Deborah J. Gersell, M.D., Jay P. Heiken, M.D., David Ling, M.D., Bruce L. McClennan, M.D.

**Differentiation of Acute Renal Rejection and Acute Tubular Necrosis: MR Demonstration**, Kenneth S. Rhol, M.D., Joseph K.T. Lee, M.D., David Ling, M.D., Gregory Sicard, M.D., Rogers Griffith, M.D.

**Using the Chemical Shift Difference between Water and Lipid in Proton Imaging**, W. Thomas Dixon, Ph.D., David D. Faul, Ph. D., Mokhtar H. Gado, M.D., Joseph K.T. Lee, M.D., William A. Murphy, Jr., M.D.

**Detection and Differentiation of Prostatic Carcinoma from Benign Prostatic Hyperplasia by MR Imaging**, David Ling, M.D., Joseph K.T. Lee, M.D., Jay P. Heiken, M.D., Harvey S. Glazer, M.D., Dennis M. Balfe, M.D., Robert G. Levitt, M.D., William A. Murphy, Jr., M.D., Bruce L. McClennan, M.D.

**MR Imaging of Abdominal and Pelvic Lymphadenopathy**, Joseph K.T. Lee, M.D., Jay P. Heiken, M.D., David Ling, M.D., Dennis M. Balfe, M.D., W. Thomas Dixon, Ph.D., Harvey S. Glazer, M.D., Robert G. Levitt, M.D., William A. Murphy, Jr., M.D.

**Tissue Characterization of the Skull and Brain Using Multispectral MR Methods**, Michael W. Vannier, M.D., Mokhtar H. Gado, M.D., Robert L. Butterfield, B.S.

**Optimal Pulse Parameters in Spin-Echo Imaging of Brain and Spinal Cord**, Mokhtar H. Gado, M.D., W. Thomas Dixon, Ph.D., Michael Teng, M.D., Fred J. Hodges, III, M.D., Klaus J. Sartor, M.D.

**MR Imaging of the Thoracic Aorta**, Harvey S. Glazer, M.D., Fernando Gutierrez, M.D., Robert G. Levitt, M.D., Joseph K.T. Lee, M.D., William A. Murphy, Jr., M.D.

**Monoclonal MR Imaging**, Evan C. Unger, M.D., William G. Totty, M.D.

**Demonstration of Fatty Infiltration of the Liver by Proton Spectroscopic Imaging**, Joseph K.T. Lee, M.D., Jay P. Heiken, M.D., W. Thomas Dixon, Ph.D., David Ling, M.D., Robert G. Levitt, M.D., William A. Murphy, Jr., M.D.

**MR Imaging of Post-Treatment Fibrosis**, Harvey S. Glazer, M.D., Joseph K.T. Lee, M.D., Robert G. Levitt, M.D., William G. Totty, M.D., Bahman Emami, M.D., Todd Wasserman, M.D., William A. Murphy, Jr., M.D.

**MR Imaging of Hepatic Metastases**, Jay P. Heiken, M.D., Joseph K.T. Lee, M.D., David Ling, M.D., Harvey S. Glazer, M.D.

**SE: Oblique Magnetic Resonance Imaging of the Cardiovascular System**, Kenneth S. Rhol, M.D., Robert G. Levitt, M.D., Harvey S. Glazer, M.D., Roy R. Peterson, Ph.D., Fernando R. Gutierrez, M.D., Edward Geltman, M.D., Joseph K.T. Lee, M.D., William A. Murphy, Jr., M.D.

### NUCLEAR MEDICINE

**Pulmonary Session**, Barry A. Siegel, M.D., presiding.

**RC: A Practical Guide for the Use of Ventilation-Perfusion Lung Scintigraphy in Pulmonary Embolism**, Daniel R. Biello, M.D., Barry A. Siegel, M.D.

**WP: Xe-133 Imaging of the Legs: A Simple Means for Potential Detection of Venous Thrombosis in Patients Undergoing Routine V-Q Scintigraphy**, William J. Ganz, M.D., Daniel R. Biello, M.D., Keith C. Fischer, M.D., Charles Garvin, M.D., Barry A. Siegel, M.D.

### PHYSICS

**Plain Radiography with a Rare Earth Screen: Comparison to a Calcium Tungstate Screen**, Daniel Picus, M.D., William H. McAlister, M.D., Emily Smith, M.D., Stephen Rodewald, M.A., R. Gilbert Jost, M.D., Ronald G. Evens, M.D.

### THERAPEUTIC RADIOLOGY

"Joint Radiation Therapy Symposium: Intraoperative Radiation therapy," Glenn P. Glasgow, Ph.D., presiding.

**Prognostic Parameters in Patients With Carcinoma of the Prostate: Analysis of RTOG 75-06**, Miljenko V. Pilepich, M.D., J.M. Krall, Ph.D., R.J. Johnson, M.D., Carlos A. Perez, M.D.

**Volumetric Implantation of CNS Tumors with Iridium 192**, Christopher J. Moran, M.D., J. Alexander Marchosky, M.D., Joseph R. Simpson, M.D., V. Rao Devineni, M.D., Fred Abrath, Ph.D., Sheri Henderson, Ph.D.

### ULTRASONOGRAPHY

**Thyroid Imaging and Neoplasm: Multivariate Analysis of Ultrasonographic and Radionuclide Findings with Surgical Pathology**, Ralph L. Smathers, M.D., Harvey S. Glazer, M.D., G. Leland Melson, M.D., Bharath Kumar, M.D., Thor Amundsen, M.D., Fred H. Burbank, M.D., Joseph K.T. Lee, M.D.

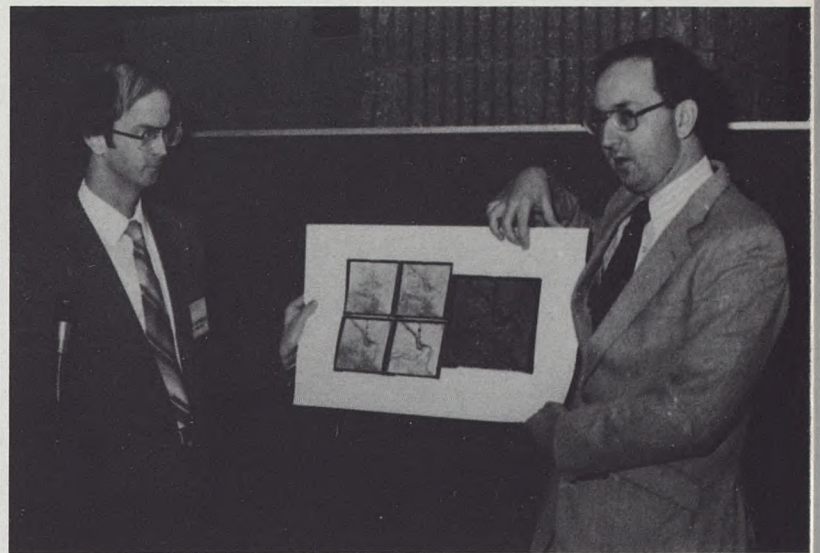
**Ultrasonography of the Biceps Tendon**, William D. Middleton, M.D., William R. Reinus, M.D., G. Leland Melson, M.D., William G. Totty, M.D., William A. Murphy, Jr., M.D.



# RSNA Press Room

MR imaging authorities, Drs. Joseph Lee and Brian Worthington, exchange notes on their work with the year-old imaging method. A resident of Nottingham, England, Worthington is a fellow of the Royal College of Radiology.

Dr. Lee is interviewed by Heather Carswell, free lance science writer and frequent contributor to **The Medical Post** in Toronto, Canada.



Dr. Michael Vannier, with NASA engineer Robert L. Butterfield, explains how space technology was used in the development of multi-spectral MR images, a significant step forward in diagnostic imaging. This development resulted from collaborative work between Mallinckrodt Institute radiologists and scientists at NASA.

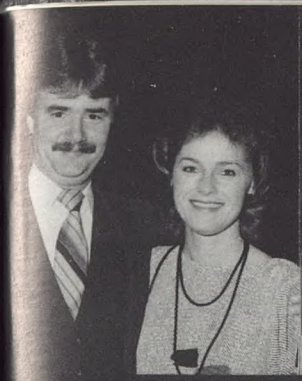
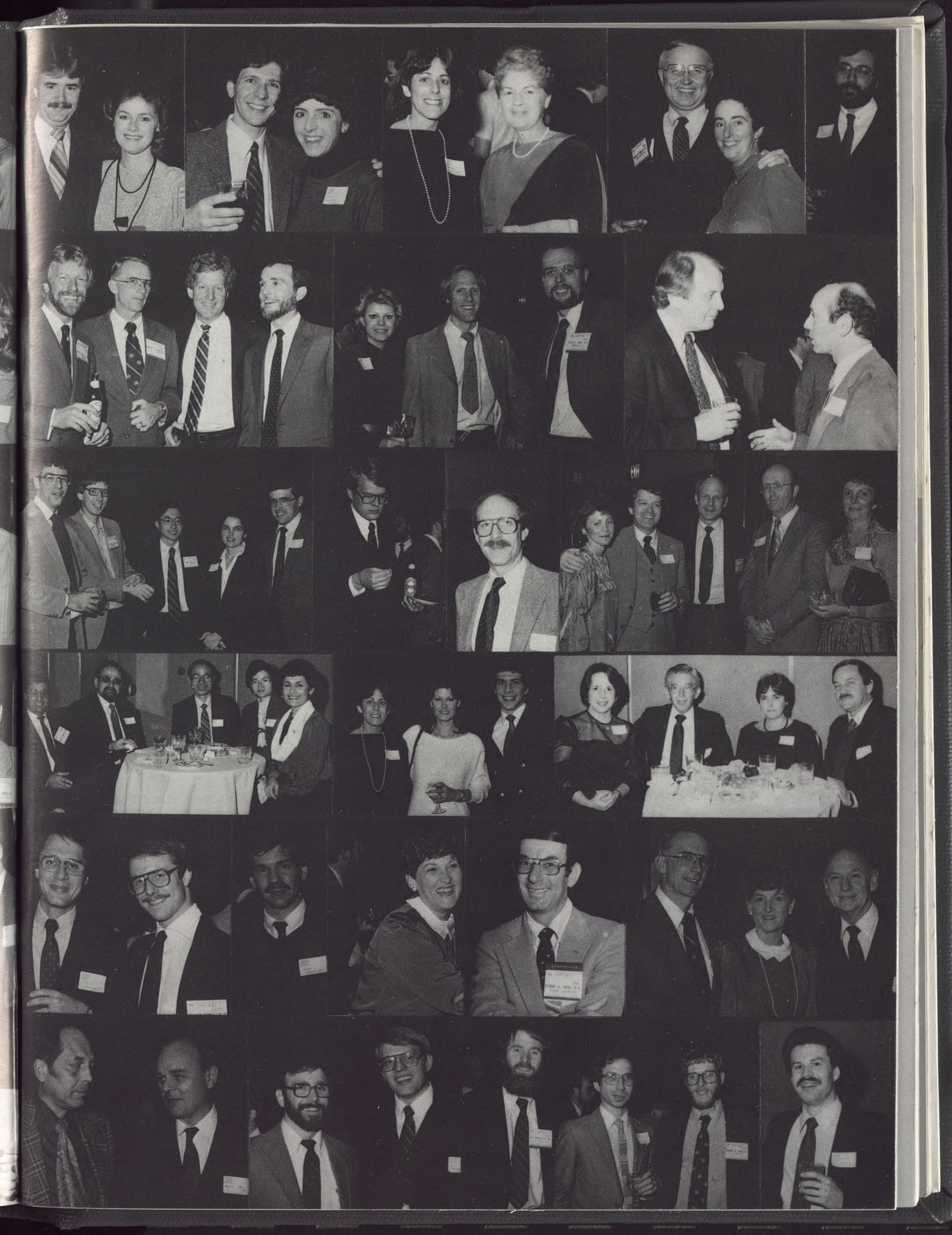




**RSNA Washington University Medical Center Alumni Reception**









# ASTR has New Name, New Focus

The American Society of Therapeutic Radiologists (ASTR) officially assumed its new name and a new theme at its twenty-fifth annual meeting held in Washington, D.C. on October 7-12.

Named the American Society for Therapeutic Radiology and Oncology (ASTRO), the two thousand member society's philosophy now encompasses radiation oncology, biology, and physics as integral parts rather than separate entities of therapeutic radiology and oncology.

Over 2,000 radiation therapists, oncologists, guest presentors, and non-physician administrators from Mallinckrodt Institute and other internationally known cancer research and treatment centers, including M.D. Anderson Hospital and Tumor Institute of Houston, the Memorial Sloan-Kettering Cancer Center of New York, and the Department de Cancerologie, Hospital Henri Mondor of France made over 200 different presentations on current research in the treatment of cancer.

**Carols A. Perez, M.D.**, director, **James A. Purdy, Ph.D.**, chief of the physics section, **Joseph R. Simpson, M.D.**, radiation oncologist, and other staff members in Mallinckrodt's division of radiation oncology presented eighteen different workshops, papers, and poster presentations. Their range of topics included the latest developments in hyperthermia, an investigation of afterloading interstitial irradiation in treatment of CNS tumors, and the first clinical use of a tissue compensator system for irregular patient contours.

The keynote speaker, Senator Orrin Hatch (R-Utah), praised the society's role in clinical research and medicine.

## WORKSHOPS/COURSES

Current dose computation algorithms in commercial treatment planning systems, new techniques in photon and electron field shaping, and other aspects of the radiotherapy process directly related to treatment planning were highlighted in the workshop, "**Radiation Therapy Planning**," presented by James A. Purdy, Ph.D.

In attempts to gain maximum control of tumors in carcinomas of the pyriform

sinus, pharyngeal wall, and postcrioid region, preserving a patient's voice and ability to swallow can be difficult to achieve. Radiation oncologist **James E. Marks, M.D.**, described how this can be done with correct tumor management and balanced combinations of radiation and surgery in the course, "**Carcinoma of the Hypopharynx**."

Even as radiation therapy, surgery, and chemotherapy have made major strides in improving tumor control and survival in malignant tumors, over half of the patients currently dying with cancer have local or regional disease. In the critical search for better treatment methods, hyperthermia (combined with irradiation or used alone) holds a great deal of potential. In the course, "**Clinical Use of Hyperthermia**," Dr. Carlos A. Perez discussed basic principles of hyperthermia, with specific focus on methods of delivering heat and the need to critically measure temperature at tumor and multiple sites, and reviewed findings gained from over several clinical studies. Dr. Perez also commented on potential use of hyperthermia in combination with chemotherapeutic agents and future areas of research.

## ABSTRACTS AND POSTERS

### Radiation Physics

#### Dosimetry Considerations of CT-guided Volumetric Interstitial Brachytherapy Malignant Brain Tumors

Fred G. Abrath, Ph.D., Sheri D. Henderson, Ph.D., Joseph R. Simpson, M.D., C.J. Moran, M.D., J.A. Marchosky, V. Rao Devineni, M.D.

#### Clinical Implementation of a New Tissue Compensation System

Sheri D. Henderson, Ph.D., James A. Purdy, Ph.D., Russell L. Gerber, B.S., M. Weller

#### Buildup/Surface Dose and Exit Dose Measurements for the Clinac 6/100 Linear Accelerator

James A. Purdy, Ph.D.

#### Variation in Off-Axis Beam Characteristics Observed for 4 and 6 MV Linear Accelerators

James A. Purdy, Ph.D., Richard A. Keys, Conrad O. Granda, Jerry Laxton

#### Afterloading Interstitial Irradiation for CNS Tumors

V. Rao Devineni, M.D., Joseph R. Simpson, M.D., J.A. Marchosky, Fred G. Abrath, Ph.D., Sheri D. Henderson, Ph.D., C.J. Moran, M.D.

### Combined Chemotherapy and Radiotherapy

#### Value of Radiation Therapy to the Thorax in Limited Small Cell Carcinoma of the Lung treated with Multi-agent Chemotherapy and Elective Brain Irradiation

Carlos A. Perez, M.D., L. Einhorn, R.K. Oldham, F.A. Greco, H.J. Cohen, H. Silberman, S. Krauss, N. Hornback, F. Comas, G. Omura, M. Salter, J.W. Keller, J. McLaren, R. Kellermeyer, J. Storaasli, R. Birch, M. Dandy

#### Prospective Randomized Trial of Large Fraction Radiotherapy and Misonidazole in Advanced Non-Oat Cell Lung Cancer

Joseph R. Simpson, M.D., Carlos A. Perez, M.D., Thomas F. Pajak, Theodore L. Phillips

#### Randomized Study to Evaluate Efficacy of Levamisole in Patients with Unresectable Non-Oat Cell Carcinoma of the Lung treated with Radiation Therapy

Carlos A. Perez, M.D., L.W. Brady, J. Cox, G. Hanks, Bahman Emami, M.D., S. Asbell, Thomas F. Pajak

### Clinical Studies of Irradiation

#### A Technique for Treatment of Advanced Carcinomas of the Larynx and Hypopharynx Using Low Megavoltage X-Rays

Joseph N. Fields, Ph.D., M.D., James E. Marks, M.D.

#### Effects of Dose Rate on Murine Alveolar Macrophage Colony-forming Cells

Hsiu-san Lin, M.D., Shin Hsu, Keith Pack

#### Phase III RTOG Study of Extended Field (PERI-AORTIC) Irradiation in Patients with Carcinoma of the Prostate

Miljenko V. Pilepich, M.D., J.M. Krall, Ph.D., R.J. Johnson, M.B., Carlos A. Perez, M.D.

#### Radiation associated Toxicities in the Second National Wilms' Tumor Study (NWTS-2)

Patrick R.M. Thomas, M.B., B.S., M. Tefft, G.J. D'Angio, E.D. Morgan, E. Baum, N.E. Breslow, J. Takashima for National Wilms' Tumor Study Committee

#### Clinical Results of Low Stage Large Cell Lymphomas Treated by Radiotherapy (RT) Only

David Monyak, M.D., Todd H. Wasserman, M.D., Rogers C. Griffith, M.D., Barbara Fineberg, A.B.



# From the



**Armand Diaz,  
R.T., R.N., FASRT**

# Technical Administrator

**Carolyn Offutt, R.T., Special Procedures**, recently obtained her bachelors degree in business management from Webster University. For the past several years, Ms. Offutt had combined her career as a radiologic technologist with part-time studies at the University of Louisville in Kentucky and Webster University.

"It is very gratifying to see technologists meet the professional goals they have set for themselves," says technical administrator Armand Diaz, "The sense of commitment and achievements such as Ms. Offutt's contributes to the institute's high standards in patient care."

Before joining MIR's technical staff, Ms. Offutt served as a special procedures technologist, specializing in invasive imaging methods, and clinical instructor at Louisville Baptist, the Louisville General, and Veterans Administration Hospitals in Louisville, Kentucky. A technologist in special procedures at Mallinckrodt Institute for the past five years, since last fall Ms. Offutt has assisted in projects directed by **Dr. Michael W. Vannier**. These projects include the development of new computer applications in digitron imaging and 3-D reconstruction with CT scans.

Alumna **Corliss J. Arand, R.T.**, a 1977 graduate of MIR's School of Radiologic Technology, was recently appointed administrative director of the department of radiology at St. Mary's Hospital in Blue Springs, Missouri. As administrative director, Ms. Arand is responsible for managing the budget and personnel of the technical staff and assists the medical director in the administration of the department of radiology. Before joining the staff at St. Mary's Hospital, Ms. Arand previously served on the technical staff of various hospitals including the Mayo Clinic in Rochester, Minnesota, and in the Kansas City area, St. Joseph's, St. Luke's, and Trinity Hospitals.

## CPR: Learning how to save a life

4½ hours. That's what it takes to learn a skill that could save someone's life in an emergency. The skill is CPR, cardiopulmonary resuscitation, and training in the technique is currently being offered to all radiologic technologists and non-medical personnel by Mallinckrodt Institute in conjunction with the St. Louis Heart Association.

CPR is used to revive victims of a heart attack, electric shock, choking, and other forms of respiratory arrest until more sophisticated cardiac care can be provided. A combination of chest compression and mouth-to-mouth breathing, the fairly simple technique can keep blood and oxygen flowing through the body during the crucial first few minutes of cardiac arrest.

The St. Louis Heart Association and American Red Cross report that as many as 50% of the heart attack victims each year may have been saved if professional help had reached them within the first four minutes of cardiac arrest. Among the survivors of cardiac arrest, some suffer irreversible brain damage, resulting from oxygen being cut off from the brain for 4-6 minutes. These victims could have been saved if CPR, cardiopulmonary resuscitation, had been applied.

Since the institute started offering courses in CPR last December, some fifty technologists, film librarians, and receptionists have been certified, or recertified, in the technique and more are expected to undergo training.

Technical administrator **Armand Diaz, R.N., R.T., FASRT**, says, "Our hope is to certify as many employees as possible. The new training program aims to provide patients in any area of the institute with professionally-trained personnel capable of administering CPR at any time and in any situation. We're projecting that this program will certify or recertify some 200 non-medical

employees. In fact, plans are underway for members of the technical staff to attend instructor courses so that we can eventually have an in-house CPR training and recertification program."

Interested students can register for the course by contacting **Tim McNabb, R.T.**, assistant technical supervisor in pediatric X-ray and coordinator of the institute's CPR training program, at 454-6264. ■



*Charles Schabb, R.T. Special Procedures, practices a CPR maneuver on a resuscitator mannequin.*



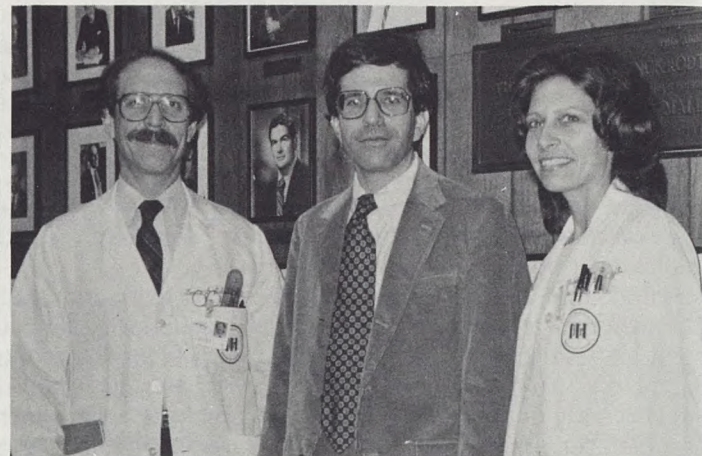
*CPR Instructor Janet Vogelsang, from the St. Louis Heart Association, instructs receptionist Jane Schmidt on how to assist a choking victim (Lisa Krieger, film librarian) as Kevin Marquart, R.T., assistant supervisor in Special Procedures, and Patty Suntrup, CT film librarian, look on.*



# MIR and the Medical World Community



Left, Drs. Fred Hodges, Ronald G. Grainger, and Bruce L. McClennan.



Left, Drs. Louis A. Gilula, Stephen A. Feig, Jr., and Judy Destouet.

## Contrast Media Expert visits Mallinckrodt

On November 29 and 30, Mallinckrodt Institute was host to Dr. Ronald G. Grainger, one of the world's leading experts on radiographic contrast media. Always interested in the latest developments in biochemical research, Dr. Grainger is a frequent visitor in the laboratory of Dr. Thomas W. Tusing, medical director of clinical trials at Mallinckrodt, Inc. During his visit to St. Louis, Dr. Grainger also gave two conferences at MIR and consulted with **Dr. Bruce McClennan**, chief of the abdominal imaging section at MIR, on research concerning the clinical use of **hexabrix** and other new contrast materials possessing the characteristic of low osmolality.

Dr. Grainger, professor of radiology at the Royal Hallamshire Hospital in Sheffield, England, has been a major contributor to the advancement of radiologic sciences for over 30 years. Working to achieve accurate diagnosis of diseases with minimal patient discomfort and improved safety, he is credited with the introduction of **conray**, **dimerX**, **hexabrix** and other contrast media in Britain.

Five years ago, Dr. Grainger undertook with Dr. David J. Allison the massive effort of editing and producing a comprehensive textbook covering all aspects of diagnostic radiology. Entitled **Textbook of Radiology: An Anglo-American Text**, the book is

three volumes in length and incorporates 50% American and 50% British authorship. "While both countries have radiology departments that are respected throughout the world," says Dr. Grainger, "there are significant differences in philosophy, economics, staffing procedures, and technology."

An honorary member of the Radiological Society of North America (RSNA), Dr. Grainger attended the recent meeting in Washington, D.C., to discuss the book. He noted, "**Dr. William Murphy** contributed an excellent section devoted to the radiology of joint disorders."

Particularly impressed with "the coordination of all radiology services under one department at MIR," Dr. Grainger compared Mallinckrodt with his own institution in England where diagnostic radiology, radiation therapy, and nuclear medicine are separated under completely different realms of management. On Mallinckrodt Institute, Dr. Grainger says, "It is unique in the world and highly respected everywhere."

## Lecturer discusses Breast Imaging

An international authority on breast imaging, Stephen A. Feig, M.D., visited Mallinckrodt Institute on October 8, 1984. Dr. Feig, who is attending physician and chief of the mammography section at Thomas Jefferson University Hospital in Philadelphia, presented

a critical review of "Current Methods in the Diagnosis of Breast Disease" at the City-Wide Radiology Conference. While visiting Mallinckrodt, Dr. Feig gave two other lectures where he discussed mammographic interpretation of masses and calcifications and the fundamentals of mammography and xeromammography.

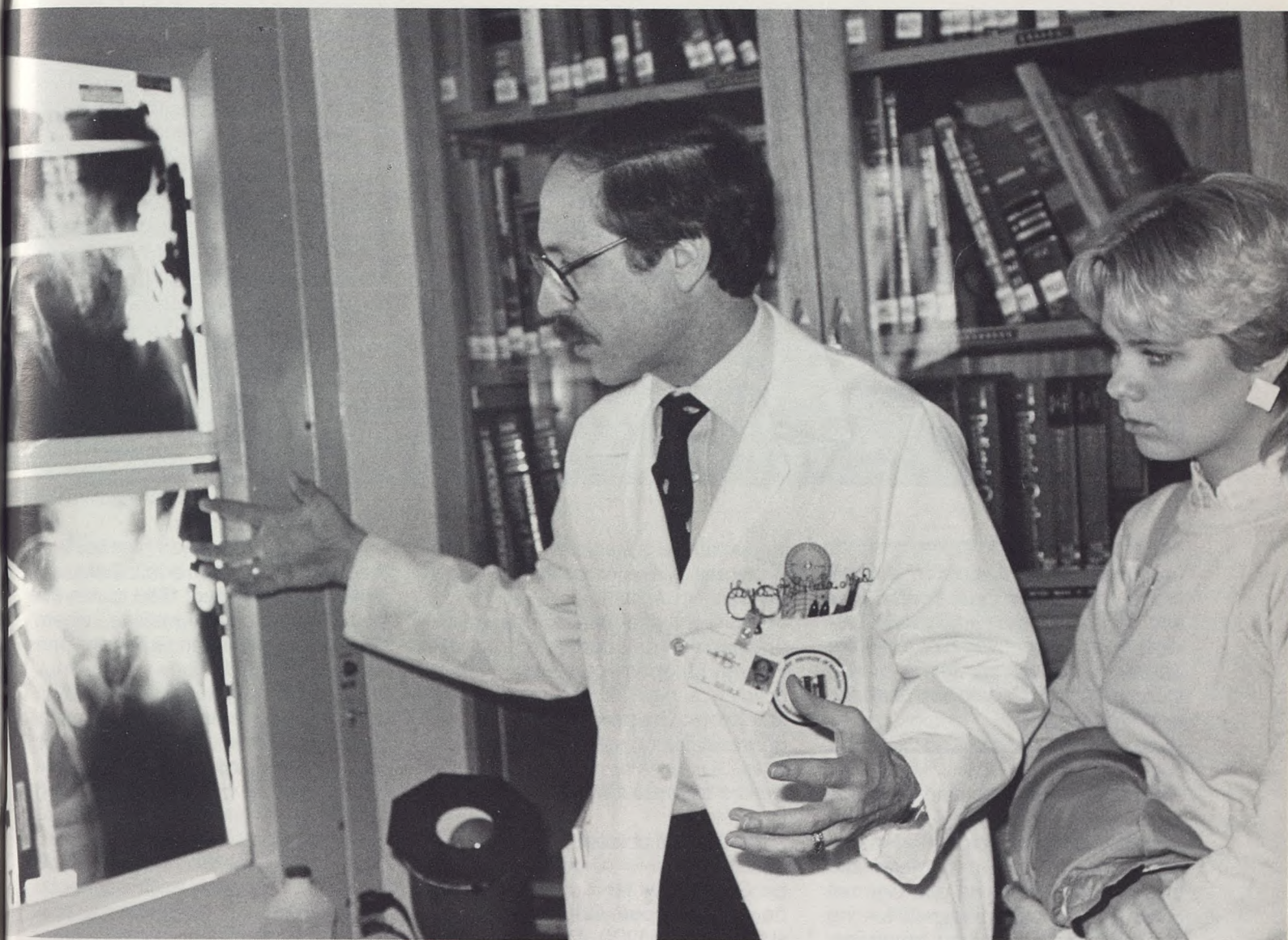
## International Visitors

Egyptian radiologists **Ahmed Aboulezz, M.D.**, and **Faten Mekkawy, M.D.**, joined Mallinckrodt as visiting physicians sponsored by the Peace Fellowship Program, a continuing education program offered by United States universities and colleges for professionals from Egypt. The physicians, the only two in the specialty of radiology among the several hundred physicians in the fellowship program, are gaining clinical experience and assisting in some of the institute's research projects. ■



Visiting Peace Fellows from Egypt, Drs. Faten Mekkawy and Ahmed Aboulezz.





**Dr. Louis A. Gilula**, co-chief of MIR's musculoskeletal section, explains x-ray imaging of the body's musculoskeletal system to one of 25 high school students who participated in an educational program on various non-invasive diagnostic and research techniques. Held recently at the institute, the program, "**Imaging—Inner Space**," consisted of three Saturday morning lecture and demonstration sessions by Mallinckrodt Institute staff, **Drs. Gilula, Joseph K. T. Lee, and Michael W. Vannier**. In separate talks, Dr. Lee discussed ultrasound, CT, and magnetic resonance imaging methods and Dr. Vannier, in his computer laboratory, described computer imaging techniques including 3-D reconstruction of the skull. This program was jointly sponsored by the St. Louis Science Center, the Gifted Resource Council, and the Washington University Medical Center.



## Profiles: Two Artists

—Ria Munoz



Klaus Sartor, M.D.

*In this article, FOCAL SPOT profiles Mallinckrodt physicians, Klaus Sartor and Carl A. Geyer, who exhibited selections from their works of art in the Mallinckrodt Institute lobby during the months of December, January, and February.*

He is part designer, painter, sketch artist, and photographer. He has also tried his hand at sculpture and written a brief novel. And his work in interior design—the conversion of a German country house into a modern loft—long ago was featured in the magazine, **Schoener Wohnen**, the German counterpart of America's **House Beautiful**. This describes **Klaus Sartor, M.D.**, Mallinckrodt neuroradiologist with an uncommon interest in the arts spanning nearly three decades.

In his collection of sketches, oil paintings, and photography exhibited at Mallinckrodt on January 9-February 6, architectural images appear changed then unchanged. Here and there a boat can also be found. This theme,

more than just an artistic interest in structures, is a reflection of something deeper.

"I think those 'images' based on drawings made during my travels through Europe, representing the idea of building a new life, or moving to a new home. The period in which I grew up was a time of great change in Germany. Like many other Germans, I wanted to see a new Germany," says Dr. Sartor.

As a writer of fiction, he has so far been more drawn to humor. Influenced by German writer Kurt Tucholsky's novella, **Schloss Gripsholm** (Gripsholm Castle, 1931), Dr. Sartor wrote his own brief novel fifteen years ago. The short work describes the mishaps and adventures a newly-married couple encounter in their travels through Southern France. He now has thoughts for an autobiographical work on a more serious topic: life in post-war Germany.

Though it seems art is not easily separated from the man, Dr. Sartor's academic career speaks of a man based in medical science. There were no sleepless nights when he made the

decision to enter the field during his last year in high school. He explains, "I too have ambition."

Receiving his medical degree from the University of Duesseldorf in 1965, he then pursued a rotating internship and residency training in radiology in his native West Germany. After gaining further radiologic training at Mercy Hospital and Medical Center in Chicago, he returned to Germany in 1972 to join the medical faculty of the University of Hamburg as a fellow in special procedures and neuroradiology.

Three years later, after briefly serving as a visiting fellow in neuroradiology at the medical center of the University of California at San Francisco, Dr. Sartor became chief of neuroradiology at Altona General Hospital, an 1100-bed facility associated with the University of Hamburg.

Deciding to further his work in medical research, he left Germany again in the spring of 1983 to join the staff of Mallinckrodt Institute, where he now serves as an associate professor in neuroradiology.

In academic radiology, the physician says his greatest satisfaction has come from medical writing. In the nineteen-year span of his career, he has become a prolific writer; having published seventy articles, one-third of which are in German, and an introductory textbook on neuroradiology, also in German. This past year, much of his work has been devoted to analyzing the potential of magnetic resonance imaging in studies of the brain and spine and he has described this work in a number of papers and presentations.

Commenting on radiology in general, Dr. Sartor says, "I think radiology is uniquely suited for someone like myself. It really is visually-oriented. Think of all those films. Who else but someone who loves pictures would want to stay all day in semi-dark rooms evaluating hundreds of transparent images?"





Carl A. Geyer, M.D.

Sunflowers, sylvan glades, and seagulls escape neither eye nor brush in the four-week exhibit of water colors and oil paintings by radiologist **Carl A. Geyer, M.D.**, shown December 12-January 9 at Mallinckrodt.

The grandson of an avid horticulturist, it was the world of greenery and especially the orchid which originally inspired this physician's interest in art. From childhood and into his college years, he continued to pursue the different interests in art and orchid-raising. But instead of botany or fine arts, he chose a major in biology when he entered college at Johns Hopkins University.

"It wasn't really a matter of medicine over art or possibly, botany. I felt then as I do now that it's healthy to pursue a diversity of interests," says Dr. Geyer.

While a freshman in college, time away from biology meant time for his orchid collection (which amounted to 250 blooming plants) and time at the Hill estate of the famed Campbell Soup Company, where he tended another orchid collection numbering 5,000

varieties of orchids from all over the world. He also continued to paint and as an undergraduate, exhibited his work in the gallery of the main library at Johns Hopkins University and at the Newport Art Association gallery in Rhode Island.

Dr. Geyer happened upon another opportunity to mix his interests during his first year in medical school at Brown University. This time he would mix art with medicine.

As one of the coordinators of a unique symposium at Rhode Island Hospital in Providence, he helped bring professionals in medicine and other disciplines from all over the country to discuss the psychosocial aspects of cancer patients. He was particularly interested in how a medical center's interior design can affect a cancer patient undergoing terminal care. Work on the conference resulted in his first medical article, "Aspects of the Cancer Patient While Waiting for Treatment: Abstract," for the **Journal of Thanatology** (1976). That same year, for the cancer treatment center in the same hospital, he initiated a

rotating art show and arranged the painting of treatment rooms by faculty members and students of the Rhode Island School of Design.

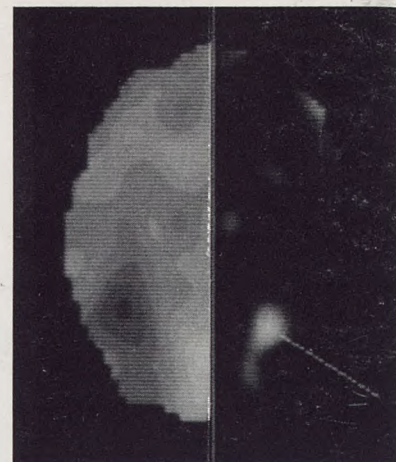
Now a fellow and instructor in neuroradiology at Mallinckrodt Institute, the passing of time has led Dr. Geyer to pursue something different: fly-fishing.

Absorbing more time than any other hobby, fly-fishing allows time outdoors, something he and his wife, Patricia, both enjoy. And though this new pursuit might seem far away from painting or orchid-raising, the physician has found a way to weave something of art into the sport.

From an exotic sampling of feathers and fur he has collected, he is able to craft beautiful and unusual flies. And his camera is a constant companion on tours of wilderness rivers throughout the United States.

"I try to record not only the beauty of the country but also the few clean streams and rivers," says Dr. Geyer. "When the fishing is over, ideas spring forth for painting." ■





PET reveals brain disorder

**MALLINCKRODT  
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**FOCAL**  
SPOT

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