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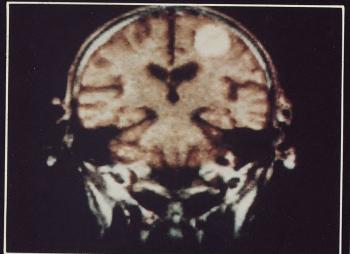
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A NEWSLETTER OF THE MALLINCKRODT INSTITUTE OF RADIOLOGY

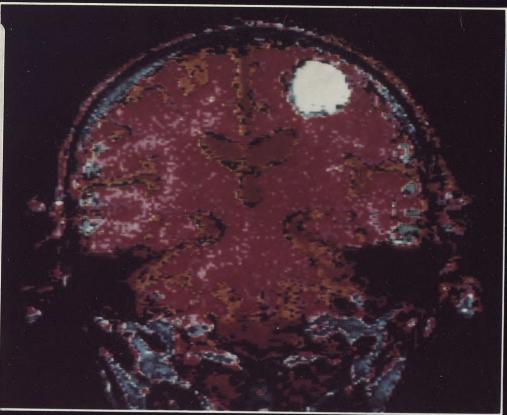
VOLUME XV WINTER 1983/84 NUMBER 37

# Mallinckrodt and NASA Advance NMR Imaging

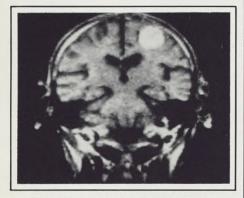








#### **About the Cover**



Color composite NMR head scan of a patient with a brain tumor. The patient's ears are on left and right margins of the image. The brain (brown color) in the center is surrounded by skull and skin. The tumor is a round white mass at the top right.



The computer has been "trained" to recognize cerebrospinal fluid (red) by the small white rectangle in the center.



This is the theme map for the same head section with brain in red, CSF brown, tumor white, and fat blue. This map was synthesized by the computer under control of a skilled operator.

# MIR/NASA team up on NMR

Physicians at Mallinckrodt Institute are finding that NMR images of the body can be interpreted more easily using NASA's satellite imaging technology. Nuclear magnetic resonance (NMR) images are very complex, and at this early stage of development, present difficulties in interpretation. In NMR, the images show local variations of relaxation times, blood flow, and proton density (the relative concentration of water) in a manner not previously possible. The problem is that the NMR scanner collects a large amount of redundant data from the same section. The information is there but in such a complex form, a human being finds it difficult to understand. Michael Vannier, M.D., assistant professor of radiology at Mallinckrodt and former NASA engineer, is pioneering a solution to that problem.

In a cooperative project between Mallinckrodt Institute, the NASA Kennedy Space Center, and the University of Florida, Dr. Vannier is applying NASA satellite computer imaging technology to NMR scans. This exchange of technology was presented in a scientific paper and exhibit at this year's Radiological Society of North America convention held November 13-18 in Chicago. In addition, Ronald G. Evens, M.D., the director of Mallinckrodt Institute, Dr. Vannier and other collaborators discussed the project in a conference with reporters, television correspondents, and medical writers.

Drawing upon his background in aerospace engineering, Dr. Vannier recognized key similarities between satellite pictures and NMR images. Satellite pictures, or images, are seldom seen in raw form. Since the early seventies, four of NASA's LANDSAT satellites have "photographed" the earth's surface almost continuously, collecting images used for locating valuable timberstands,

mineral deposits, petroleum sources, and rich fishing grounds. The satellite's multispectral imaging system takes photos in several segments of the light spectrum, recording each on a different channel. The computer examines the photos, sharpens the contrasts, removes confusing details, and then combines three or four channels of digital information into a singular composite. Much like a satellite, the NMR scanner can produce numerous pictures with different spectral characteristics.

Eleven months ago, Dr. Vannier contacted Robert Butterfield, a NASA image analysis specialist, who now manages technology integration at Kennedy Space Center, to see if computer processing developed for satellite images could be applied to NMR imagery. Butterfield responded enthusiastically, inviting Dr. Vannier to process test data on the LANDSAT computers. Through his collaboration with Mr. Butterfield, Dr. Vannier gained access to the Remote Sensing and Image Processing Laboratory, on permanent loan from Kennedy Space Center to the University of Florida's Institute of Food and Agricultural Sciences at Gainesville. The Gainesville laboratory houses LANDSAT's image analysis computer.

When NMR scans were fed into the LANDSAT computer, its multispectral scanner system combined the NMR images into a single, realistic color composite. Nuclear magnetic resonance images of the head, chest, and abdomen could be analyzed just as if they were earthly landscapes. Recognizing and color-coding the types of tissue contained in a cross-sectional NMR scan, the LANDSAT computer created information-packed color pictures of the human body.

"What we've done here," says Dr. Vannier, "is to borrow existing technology already proved successful in

analyzing and classifying multispectral satellite images. No one can mentally assimilate multispectral NMR images the way this computer can." Even the initial results "saved three years of effort had we used our own equipment," according to Dr. Vannier.

Working with Douglas Jordan, engineering manager of the Gainesville laboratory, Dr. Vannier was able to call up the NMR scans and begin the task of assigning colors to the various anatomic sections of the body. With the help of other Mallinckrodt radiologists, Dr. Vannier very carefully chose realistic, "lifelike" colors for

the composites.

'Color-composite NMR images are particularly valuable in revealing subtle evidence of infarction, asceptic necrosis of the femoral head, and white brain matter disease," says Dr. Vannier. Dr. Vannier has collaborated with Drs. William A. Murphy, Mokhtar Gado, and Robert Levitt on more than thirty patient studies at Mallinckrodt, providing color composites for many of them.

Dr. Vannier also realized that "signatures," or unique image features, are found when satellites are used in land-mapping. Water, for example, has a different signature than land. "Like landscape features, many organs and types of tissue have distinct signatures," says Dr. Vannier. "By applying satellite imaging techniques to NMR scans, we are able to map a slice of the body by measuring the signatures of various tissues including bone, fat, muscle, and blood."

Potential benefits? "NMR's imaging of morphology of the central nervous system is particularly exquisite. It has much more specificity than CT in imaging CNS lesions," says Dr. Vannier. "Presently, if we find evidence of a tumor on a CT scan, the patient must undergo a biopsy or operation to remove it before we can determine its exact nature, correct mode of treatment, and prognosis. With computer processing of NMR scans, we expect to achieve the same end without surgery and with less risk and cost to the patient"

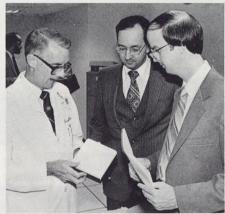
"By teaching the computer the signature for a blood clot in the brain, we can ask it to show us every part of the image in which that signature can be found. Immediately, the com-

puter searches the entire image coloring any area that has the hematoma signature," states Dr. Vannier, Because the tissue theme map resulting from the search will differentiate the hematoma from the normal parts of the brain, this technique may lead to earlier diagnosis of such cases.



#### **NASA Collaborator** Visits NMR Facility





Dr. Vannier is now adapting space agency software to operate on the NMR scanner located at the institute. This conversion will enable hospitals with these new multi-million dollar imaging devices to fully utilize the imaging capabilities "in-house." Future computer manipulation may result in the narrow slices of NMR imagery being combined into three-dimensional views. What would appear on the screen would be a three-dimensional

construct of almost any portion of the body, viewed from any angle, or even from the inside.

Further, NASA specialists seem delighted that NMR image processing may "spinoff" from NASA research and even predict that advanced diagnostic technologies may "spinback" from medicine to aerospace, helping NASA engineers to solve some of their complex problems. Mr. Butterfield states, "NASA is finding that technologies like CT and NMR may present new methods for non-destructive testing which are better than previous techniques."

'This project between Mallinckrodt in St. Louis and NASA facilities in Florida and Maryland," says Dr. Ronald G. Evens, "has already generated exciting scientific and medical results. Three aspects are particularly important?

'First, this ability to display images in realistic color-to make them look like fresh-cut anatomic sections-is the first real medical use of color to extract diagnostic information from an image. Color is a person's innate way of handling and understanding multispectral information."

"Secondly, scientific collaboration between private medical institutions and governmental agencies can work effectively and quickly and can be of benefit to individual patients. Important engineering accomplishments for satellite imaging are of great value to medical procedure. The Mallinckrodt Institute could never have developed these resources independently," continues Dr. Evens.

'And third, the project provides a solution to a most important problem for the newer technologies of diagnostic radiology. The radiologist is being overwhelmed with data and images. Patients with complicated problems often receive several diagnostic tests, and the radiologist will analyze more than fifty individual 'pictures' to determine a single diagnosis. The number of images is increasing and the problem is getting worse," says Dr. Evens. "We need help from the computer to identify areas of concern and subtle changes that might be missed on the original images. Analysis and interpretation by the radiologist/ physician will also be necessary but computer aid will be essential for the future".



#### **RSNA Press Conference**



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No one can mentally assimilate multispectral NMR images the way this computer can.

- Michael Vannier, M.D.



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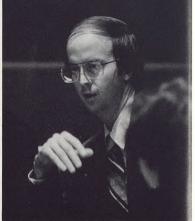
Color is a person's innate way of handling and understanding multispectral information.

--- Ronald G. Evens, M.D.





Douglas Jordan, engineering manager, NASA's Gainesville laboratory



Robert Butterfield, NASA Image Analysis Specialist



### MIR Computers Enhance Hospital Communication

The MIR computer facilities remain the largest radiology computer system in the world, supporting in excess of 150 computer terminals within the radiology department alone. Recently, the capabilities of this system have been enhanced by strengthening the electronic linkage between the Barnes Hospital computer system and that of the Mallinckrodt Institute. Through comptuter programs developed by Allen Rueter, MIR systems analyst, and with the support of members of the MIR and Barnes Hospital computer staffs, it is now possible to order examinations electronically from any of the nursing stations throughout the hospital.

Doctors are able to request a radiology examination by simply making a note on the patient's order sheet. Nursing personnel then enter this request, along with the reason for the examination, at a nearby computer

terminal using an optical wand to select from menus displayed on the screen. The Barnes computer checks to see that the order has been properly compiled and then relays the request to the MIR computer. The request is then electronically routed to the MIR patient service area where the examination can best be performed. Once the request has been verified in the radiology department, comptuters complete the patient registration, prepare flashcards and automatic barcoded film identification labels. A message is then printed in each of the film libraries requesting that old films be sent to the appropriate examination area.

Once an examination has been completed and interpreted, the report prepared on the MIR computer system is transmitted by the same electronic link to the Barnes Hospital system. Complete reports are therefore avail-

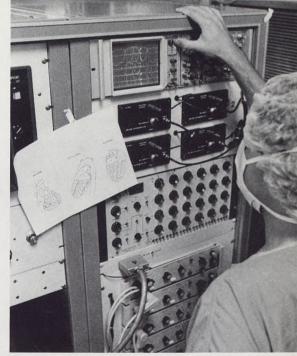
able in nursing stations and in the doctor's lounge from the moment the report is transcribed. This capability provides faster service by eliminating the necessity for carrying paper copies of requests and reports between nursing stations and the radiology department.

According to **Dr. Gilbert Jost**, associate professor of radiology, who is responsible for MIR's computer facilities, "the electronic link between the hospital and Mallinckrodt Institute will be further strengthened in the near future. More information about each patient will be made available to radiologists, including laboratory values and pathology reports. In addition, it is anticipated that doctors at key locations throughout the hospital will not only be able to retrieve radiology reports, but will be able to call up electronically the actual radiology images."

# MIR Cath Lab Site of Preliminary Studies for Cardiac Arrythmia Surgery

Mallinckrodt Institute's cardiac catherization laboratory provides the setting and advanced technology for electrophysiological studies used in open-heart surgery performed at Barnes to correct cardiac arrhythmia. Dr. James L. Cox heads the team that has performed landmark surgery to correct the most common arrhythmia, Wolff-Parkinson-White syndrome (WPW). WPW occurs once among every 1,000 persons in the population and is caused by the presence of an accessory electrical pathway or "short circuit" between the upper and lower chambers of the heart. Surgical planning requires electrophysiological "mapping" of the heart's surface. Dr. Michael E. Cain conducts the mapping which reduces the time needed to pinpoint the location of the arrhythmia problem in the operating room. Preliminary to surgery,

working under fluoroscopic monitoring in the MIR catheterization lab, the electrophysiologist places specialized catheters with electrodes into the heart to define and isolate the abnormality. Then, in the operating room, the surgeon sews electrodes onto the heart and, with the probe of a portable electrophysiology terminal. locates the extra hairlike nerve fiber (accessory electrical pathway) inside the heart muscle. After the fiber is severed, that portion of the heart is electrically stimulated in an attempt to produce an abnormally fast beat. If the beat remains normal, there is a 95 percent indication of success. If, after seven to ten days, a similar test performed in the MIR lab produces the same results, the patient's irregular heartbeat has been eliminated permanently.



Dr. Michael Cain at electrophysiological terminal in MIR Cath Lab.

# Mallinckrodt Business Administrator Addresses National Meeting



Robert Wagner, AAMT convention speaker.

Serving as a panelist in a management seminar, Mr. Robert Wagner, Mallinckrodt business administrator, recently spoke to some 500 members attending the 1983 national convention of the American Association of Medical Transcriptionists in St. Louis. His address concerned the new Medicare regulations and the new methodology the federal government will use to prospectively reimburse hospitals for health care provided to Medicare inpatients.

Effective October 1st this year, Medicare reimbursements are based on 467 diagnosis-related groups (DRGs). Each Medicare inpatient is assigned to a DRG, determined by the illness and treatment. In a given hospital, each DRG has its own predetermined price which includes length of stays, x-rays, tests, and other variables. The concept behind Medicare's DRG payment is that the federal government should pay roughly the same price to all hospitals for similar types of patients, no matter

what the hospital's cost in delivering that care. Those hospitals with above average costs will stand to lose money and those below may profit. Aside from competing for limited funds, the obvious implications for physicians and hospitals can be described in three major categories: hospital records, utilization review, and cost containment and control.

According to Mr. Wagner, hospital records will need to be tailored to demonstrate the need and reason for service along with the associated cost data. These records will represent a set of specifications which will lend themselves to standards for cost evaluation and control for each institution.

Utilization review will require close scrutiny both by physicians who control volume and hospitals that control costs. "In the past, referring physicians have often ordered whatever tests they wanted, whenever they wanted them, to diagnose patient disorders. Under DRGs, individual practice patterns will be compared

with group norms to develop standard exam flows per diagnosis. Emphasis will be placed on services being performed with the greatest possible efficiency of resources," said Mr. Wagner.

He further observed that cost containment and control will require cooperation and crucial intra and interdepartmental collaboration and communication. A team effort in departmental management will be critical in using departmental resources most efficiently and for the most good. Productivity standards will need to be developed on a sophisticated scale to ensure staffing levels are appropriate for the volume and types of services provided. Mr. Wagner emphasized, "Supplies will need to be used prudently and waste eliminated. Institutional and multi-institutional purchasing may be emphasized for the best possible discount. Effective inventory control will be crucial in an environment where resources expended match services performed."

Pointing out that there is no easy resolution to the potential conflicts and problems these regulations present, Mr. Wagner summed up his talk with the following thoughts: "Our challenge as medical and administrative personnel will be to continue the quest of delivering effective, efficient, and economical care. To meet the challenge will require a team effort by both the physician and administrator. We will have to understand and apply the concepts of quality assurance, appropriateness review, productivity, cost accounting, case mix analysis, resource allocation, planning, and even marketing. Our very future depends on it."



MIR certified medical transcriptionists, key planners for the 1983 national convention, in a follow-up meeting with Mr. Robert Wagner. Left, Jacqueline Rudolph, Sharon Keathley, Susan Ratliff, and Sheila Doerhoff.

### Olympic Runner at Mallinckrodt

Success is not measured by the heights one attains, but by the obstacles one overcomes in its attainment.

Booker T. Washington

It seemed perfectly natural for Craig Virgin to be wearing an Adidas running suit rather than hospital pajamas while a patient at Barnes Hospital. But, then the personable world class distance runner gives the impression that he would be relaxed in almost any situation—even one as disappointing as watching the 1983 World Track and Field Championships on TV from his hospital bed rather than participating at Helsinki, Finland. This was but one of the many setbacks the twenty-eight year old Olympic athlete has overcome.

Craig was born with an urologic problem: a faulty valve in the ureter created a constant threat of kidney infection. He describes his life from age to thirteen as "a challenging time," with daily doses of antibiotics and numerous hospitalizations for tests every three to four months. The turning point for Craig came at age 14 when reconstructive bladder surgery restored normal function and helped the left kidney drain better. Craig began a more normal life in his hometown of Lebanon, Illinois.

An outstanding scholar and school leader, Craig began as a high school freshman to channel his dynamic energy into running. He became an Illinois state champion in the two-mile, one-mile, and cross country events. He went on to set a number of national class and age group records in long distance running events. In 1973, he was awarded a track scholarship by the University of Illinois at Champaign-Urbana. Craig continued to compete and to win. In 1976, he was a member of the U.S. Olympic Track Team in the 10,000 m. event.

Graduating from college with honors, Craig received his B.S. degree in communications. In 1980, he started his own marketing, public relations, and advertising firm, Front Runner Inc. At the same time, he was demonstrating his versatility in distance running, taking on road racing. He became

the first American to win the World Cross Country Championship in 1980 (Paris). A member of the boycott 1980 Olympic team, he posted the fastest time in the world for the 10,000 m. event.

While in Europe, during March of 1982, Craig developed a strange flulike illness with frustrating off-and-on attacks of fever and other constitutional symptoms. At the University Hospital in Erlangen, West Germany, a nuclear medicine scan revealed a urinary tract infection that had gotten out of hand. A nephrostomy tube was inserted, draining infected urine from the right kidney. Kidney surgery became a definite possibility and Craig was referred to **Dr. Robert Royce** at Washington University Medical School.

Craig arrived in St. Louis and Dr. Bruce McClennan of Mallinckrodt Institute performed a nephrostogram once the infection was controlled. This diagnostic study showed no actual obstruction but noted a small stone in the right kidney. A conservative approach (continue to monitor) was decided upon and the drainage tube was removed. Craig went home to his consulting firm in Lebanon and an eleven-month training program for the 1983 World Track Championships.

Things were going well for Craig, now happily married to Sandy, a flight attendant he met "at 31,000 feet on an Eastern Airlines' flight." But in July 1983, he developed a persistent tendonitis in his right foot during preparations for Helsinki. Returning to St. Louis for more tests, an ultrasound exam and further radiographs revealed that the kidney stone was getting larger and was moving around. Surgery was again considered.

The realization was shattering. Not only would he miss the 1983 World Track Championships but standard surgery and possibly eight weeks of recuperation would jeopardize his preparation for the 1984 Olympics. He had to keep racing in order to compete at a world class level.

For Craig, a new important medical technique, percutaneous nephrolithotomy, was the answer. Only ten of these procedures had been performed at Mallinckrodt by late July 1983. **Dr.** 

Philip Weyman, Mallinckrodt radiologist, inserted a long tube (catheter) using fluoroscopic guidance through Craig's right side directly into the right kidney. Craig stayed at Barnes for five days before tissue around the catheter had become firm enough to allow a lighted tube (endoscope) to be placed into the catheter tract by Drs. Royce and Mani Menon. Graspers inserted through the endoscope picked up the stone and removed it intact through the tract in minutes.

Through this close-knit partnership of radiology and urologic surgery at Washington University Medical Center, Craig is back in training for the 1984 Olympics. Several days after the procedure, Craig said, "Where the new procedure really shines is the recovery time. I had just 7 to 10 millimeters of muscle tissue cut so the tube could go in, and I should be going home in a few days. I hope to do a ten-mile run one month from now. I had been facing the fact that I might never be able to compete at a world class level again. Thanks to the medical expertise at this hospital, I'll be able to get back into my running shoes before too long."

For Craig Virgin, the extra mile now lies behind him.



MIR runners, Drs. Evan Unger, left, and Ronald Evens, visit with Craig in Barnes Hospital.

# NEWS

#### Dr. Nakeff Awarded Grant

Alexander N. Nakeff, Ph.D., associate professor of cancer biology in radiology and director of the flow cytometry laboratory, is the recipient of a grant totaling \$271,000 awarded by the U.S. National Institutes of Health (NIH) (Hematology Study Section) National Heart, Lung and Blood Institute. The three-year research grant for the study of cell physiology and development of bone marrow megakaryocytes supports fundamental studies of the role played by megakaryocytes in the process of blood coagulation through their production of blood platelets.

This research complements other ongoing research being conducted by Dr. Nakeff related to the production of megakarocytes, the regulation of their growth, and the effects of anticancer agents on these processes. The results of study supported by the new grant will provide a more comprehensive understanding of normal megakaryocyte development. This information will aid in determining to what extent abnormalities in blood clotting resulting from platelet-borne defects can be explained by alterations induced in the early development of megakaryocytes.

#### Dr. Wasserman to Head Radiation Oncology at Jewish Hospital

Todd H. Wasserman, M.D., associate professor, MIR's division of radiation oncology, has been appointed chief of the department of radiation oncology at Jewish Hospital. A joint project of Mallinckrodt Institute and Jewish Hospital at Washington University Medical Center, the facility is presently housed in the hospital's Kingshighway Building, but will be relocated in a larger new facility in 1985. Dedication of the department was held in conjunction with two

scientific lectures on December 6.

Dr. Wasserman received his medical training at the University of Rochester School of Medicine in New York. He interned at Strong Memorial Hospital in Rochester and served as resident and fellow at San Francisco Medical Center and the Zellerbach-Saroni Tumor Institute, Mt. Zion Hospital, also in San Francisco. Dr. Wasserman joined the Mallinckrodt staff in 1979.

#### Symposiums/Seminars/ Conferences/Meetings/ Workshops

Carlos A. Perez, M.D., attended the Fifth Cancer Congress of the Sociedad Columbiana de Cancerologia in Cartagena, Colombia, South America, July 20-24. He presented: "Treatment of Lung Cancer," "Radiobiology in Clinical Oncology," and "Recent Advances in Cancer," and participated in panel discussions on 'Non-Hodgkin's Lymphoma" and "Cancer of the Oral Cavity." For the XIII Interamerican Congress of Radiology, XI National Congress of Radiology, in Guadalajara, Mexico, Aug. 28-Sept. 1, Dr. Perez presented "Carcinoma of the Prostate." Dr. Perez also attended the VIII Peruvian Cancer Congress and First Latin American Congress of Clinical Oncology of the UICC in Lima, Peru, Sept, 18-22. He presented "Tumors in Children: Results of the Cooperative Study of the Treatment of Ewing's Sarcoma," "Present Status of Radiotherapy in Lung Cancer," "Hyperthermia and Irradiation in the Treatment of Malignant Melanoma," and "Future of Radiotherapy in the Treatment of Cancer."

#### Julia Hudson Freund Memorial Lecture

The second annual Julia Hudson Freund Memorial Lecture, which is held in recognition of meritorious research in clinical oncology, was presented in Mallinckrodt's Scarpellino Auditorium Nov. 10. Guest lecturer, Bernard Fisher, M.D., professor of surgery, director of the Cancer Adjuvant Therapy Center at the University of Pittsburgh Health Center, and one

of the world's most respected cancer specialists, spoke on "The Role of Science in the Evolution of Breast Cancer Management."

Dr. Carlos Perez, right, presents
Dr. Bernard Fisher, Freund Memorial
Lecturer, with a certificate from
Washington University recognizing his
meritorious research in clinical oncology.



# UPDATE

**Mokhtar H. Gado, M.D.**, attended meetings and made presentations as follows:

Postgraduate Course in Basic Review and Recent Advances in Neuroradiology and Head and Neck Radiology at Massachusetts General Hospital, Harvard Medical School, Boston, Sept. 26-30, "Anatomy and Functional Anatomy of the Cranium," "Metrizamide CT for Intracranial Structures," "Degenerative Lumbar Disc Disease—Anatomy and Pathology," and "Sellar and Persellar Region."

10th annual course on CT and NMR at Rush Presbyterian-St. Luke's Medical Center, Chicago, Oct. 13 and 14, "Correlation of Brain Anatomy and Function on CT," "CT of the Sinuses and Facial Bones," "Evaluation of Cranio-Facial Anomalies by CT," and "New Perspectives in CT of Spinal Stenosis."

American College of Radiology weekend symposium on computed body tomography in New Orleans, Oct. 15 and 16, "Spine."

Workshop on Diagnosis of Alzheimer's Disease, sponsored by the National Institutes of Health and the American Association of Retired Persons in Bethesda, Maryland, Dec. 4-7, "Neuroradiology in the Diagnosis of Alzheimer's Disease."

Sheri D. Henderson, Ph.D., presented "Interaction of Razoxane (ICRF 187) and Radiation on the Survival of Cultured 9L Rat Brain Tumor Cells" for the VIIIth International Congress of Radiation Research in Amsterdam, The Netherlands, July 3-8.

Bruce J. Walz, M.D., attended a conference, "Radiology in Baden-Baden," held in Baden-Baden, Germany, Sept. 11-16, where he presented "Interstitial Radioactive Implantation of Brain Tumors," a paper he coauthored with Joseph R. Simpson, M.D., D. Venkata Rao, M.D., Fred J. Abrath, Ph.D., J. A. Marchosky, M.D., and Harry Cole, M.D.

Bruce L. McClennan, M.D., served as program chairman and moderator of the symposium on loxaglate, a new low osmolality contrast medium, held in Scottsdale, Arizona, Sept. 20-21.

Daniel R. Biello, M.D., presented a lecture, "Aerosols in the Diagnosis of Pulmonary Embolism," at a meeting of the Royal College of Physicians and Surgeons in Calgary, Alberta, Canada, on Sept. 22, 1983.

Mark A. Green, M.D., presented "Salicylimines as Chelating Agents for the Preparation of Gallium and Indium Radiopharmaceuticals" for a meeting of the Missouri Valley Chapter of the Society of Nuclear Medicine held in Omaha, Nebraska, Sept. 24-25.

Louis A. Gilula, M.D., presented a refresher course on Ewing's Sarcoma at the International Skeletal Society meeting in Geneva, Switzerland, on October 3-8.

Michael W. Vannier, M.D., presented "Computers and Graphics in the Delivery of Health Care Services" for the International Conference and Exposition, "Defense Computers—Graphics '83," held in Washington, D.C., Oct. 10-14. And for the Second Annual Pacific Northwest Computer Graphics Conference, sponsored by the University of Oregon and held in Eugene, Oregon, Oct. 24-25. Dr. Vannier spoke on the use of graphics, CT scans, and computers for surgical planning.

G. Leland Melson, M.D., presented "Efficient 3-Dimensional Surface Reconstruction from Real Time B-Mode Sonograms" at the annual meeting of the American Institute of Ultrasound in Medicine in New York, N.Y., Oct. 19. William A. Murphy, M.D., presented "Forensic Radiology" for the Medico-legal Death Investigator Training Course at St. Louis University School of Medicine on Oct. 3, and "Nuclear Magnetic Resonance Imaging" for the Merck, Sharp and Dohme Rheumatology faculty meeting in Tucson, Arizona, on Oct. 15. For the Rheumatology Update/1983 at Brookwood Medical Center in Birmingham, Alabama, on Oct. 21, Dr. Murphy presented "The Radiologist's Role in Diagnosing Arthritis."

#### Sabbatical Abroad

Alexander N. Nakeff, Ph.D., associate professor of cancer biology and director of the flow cytometry laboratory, recently returned from a year's sabbatical study in Europe supported by a Research Career Development Award from the U.S. National Heart. Lung and Blood Institute of the National Institutes of Health and by Mallinckrodt Institute of Radiology. From August 1982 through April 1983, Dr. Nakeff served as visiting professor for the clinical oncology and radiotherapeutics unit at Cambridge University and the Medical Research Council in Cambridge, England. Then he began a visiting professorship for the department of hematology St. Radboudzeikenhaus, University of Nijmegen, The Netherlands, that continued through August 1983. Dr. Nakeff also served as visiting professor for a seminar on "Cytokinetic Analysis of Megakaryocytic Cell Development by Fluorescence-activated Cell Sorting" presented by INSERM in Paris, France, on June 21, 1983, and attended the 12th annual meeting of the International Society for Experimental Hematology in London, England, July 11-14.

# NEWS

#### **Appointments**

Barry A. Siegel, M.D., professor of radiology and director of the MIR division of nuclear medicine, has been appointed an American Medical Association (AMA) representative on the Residency Review Committee for Nuclear Medicine. The committee, which is comprised of representatives from both the AMA and the American Board of Nuclear Medicine, plays an important role in maintaining the quality of graduate medical education in the specialty of nuclear medicine. Dr. Siegel's two-year term will begin on Jan. 1, 1984.

Todd H. Wasserman, M.D., has been appointed to the Writing Group for the Syllabus for Radiation Therapy Resident Training Programs for the American College of Radiology Education Committee.

Alexander Nakeff, Ph.D., has been appointed to the editorial board of the International Journal of Cell Cloning.

Gilbert H. Nussbaum, Ph.D., has been appointed an associate director of the Hyperthermia Foundation, a private, non-profit, charitable organization supporting research in clinical hyperthermia. Dr. Nussbaum has also been appointed to the newly formed hyperthermia committee of the American Association of Physicists in Medicine, and to the hyperthermia subcommittee of the Radiation Research Society.

Dr. John W. Wong, assistant professor of radiation physics in radiology, has recently been appointed a research associate in the Biomedical Computer Laboratory (BCL) of the Washington University School of Medicine. Dr. Wong is collaborating with members of the BCL and its sisterinstitution, the Computer System Laboratory, in implementing a new approach to accurate 3-Dimensional dose calculation for radiotherapy treatment planning. Dr. Wong is the chief architect of the new method.

# Society of Uroradiology

Bruce L. McClennan, M.D., and Joseph K.T. Lee, M.D., attended the Society of Uroradiology meeting in San Francisco, Sept. 10-15. Dr. McClennan presented two papers, "The Digital Imaging Evaluation of the Renal Donor" and "Capillary Renal Cell Carcinoma—CT and Ultrasound Evaluation;" conducted a workshop on Digital Vascular Imaging; and presented a lecture entitled, "Digital Vascular Imaging (DVI) in Renal Disease". Dr. Lee presented "Imaging in Renal Failure" and conducted a postgraduate course workshop on Basic Renal Ultrasound.

#### Visiting Professor/ Guest Lecturer

**G. Leland Melson, M.D.**, presented "Imaging Evaluation of Renal Infections" for The Greater St. Louis Society of Radiologists on Sept. 20 and as visiting professor at the University of Vermont in Burlington on Oct. 21.

Joseph K.T. Lee, M.D., was visiting professor at the Medical College of Wisconsin at Milwaukee, Sept. 30-Oct. 1, and at Loyola Medical School in Chicago, Oct. 27-28, 1983.

Bruce L. McClennan, M.D., was visiting professor at the University of California San Diego and City Wide speaker for the San Diego Radiologic Society, Oct. 5-7.

Alexander Nakeff, Ph.D., was guest lecturer for the Symposium on Regulation of Cell Proliferation and Differentiation: Megakaryocytic Proliferation for the 12th annual meeting of the Reticuloendothelial Society held in Portland, Oregon, Oct. 11.

Gerald Edelstein, D.O., spoke on "Protrusio Acetabuli: Radiographic Appearance in Arthritis and Other Conditions" and "Radiographic Evaluation of Rib Abnormalities" as a member of the guest faculty for the 77th Annual Convention and Educational Program of the Vermont State Association of Osteopathic Physicians and Surgeons in Burlington, Vermont, Oct. 5-6. Dr. Edelstein also spoke on "A Radiographic Spectrum of Rib Lesions" as visiting professor in the department of radiology at the University of Vermont School of Medicine on Oct. 6.

Louis A. Gilula, M.D., was visiting professor at George Washington University in Washington, D.C., Oct. 12-14. He presented "CT of the Musculoskeletal System," "CT of the Foot," "Radiology of Ewing Sarcoma," "Radiologic Evaluation of Complex Carpal Trauma," and "Percutaneous Bone Biopsy."

William A. Murphy, M.D., was visiting professor for the department of radiology of the University of Alabama in Birmingham on Oct. 20. He presented "Radiography and Arthrography of Temporomandibular Joint Dysfunction" and "The Radiograph as a Window to the Pathophysiology of Inflammatory Arthritis."

#### **Media Interviews**

Gilbert H. Nussbaum, Ph.D., was interviewed on the subject of hyperthermia by National Public Radio's "All Things Considered" on July 9. Dr. Nussbaum has also made a video cassette entitled "Safe and Effective Administration of Clinical Hyperthermia" with the National Center for Devices and Radiological Health to be distributed both nationally and abroad.

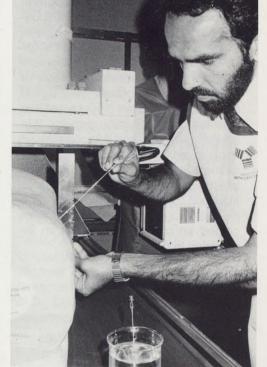
Jeanne Evans, Barnes Hospital volunteer, discussed the Cancer Information Center on a segment of "Gloria Sawyer's Journal" aired on KSD-AM Radio, Sept. 25.

# UPDATE

#### **Continuing Education Seminars**



During the laboratory session at MIR, Dr. Baljij Sidhu, Hopewell, Virginia, locates lumbar disc space before injecting cymopapain. Dr. James W. Serene, Statesville, North Carolina, foreground, and Mark McClane, R.T., MIR, observe.



Dr. Sidhu uses specially designed ruler to calculate the disc space.

#### **Intradiscal Therapy**

Mallinckrodt Institute of Radiology provided the laboratory facilities and x-ray equipment for an intensive one-day training seminar, Sept. 10, on the use of chymopapain in intradiscal therapy for lumbar disc disease. The program was directed by Lee T. Ford, M.D., associate professor of orthopedic surgery, and was sponsored by the WUMC division of orthopedic surgery and the office of continuing medical education. Restricted to orthopedic and neurological surgeons and residents, the course was designed to provide specialized hands-on experience for physicians to learn proper technique for lateral needle placement in the lumbar discs. After a morning of lecture sessions, the 120 participants moved to Mallinckrodt Institute to rotate through laboratory sessions in which they used x-ray control with life-size manikins made of clear and opaque plastic to practice technique.

#### Low Back and Sciatic Pain

Staff of Mallinckrodt Institute served as faculty members for a symposium, "Low Back and Sciatic Pain: Evalua-

tion and Treatment," held Dec. 9-10 in the Medical Center. Lee T. Ford, M.D., was program chairman of the course designed for practicing physicians interested in the special diagnostic studies useful in patients with problem cases of low back and sciatic pain. Mallinckrodt participants were as follows:

"Radiographic Examination of the Lumbosacral Spine," Louis A. Gilula, M.D.

"CAT Scan of Lumbosacral Spine," Mokhtar H.Gado, M.D.

"Lumbar Myelography," Fred J. Hodges, M.D.

"Bone Scanning of the Lumbosacral Spine," Barry A. Siegel, M.D.

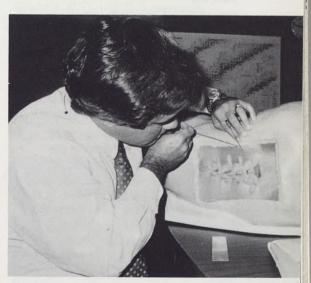
"Lumbar Facet Injections: Indications, Technique, and Clinical Correlation," Judy M. Destouet, M.D.

"Nuclear Magnetic Resonance: Its Future Role in Diagnosis of Low Back Pain," William A. Murphy, M.D.

"Percutaneous Spinal Biopsy for Tumor and Infection in the Lumbosacral Spine," Louis A. Gilula, M.D.

"X-ray Diagnosis of Spinal Stenosis," Mokhtar H. Gado, M.D.

"Arachnoiditis, Secondary to Intraspinal Injections," Charles L. Abramson, M.D.



Dr. Joe Mesa, Madison, Indiana, uses the partially injected needle on right as a guide for directing second needle into disc space.

continued on page 17

### 69th Annual RSNA

The Radiological Society of North America held its 69th Scientific Assembly and Annual Meeting in Chicago, November 13-18, 1983. Over 25,000 attended the six-day program, which included sessions in joint sponsorship with the American Association of Physicists in Medicine, and collaborative programming in radiation oncology with the American Society of Therapeutic Radiologists. The program offered more than 160 refresher courses, 800 scientific papers, 250 scientific exhibits, and 380 commercial exhibits representing new research of ultimate benefit to patient diagnosis or treatment. Nearly 4,000 participants attended the special programming on Nuclear Magnetic Resonance that included an opportunity to visit an installation in operation.

#### **SCIENTIFIC SESSIONS**

#### **Program Committee**

Therapeutic Radiology and Radiobiology, **John M. Bedwinek**, **M.D.** 

Nuclear Medicine, Barry A. Siegel, M.D., chairman

Physics, Glenn P. Glasgow, Ph.D., (AAPM)

"Digital Urography with a 25 cm Image Intensifier," **Bruce L. McClennan**, **M.D. Philip Weyman**, **M.D.**, **Michael W. Vannier**, **M.D.** 

"Intravenous Cholangiography in the CT Era," Kenneth S. Rholl, M.D., Ralph L. Smathers, M.D., Bruce L. McClennan, M.D.

"Radiation Therapy Alone in the Management of Carcinoma of the Uterine Cervix: Twenty Years' Experience;" Carlos A. Perez, M.D., John M. Bedwinek, M.D., Bruce J. Walz, M.D., H. Marvin Camel, M.D., Ming-Shian Kao, M.D., Andrew E. Galakatos, M.D., William E. Powers, M.D.

"The Utility of the Lung/Heart Ratio in Patients with Thallium-201 Scans without Perfusion Depth;" Bharath Kumar, M.D., Richard L. Wahl, M.D., Daniel R. Biello, M.D., and Thomas R. Miller, M.D. "Clincal Outcomes of Patients with 'Low Probability' Ventilation-Perfusion Scintigrams," Bharath Kumar, M.D., Daniel R. Biello, M.D., Barry A. Siegel, M.D., and Marie E. Lee, M.D.

"High Resolution Ultrasonography of Adenomatous (Nodular) Hyperplasia of the Thyroid," **Bharath Kumar**, M.D., **Harvey S. Glazer**, M.D., G. **Leland Melson**, M.D., **Joseph K.T. Lee**, M.D., and **Thor Amundsen**, M.D.

"Efficient 3-Dimensional Surface Reconstruciton from Real Time B-Mode Sonograms," Michael W. Vannier, M.D., G. Leland Melson, M.D., and Jean Y. Barbier.

"Computed Tomography in the Evaluation of Patients Following Esophagogastrectomy," Jay P. Heiken, M.D., and Dennis M. Balfe, M.D.

"Computed Tomography in the Evaluation of the Postpancreatectomy Patient," Jay P. Heiken, M.D., Daniel Picus, M.D., and Dennis M. Balfe, M.D.

"Laminal Fragmentation: A Valuable Sign of Lumbar Isthmus Defect," Mary Ellen Amato, M.D., Louis A. Gilula, M.D., William G. Totty, M.D.

"Detection of Colonuic Inflammatory Disease of Childhood by Double-and Single-Contrast Radiography," James D. Winthrop, M.D., Marilyn J. Siegel, M.D., Dennis M. Balfe, M.D., Gary D. Shackelford, M.D., and William H. McAlister, M.D.

"Diagnosis and Prognostic Evaluation of Hypoxic-Ischemic Encephalopathy in Full-Term Infants by Cranial Sonography," Marilyn J. Siegel, M.D., Gary D. Shackelford, M.D., Jeffrey M. Perlman, M.D., Kokhtar H. Gado, M.D.

"Elbow Arthrography: A More Complete and Necessary Appraoch?" Michael Teng, M.D., Louis A. Gilula, M.D., William A. Murphy, M.D., Judy M. Destouet, M.D., Gerald Edelstein, D.O., Barbara Monsees, M.D., William G. Totty, M.D. "Ankle Tenography: A Key to Unexplained Symptomatology," Michael Teng, M.D., Judy M. Destouet, M.D., Robert O. Cone III, M.D., Louis A. Gilula, M.D., Donald Resnick, M.D., Lawrence Oloff, D.P.M., Richard Caputi, D.P.M., Allen Jacobs, D.P.M., Murray Solomon, M.D.

"Postlaryngectomy Computed Tomography: Normal and Pathologic Anatomy," David J. DiSantis, M.D., Dennis M. Balfe, M.D., Stuart S. Sagel, M.D., Donald Sessions, M.D., Philip J. Weyman, M.D., Joseph K.T. Lee, M.D., Joseph Ogura, M.D., Richard Hayden, M.D.

"Nonselective Digital Coronary Arteriography," James P. Neeley, M.D., Michael W. Vannier, M.D., Philip A. Ludbrook, M.D., Fernando R. Gutierrez, M.D.

"Ascending Aortic Appendage: A Pitfall of Mediastinal CT," Dixie J. Aronberg, M.D., Harvey S. Glazer, M.D., R.R. Peterson, Ph.D., Ralph L. Smathers, M.D., Stuart S. Sagel, M.D.

"Inhomogeneous Ventricular Filling in Hypertrophic Cardiomyopathy Detected by Radionuclide Ventriculography;" Gilbert A. Hurwitz, M.D., Tom R. Miller, Ph.D., M. D., Daniel R. Biello, M.D., Philip A. Ludbrook, M.D.

"Digital Filtering of the Gated Cardiac Blood-Pool Study," Tom R. Miller, Ph.D., M.D., Kenneth J. Goldman, K.S. Sampathkumaran, M.D., Douglass F. Adams, M.D.

"Computer-Assisted Instruction in Radiology," Dixie J. Aronberg, M.D., Stephen S. Rodewald, M.A., R. Gilbert Jost, M.D. Therapeutic Radiology session, Carlos A. Perez, M.D., presiding.

#### **REFRESHER COURSES**

Refresher Course Committee, Stuart S. Sagel, M.D.

"Computer Tomography of the Retroperitoneum," **Joseph K.T. Lee, M.D.** 





"Radiology of Hydrocephalus;" Mokhtar H. Gado, M.D.

"Computed Tomography of the Thorax: Anatomy and Pathology of the Mediastinum and Lung;" Stuart S. Sagel, M.D.

#### **CATEGORICAL COURSES**

"Therapy of Central Nervous System Tumors," James E. Marks, M.D., and Melvin L. Griem, M.D., coordinators.

"Neuroradiologic Imaging of Brain Tumors," **Mokhtar H. Gado, M.D.** 

"The Value of Radiation Therapy for Brain Tumors," James E. Marks, M.D., Glenn E. Sheline, M.D., Ph.D., Melvin L. Griem, M.D.

"Cerebral Radionecrosis and the Effects of Radiation on Cranial Soft Tissues," James E. Marks, M.D., and Robert J. Baglan, M.D. "Complications and Late Effects of Irradiation of Brain Tumors," James E. Marks, M.D., and Barbara F. Danoff, M.D.

#### **PANEL DISCUSSION**

Symposium on "Total Body Irradiation," **Glenn P. Glasgow, Ph.D.**, presiding.

#### **WORKS IN PROGRESS**

"Intracranial Iridium-192 Therapy-CT Guided Implantation," Christopher J. Moran, M.D., J. Alexander Marchosky, M.D., Joseph R. Simpson, M.D., F. Alrath, Ph.D.

"Early Results of Central Nervous System Tumors Volumetrically Implanted with Iridium 192," Christopher J. Moran, M.D., J. Alexander Marchosky, M.D., Joseph R. Simpson, M.D., F. Alrath, Ph.D. MIR scientific exhibits at RSNA.

#### **SCIENTIFIC EXHIBITS**

Scientific Exhibit Committee, James E. Marks, M.D.

"CT and the Foot and Ankle: Anatomy and Clinical Applications," Murray A. Solomon, M.D., Louis A. Gilula, M.D., Lawrence Oloff, D.P.M., Joan Oloff, D.P.M., Allen Jacobs, D.P.M., Terry Compton, R.T.

"Ewing Sarcoma: Radiographic Evaluation and Prognostic Features in the Intergroup Ewing Sarcoma Study (IESS)," Louis A. Gilula, M.D., William R. Reinus, M.D., Norbert J. Liebsch, M.D., Mary Faulkes, Ph.D., Patrick Thomas, M.D.

"Ankle Tenography: A Key to Unexplained Symptomatology," Michael Teng, M.D., Judy M. Destouet, M.D., Robert O. Cone III, M.D., Louis A. Gilula, M.D., Donald Resnick, M.D.

"Implementing a Radiology Information System," Ronald L. Arenson, M.D., R. Gilbert Jost, M.D., Harvey J. Berger, M.D., Joseph N. Gitlin, D.P.H., Robert A. Greene, M.D., Ph.D. Lawrence Moss, M.D.

"Multispectral Analysis of NMR Imagery," Michael W. Vannier, M.D., Robert L. Butterfield, B.S., Douglas Jordan, B.S.E.E., William A. Murphy, M.D., Robert G. Levitt, M.D., Mokhtar H. Gado, M.D.



RSNA Washington University Medical Center Alumni Reception





# NEWS UPDATE

#### **News Conference**

Gilbert H. Nussbaum, Ph.D., was selected by the American Institute of Physics to speak to and answer questions on hyperthermia from the media in New York City, Dec. 14, and Washington, D.C., next April.

#### **Alumni News**

David E. Perkins, M.D., (56-59), was named a fellow of the American College of Radiology during the annual meeting of the ACR in Denver, Sept. 26-29. Dr. Perkins is a member of the board of directors of the Missouri State Radiological Society, past president of the Greater St. Louis Society of Radiologists, and since 1964, has been a member of the Scott Radiological Group, Inc. of St. Louis.

#### **Grand Rounds**

Gilbert H. Nussbaum, Ph.D., delivered a lecture on the physical aspects of clinical hyperthermia at Plastic Surgery Grand Rounds, Oct. 18.

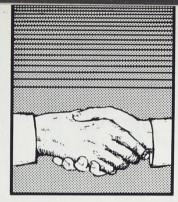
#### **Oncology Update**

"Oncology Update," a clinically oriented seminar on current concepts in the management of cancer, is sponsored annually by the division of radiation oncology of Mallinckrodt Institute of Radiology, St. Luke's Hospitals, and the office of continuing medical education of Washington University School of of Medicine. This year's program, "Supportive Care of Patients with Cancer," was presented Nov. 11 at St. Luke's West and focused on the particular problems of nutrition, pain control, surgical care, and psychosocial support of cancer patients. MIR staff members, Carlos A. Perez, M.D., professor of radiology and director of the division of radiation oncology, and Bruce J. Walz, M.D., associate professor of radiology, served on the program committee and participated in the seminar with other faculty members and distinguished guest lecturers chosen for their expertise in patient care.

### **Twelth Annual Wendell Scott Lecture**



The twelfth annual Wendell Scott Lecture was presented on September 12, 1983, in Scarpellino Auditorium. Pictured beneath Dr. Wendell Scott's portrait in the MIR lobby are the lecturer, John C. Shepherd, J.D., center, with Mrs. Scott and Dr. Ronald G. Evens.



# Team Care In Radiation Oncology

# The Wave of the Present

"The secret of care of the patient is in caring for the patient."—Francis Peabody

Not so many years ago, a diagnosis of cancer usually meant two things: radical surgery and, frequently, death despite the surgeon's intervention,

"Today, we are using the word 'cure' with more confidence," says Dr. Carlos A. Perez, director of Mallinckrodt's division of radiation oncology. "Ten years ago, 30 percent of the patients with cancer were cured. Now, we cure about half of the patients we treat. For example, with radiation therapy as a mainstay, we have achieved particular success in the management and curability of Hodgkin's disease, gynecological tumors, early cancer of the breast,

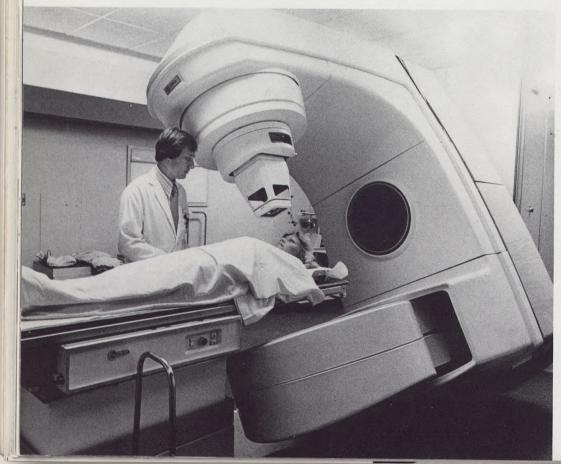
some tumors of the head and neck, and skin cancer. But these optimistic cure rates still depend on early diagnosis. The earlier we detect cancer, the better we are able to treat it."

Cancer is a very complex disease. It is actually more than 100 different diseases, each of which needs individualized strategy. It is exactly this individualized care that is provided by Mallinckrodt's 150-member radiation encology team. These health care professionals, each with a different role to play, share a common goal—curing the disease and returning the patient to his or her normal activities.

Cancer management involves individual or collective use of three oncology disciplines: surgery, chemotherapy, and radiation. Patients referred to Mallinckrodt for radiotherapy are treated in spacious, comfortable surroundings on the ground level of MIR with state-of-the-art equipment unsurpassed in any cancer center in the country.

#### **Treatment Facilities**

Five megavoltage radiation therapy units (ranging from 4 to 35 million electron volts (MeV)) offer a wide variety of sharply defined beams which penetrate deep into the tumor tissue without damaging healthy surrounding tissue. Safeguards within each machine minimize risks and side effects. At the hub of the clinical area are computers, MeV control consoles, three therapy simulators, and examination and viewing rooms. Separate inpatient and outpatient waiting areas offer privacy and facilitate work flow. Balancing this "high tech" atmosphere is the "soft touch" of the radiotherapy team.







#### The Team

The radiation oncologist, a physician with four years of specialized training in the nature of cancer and the effects of radiation on the body, heads the team. Before radiation treatment begins, the patient is thoroughly examined by one of twelve radiation oncologists on the MIR staff. After evaluation of the patient's general condition and the extent of the tumor, aggressive treatment begins.



Clinical aides assist the radiation oncologist during examinations and with other daily activities. From the first day, these care givers act as liaison personnel between patient and physician, relating to each patient on a warm and friendly first-name basis.



Treatment planning is next. Working in close collaboration with the physicians, is a large and competent radiation physics staff headed by Dr. James A. Purdy. In addition to designing effective treatment plans, they carefully monitor the equipment. Dosimetrists are trained to calculate the correct radiation dose for each patient and precisely define the area to receive that dose.

Radiation therapy technologists also play a pivotal role, taking responsibility for scheduling treatments, operating the machines, and checking results. "Our technologists must be especially attuned to the feeling of patients experiencing radiation treatments for the first time," says Betty James, R.T.T., technical supervisor, "the red marks on the skin (outlining boundaries of the treatment

area), the feeling of isolation they may experience when alone in the treatment room. We must be equally sensitive to the anxieties of those patients who are returning for treatment after a period of remission. As



treatment continues, we constantly monitor the patient's progress, remaining alert to any adverse side effects. It is important that we report any changes to the appropriate medical personnel."



"The oncology nurses handle the patient's acute medical needs such as local pain control, instructing patients and families in tube feeding, and alleviating skin problems," says Shirley Davis, R.N., nursing supervisor. "Sometimes, it's hard for the

family to be supportive of the patient and we on the staff become their support system." In a dual role, MIR nurses also manage nearly fifty protocol research studies on lung, breast, and pediatric cancer. These studies, involving hundreds of patients, represent the division's strong commitment to finding the best possible treatment for specific diseases and increasing the number of long-term survivals.



**Residents**, physicians being trained in the specialty of radiation therapy, add another dimension to the con-



centrated care and **dieticians** are regularly available to advise patients on maintaining optimum nutrition. Weight loss, the most common experience shared by cancer patients, makes a proper diet very important in the success of radiation therapy.

#### **MIR Research**

The MIR **researcher** plays an indispensable role in improving the lives of cancer patients. At present, six independently funded biological research projects are underway within the division of radiation oncology. "Our primary goals are finding the causes of cancer, better ways to treat



the disease, and ways to prevent it," says Dr. Perez. "What we learn here must be gotten out into the community and to the nation."

Since cancer is fundamentally a disease of the cell, basic cellular research is mandatory if cancer is to be understood and treated effectively.



Dr. Alexander Nakeff, cancer biologist, is investigating the production of platelets in bone marrow. With the use of a flow cytometer, a revolutionary cell separation instrument, he can produce substantially pure populations of cancer and normal cells in his study of the precursor cells of platelets. Dr. Gary Van Zant's area of research involves red blood cell production in bone marrow and its regulation by hormones.

Another promising area of research is hyperthermia. Dr. Perez and Dr. Bahman Emami are directing three nationwide studies dealing with the treatment of cancer patients with radiation combined with hyperthermia. They, in conjunction with Drs. Gilbert Nussbaum and Ronald Johnston, physicists, are exploring how heat and radiation affect blood flow in normal and cancerous tissues as well as ways to optimize treatment techniques.



Dr. Hsiu-san Lin is collaborating with other scientists and physicians in Washington University research on bone marrow transplantation. Both research biologist and clinician, Dr. Lin has been studying for over ten years the effects of radiation and cancer chemotherapy agents on both bone marrow stem cells and tissue microphages. "Two sources of bone marrow cells are used in this method," says Dr. Lin. "In autologous transplant, we remove healthy bone marrow cells from a cancer patient in remission, store them in a freezer, and then return them to the patient if cancer returns. Healthy bone marrow is essential for blood production but also very susceptible to many of the chemotherapy drugs used to fight cancer. In allogenic bone marrow tranmsplantation, we use bone marrow cells from related donors. Under this treatment program, we give intense chemotherapy and radiation to kill

tumor cells within the body," says Dr. Lin. **Dr. Glenn Glasgow**, medical physicist, assists with the treatment planning to insure a uniform distribution of the radiation. When the combined treatment is completed, the healthy bone marrow cells are transplanted by a process similar to blood transfusion. In several weeks, the body begins to produce normal blood cells. "Transplants are proving increasingly beneficial to patients who have leukemia and lymphoma and who have failed conventional therapy," states Dr. Lin.

Finding better methods of treating children with cancer is another focus of MIR research. A member of the National Wilms' Tumor Study Committee, **Dr. Patrick Thomas** says, "As the Wilms' tumor is curable in about 80 percent of all children, the national study seeks methods of refining therapy and keeping it effective while retaining toxicity." With child psychologists at St. Louis Children's Hospital, Dr. Thomas is also studying long-term effects of radiotherapy on children cured of brain tumors.

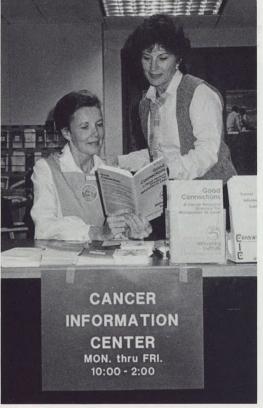
"We are branching into non-therapeutic avenues of research," states Dr. Perez, "studying the psychological and sociological results of cancer on the patient and the patient's family. We are focusing on the quality of survival. When we cure or prolong the life of a patient with cancer, we want to see that those additional years of life are comfortable, useful, and productive years."



#### Psychological and Sociological Support

Along with treating the disease, it is especially important to the cancer patient that someone be available to inform, counsel, and at times, simply listen.





The radiation oncology staff includes a full-time social worker, whose office is directly adjacent to the treatment area and who is always available to discuss the non-physical aspects of cancer. Rebecca Banks, ACSW, points out, "Patients and their family and friends typically have a broad range of feelings which range from fear of abandonment and isolation to denial, anger, and fear of death. They need time to come to grips with their illness. Patients must also deal with a variety of financial, practical, and interpersonal problems. Part of my work is to help patients feel less out of control by giving them information and the opportunity to talk over their concerns—either with me on an individual basis or with other team members in weekly classes," says Ms. Banks. "If a patient learns the language of cancer and understands the medical aspects of the disease, he or she feels less overwhelmed and is better able to cope with the daily aspects of living with cancer. We have found that attitudes of patients have a great deal to do with their response to treatment and the prognosis for recovery."

A second means of "treating" the patient's informational and psychological needs is the **Cancer Information Center** (CIC). Co-sponsored by the division of radiation oncology and Barnard Free Skin and Cancer Hospital, the center offers a unique service to the cancer patient and the general public. Staffed by caring volunteers, some of them former patients themselves, the CIC contains a vast array of free information about the many kinds of cancer, ways of treating it, and methods of coping with feelings so common to cancer patients.

In summary, Dr. Perez says, "The corps of personnel within Mallinckrodt's division of radiation oncology has made a commitment to meet each patient's specific needs. In this way, we provide total care."

### Steve Copes With Cancer...

Steve Molho at MIR

Steve Molho was 17; popular, all-around good student, captain of the cross country track team. Life was a happy mix of studies, sports, and social activities at John Burroughs School in Ladue. Then one crisp, clear night in the fall of 1979, Steve intended to join friends at progressive Halloween parties. Instead, he found himself lying on a stretcher in the emergency room of St. Luke's Hospital, suffering from a disabling headache.

During the following week of testing, a CT scan revealed the anterior lobe of the pituitary gland was appreciably enlarged. The attacker—a pituitary adenoma. Steve was scared. Life had become something never anticipated.

The medical team moved quickly and in early November, surgery was performed to remove the tumor. Meanwhile, his family members waited in a hospital room nearby and the headmaster of Burroughs led the student body in prayer for Steve's recovery. The surgery was a success and Steve re-entered Burroughs in January 1980. He resumed his sports activities and worked hard to make up the academic requirements of the first trimester. Steve graduated with his class in 1981.

On the surface, life was normal again. In reality, Steve had been deeply touched by the experience. His initial fear had become courage and understanding. His routine acceptance of advantages and opportunities was replaced with exceeding gratitude for the gift of life. His family relationships had been heightened. He found in his mother, resources of strength never before tapped. He was now determined to become a physician.

The fall of 1981, Steve began premedicine studies at Grinnell College in lowa. He studied hard and made good grades during the next two





years. In May 1983, Steve went in for his periodic check-up. Reviewing the CT scans, the radiologist found that the pituitary gland was enlarged—the tumor had returned. The threat was real: possible loss of vision and the tumor continuing to grow.

The struggle began again—consultations, more testing, and on July 21st, microscopic surgery was performed. The tumor was cut back but no facial scars were left. A month later, Steve began six weeks of radiation therapy treatments at Mallinckrodt Institute of Radiology. During the remainder of the hot summer, Steve developed lasting friendly relationships with everyone involved in his treatment. The oncology team

was supportive and cheerful.

On the last day of treatment, Steve said, "Dr. James Marks, my oncologist, has been fantastic-always taking time to explain or answer any of my questions. The nurses and techs, everyone on the team, have been open, honest, and friendly. I'm going to miss seeing them every week. I've had no bad side effects from the radiation treatments, maybe a little fatigue. When people ask about the red lines on my face, I just say, 'It's a pledge prank.' I just feel very lucky that medicine has advanced to the point where a person can be cured. My experience has helped me to understand what patients go through. What they need from a physician is not only medical expertise, but lots of patience and understanding."

While Steve has finished his treatments, there'll still be periodic checkups. His expectations are optimistic yet realistic; a watchful eye must be kept. As to plans for the future, "I've lined up two jobs and plan to work until I go back to college in January next year. Now, I just want to get on with things." And, that means life.

#### **ASTR**

The 25th Annual Scientific Meeting of the American Society of Therapeutic Radiologists, the largest society of radiation oncologists in the world, was held in Los Angeles, October 3-7, 1983. MIR radiation oncology staff members made presentations as follows:

Carlos A. Perez, M.D., ASTR president, introduced the 1983 president, Samuel Hellman, M.D., and presented the ASTR Gold Medal to Mortimer M. Elkind, M.D.

#### **SCIENTIFIC SESSIONS**

"Cobalt-60 Plaque Therapy for Choroidal Melanomas," D. Venkato Rao, M.D., and Glenn P. Glasgow, Ph.D.

"Parotid Carcinoma: Impact of Postoperative Radiation," **D. Venkato Rao, M.D.** 

"Clinical Results with Irradiation and Local Microwave Hyperthermia in Cancer Therapy," Carlos A. Perez, M.D., Bahman Emami, M.D., Gilbert H. Nussbaum, Ph.D., Debbie Von Gerichten, R.N., Leonid Leybovich, B.S., and Linda Smith, R.N. "Carcinoma of the Uterine Cervix."

"Carcinoma of the Uterine Cervix," Carlos A. Perez, M.D., and John M. Bedwinek, M.D.

"Misonidazole Sensitized Radiotherapy Plus BCNU Compared to Radiotherapy Plus BCNU for Treatment of Malignant Glioma in a Randomized Clinical Trial," Todd H. Wasserman, M.D.

"Treatment of Stage I Adenocarcinoma of the Endometrium by Hysterectomy and Adjuvant Irradiation: Prognostic Factors and Sites of Failure," Steven H. Stokes, M.D., John M. Bedwinek, M.D., and Carlos A. Perez, M.D.

"Preliminary Results of the Phase I Trial of the Hypoxic Cell Radiosensitizer SR-2508," **Todd H. Wasserman, M.D.** 

Moderator of session on the "Ovary," John M. Bedwinek, M.D.

"Postoperative Irradiation in Carcinoma of the Prostate," Miljenko V. Pilepich, M.D., and Bruce J. Walz, M.D.

"Preoperative Irradiation in Two Schedules for Rectal Cancer," **Bruce J. Walz, M.D., Sherry Breaux, B.S.,** and **Mary Ann Hederman.** 

"Moderator of session on "Lung/ Phototherapy," Joseph R. Simpson, M.D. "Palliative Radiation Therapy in Inoperable Cancer of the Lung: Final Report on RTOG Protocol 73-02," Joseph R. Simpson, M.D., D. Venkato Rao, M.D., and Carlos A. Perez, M.D.

"Toxicity Associated with Adjuvant Postoperative Therapy for Adenocarcinoma of the Rectum," **Patrick R. M. Thomas, M.D.** 

#### **REFRESHER COURSES**

"Carcinoma of the Larynx," James E. Marks, M.D.

"The Technique of Tumor Excision and Irradiation for Stage I and II Breast Cancer," John M. Bedwinek, M.D.

"Radiation Therapy Planning," James A. Purdy, Ph.D.

"Clinical Applications of Local Hyperthermia," Carlos A. Perez, M.D.

#### **POSTERS**

"Results of Treatment for Wilms' Tumor Before and After the Introduction of Systematic Chemotherapy," John W. Clouse, M.D., Patrick R. M. Thomas, M.D., and Carlos A. Perez, M.D.

"Performance of Rotational Treatment Planning by Several Dedicated Commercial Computers," Julia E. Bello, M.Sc., Frederick G. Abrath, Ph.D., and Bruce J. Walz, M.D.

"Effective Angle Method for Calculation of Dose for Electron Beam Arc Therapy," Russell L. Gerber, B.S., James A. Purdy, Ph.D., and John W. Wong, Ph.D.

"Evaluation of a New Tissue Compensator System: Dosimetry and Practical Aspects," Sheri D. Henderson, Ph.D., Russell L. Gerber, B.S., and James A. Purdy, Ph.D.

"A New Method for Accurate Three Dimensional Photon Dose Calculation," James A. Purdy, Ph.D., and John W. Wong, Ph.D.

"Unexpected Similarities of Intellectual Dysfunction Between Children Treated for Medulloblastoma and Cerebellar Astrocytoma," John W. Clouse, M.D., and Patrick R. M. Thomas, M.D.

"Angiotensin-I-Converting Enzyme Levels in the Serum of Lung Cancer Patients," **Sheri D. Henderson, Ph.D.** 

#### **ASRT SECTION**

"Hyperthermia Today" Promises and Problems," **Bahman Emami, M.D.** 

#### **AAPM**

The American Association of Physicists in Medicine held its 25th annual meeting and exhibition in New York, New York, July 31—Aug. 4, 1983. The AAPM, which was founded in 1958, "promotes the application of physics to medicine and biology and encourages interest and training in medical physics and related fields." Members of the staff of Mallinckrodt Institute of Radiology who participated in the scientific program are:

#### **SCIENTIFIC SESSIONS**

"Effective Angle Approximation for Calculation of Dose for Electron Beam Arc Therapy," Russell L. Gerber, James A. Purdy, Ph.D., and John Wai-Chiu Wong, Ph.D.

"Multiple-Antenna Applicators for Microwave-Induced Local Hyperthermia," Gilbert H. Nussbaum, Ph.D., and Leonid Leybovich.

"Evaluation of a New Tissue Compensator System: Dosimetry Aspects," Sheri D. Henderson, Ph.D., James A. Purdy, Ph.D., and Russell L. Gerber.

"Implementation and Verification of a New CT Based 3-Dimensional Photon Dose Calculation Algorithm," John Wai-Chiu Wong, Ph.D., James A. Purdy, Ph.D., E. Slessinger, D. Stein, and F. Rosenberger.

#### **SCIENTIFIC SYMPOSIUMS**

"Technical Requirements of Precision Radiation Therapy: Dose Computation and Treatment Planning," **James A. Purdy, Ph.D.** 

#### REFRESHER COURSES

"Problems and Progress with the Administration of Clinical Hyperthermia." Gilbert H. Nussbaum, Ph.D.

"Quality Assurance of Radiation Therapy Treatment Units," **James A. Purdy, Ph.D.** 

#### **PAPER EXHIBITS**

"The Use of CT 'Scout Views' for Localization of Iridium-192 Seeds in Large Volume CT Assisted Brain Implants," Frederick G. Abrath, Ph.D., and Julia Bello, M.S.

"Radiation Protection Problems Associated with Large Volume CT Positioned Ir Brain Implants," Julia Bello, Frederick G. Abrath, Ph.D., James R. Simpson, M.D., Christopher J. Moran, M.D., and J. Marchosky.

### The Challenge Recalled

St. Louisan
Finishes 45th

Special to the Post-Dispatch

KAILUA-KONA, Hawaii — St.

Louisan Dr. Evan Unger finished in 45th place here Saturday in the seventh annual Ironman Triathlon World Championship.

Dr. Unger

Saturday, October 22nd, at 7:00 a.m., 1,100 athletes wearing bright orange caps and goggles plunged into the Pacific Ocean off the coast of Hawaii to swim 2.4 miles. Following the swim, they bicycled 112 miles and ran a 26.2 mile marathon. Here is Dr. Evan Unger's recollection of the seventh annual Ironman Triathlon World Championship:

"The start of the swim was congested and hectic. After the first several hundred yards, people spread out and

I was able to relax and concentrate on my stroke. The remainder of the swim was pleasant. I was 215th out of the water and excited to hop on my bike. Bicycling is my best event and I expected it to be relatively easy. Thirty miles out, the wind increased to 40 then 60 miles per hour. It was like riding into a wall. As luck would have it, the wind changed direction on the way back so that most of the ride was into a headwind. At the end of the ride, I was in 49th place. My feet were a mass of blisters and bruises from pedalling into all that wind."

"It hurt to run and I half way wanted to give up. Thinking of my supporters at Mallinckrodt increased my determination and I finished in 10 hours and 50 minutes for 45th place."

"Finishing the Ironman Triathlon and placing well represents an exciting physical challenge to me. I am pleased with my 45th place finish. The field of competitors was much better than in the event two years ago. Many of the competitors have mastered all three sports. They are not simply runners, bikers, or swimmers. They



Dr. Unger finishes in 10 hours, 50 minutes, bettering his 67th-place finish of last year.

are now triathletes. To finish in the top five percent of such a group is an accomplishment I am proud of."

"I am grateful to the Mallinckrodt Institute, the Sugar Creek Swim Club, and all of the individuals who contributed to the fund which made it possible for me to compete in the Ironman Triathlon."

#### Pamela Mihail-

"Being the oldest of five children, I have always felt a responsibility to do my best in all endeavors and to share any advantages with those less fortunate." Perhaps it is this attitude which explains why Pamela Mihail was chosen as a "Yes, I Can" achiever. Pamela Mihail, medical records administrator in MIR's division of radiation oncology, was one of 24 special achievers honored at the St. Louis Sentinel's tenth annual "Yes, I Can Dinner" on October 28.

She was awarded this recognition for her expert handling of job responsibilities—achieving a standard of excellence which has made her a role model for young blacks. A member of the radiation oncology staff since 1979, Ms. Mihail suprvises medical records, the film library, and a computerized tumor registry to provide a data base of patient information for



use by the clinical staff of radiation oncology.

A native St. Louisian, Ms. Mihail graduated from Beaumont High School. She holds a B.S. in medical record science from St. Louis University and a master's degree in health services management from Webster University. From 1970 to 1977, she held the position of medical records coordinator for the St. Louis

#### "Yes, I Can"

Comprehensive Neighborhood Health Center. In addition to her professional responsibilities, she is studying advanced computer techniques. A firm believer in volunteer community service, Ms. Mihail has raised funds for the United Negro College Fund, helped to organize the Run for Sickle Cell Anemia, and currently serves as a volunteer consultant to the Tower Village Nursing Home Adult Day Care project.

Ms. Mihail was highly recommended for this award by Dr. Carlos Perez, director of Mallinckrodt's division of radiation oncology. Established in 1974 by the late Howard B. Woods to honor black achievers in the St. Louis metro area, this event provides young black people with the opportunity to meet others who have risen above obstacles to achieve success in their careers.

#### From the



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

# Technical Administrator...

#### MSRT Convention 1983

The fifty-first state convention of the Missouri Society of Radiologic Technologists was held September 14-17 in Columbia, Missouri. President Michael D. Ward, R.T.B.S., presided. Participants were offered forty-four hours of continuing education lectures in the areas of education, technology, management, nuclear medicine, sonography, and radiation oncology. The technical agenda included the following contributions from members of the MIR technology staff and senior radiologic students:

#### **TECHNOLOGIST LECTURES:**

"What Licensure Means to You," Norman L. Hente, R.T.

"Neonatal Head Sonography," Maureen Lorbert, R.T., R.D.M.S.

#### **TECHNOLOGIST ESSAY AWARDS:**

1st Place: "Understanding and Coping With Stress," Norman L. Hente, R.T.

#### STUDENT SCIENTIFIC EXHIBITS:

1st Place: "Reflection Perfection," on craniofacial reconstruction, senior radiologic students, left, Mary B. Welker and Tracy Kidd.

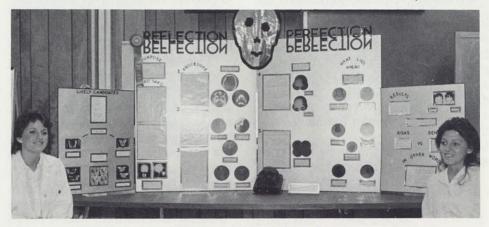
3rd Place: "The Beat Goes On," on pediatric cardiac catheterization, by senior radiologic students, left, Mark Brillos, Valinda Braun, Elissa Shaffer, and Sherry West.

Mallinckrodt technologists elected to serve as MSRT officers include: president Michael D. Ward, R.T.B.S., retiring to senior board member; Cynthia Miller, R.T., secretary; Philip Sotir, R.T., eastern counselor; Mark McClane, R.T., 4th District representative; and Norman L. Hente, R.T., parliamentarian.

#### **National Radiologic Technology Week**

The 1983 national radiologic technology week was observed at Mallinckrodt Institute with a display of technical exhibits arranged by Mary Kimberlin, R.T.B.A., and Norman

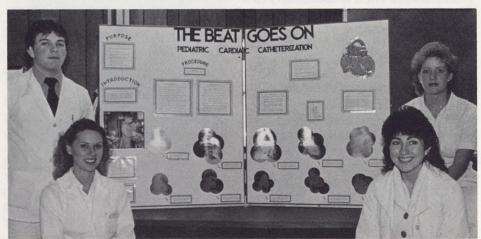
L. Hente, R.T. Located in the MIR Lobby, the prize-winning exhibits by students in the MIR School of Technology demonstrated some of the latest advances in technical practices.



#### **Award Winning Scientific Exhibits**

Above, 1st Place — "Reflection Perfection" (craniofacial reconstruction) From left, Tracy Kidd and Mary Beth Welker.

Below, 3rd Place — "The Beat Goes On" (pediatric cardiac catheterization) From left, Mark Brillos, Valinda Braun, Elissa Shaffer, and Sherry West.



#### **Technology Students Win Blood Drive Competition**

During a recent blood drive sponsored by the American Red Cross and Washington University Medical Center, students from Mallinckrodt's School of Radiologic Technology turned out the largest percentage of donors—89 percent of the student body.

### Happy 50th

#### for Mallinckrodt Administrator

As James Patterson drove to work Friday, September 2nd, he may have given some thought to the significance of the day, his fiftieth birthday. "Pat," as he is affectionately called by his friends and staff in radiation oncology, may have anticipated receiving a card or two. However, he didn't realize just how special September 2nd was going to be

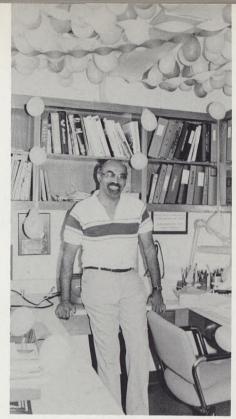
By late morning, a celebration was just around the corner as food started streaming into a fourth floor cancer biology lab. Summoned to the lab at noon, to take care of an "urgent problem," Pat walked into a heartfelt chorus of "Happy Birthday." The birthday celebration was attended by some thirty enthusiastic friends. The lab, festooned with balloons, couldn't hold any more.

Pat is an administrator for biological research in the cancer biology section

of radiation oncology. The reason for this outpouring of friendship and admiration from fellow workers is reflected in the words of his secretary, Kathy McDonald, "We consider Pat the best an administrator can be."

Achieving this measure of success didn't happen overnight. It took years of hard work and persistence. Pat first began working for Mallinckrodt nearly 25 years ago. His intelligence, determination, and innate interpersonal skills propelled him steadily upward from lab worker to research technician, scientific coordinator, and supervisor. He has held his present administrative position since 1978.

Pat holds a bachelor's degree in biology from Lincoln University, Pennsylvania and a master's degree in business administration from Webster College. In 1980, he was honored for his achievements by the St. Louis



Jim Patterson, administrator for biological research.

Sentinel with the "Yes I Can" Award. Pat and his wife, Mildred, a remedial reading specialist for the St. Louis Schools, have two sons, James III, a junior at the University of Notre Dame, and Roger, a junior at University City High School.

#### **MIR Calendar of Events**

January 9, 1984
CITY WIDE RADIOLOGY
CONFERENCE
St. Louis University
5:30 P.M.

February 6, 1984
CITY WIDE RADIOLOGY
CONFERENCE
Scarpellino Auditorium
Mallinckrodt Institute
5:30 P.M.

March 12, 1984
CITY WIDE RADIOLOGY
CONFERENCE
Scarpellino Auditorium
Mallinckrodt Institute
5:30 P.M.

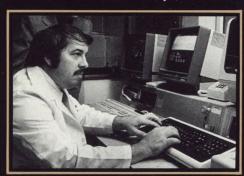
March 18—April 2, 1984
6th ANNUAL
CURRENT CONCEPTS IN
MUSCULOSKELETAL
RADIOLOGY
Egypt and Israel

April 8-13, 1984 AMERICAN ROENTGEN RAY SOCIETY Las Vegas, Nevada April 25, 1984 LEROY SANTE LECTURE St. Louis University 5:30 P.M.

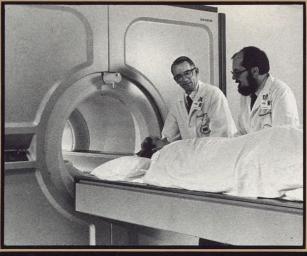
May 14, 1984
CITY WIDE RADIOLOGY
CONFERENCE
Scarpellino Auditorium
Mallinckrodt Institute
5:30 P.M.

May 23-25, 1984
8th ACR CONFERENCE
ON COMPUTER APPLICATIONS
IN RADIOLOGY
Mallinckrodt Institute

Photo by Herb Weitman



Spage-age Technology and NMR Help Map the Body



Drs. Ronald Evens, left, and William Murphy describe the Team care in radiation oncology. scanning procedure to a patient in Mallinckrodt's NMR facility.





Press conference at RSNA



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**Virginia Trent** Director and Editor

Ria Munoz **Editorial Assistant/** Photographer

Kay Porter Assistant Editor

**Norman Hente** Tom Murry **Photographers** 

**Return Address Public Relations Department** Mallinckrodt Institute of Radiology 510 South Kingshighway St. Louis, Missouri 63110

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