

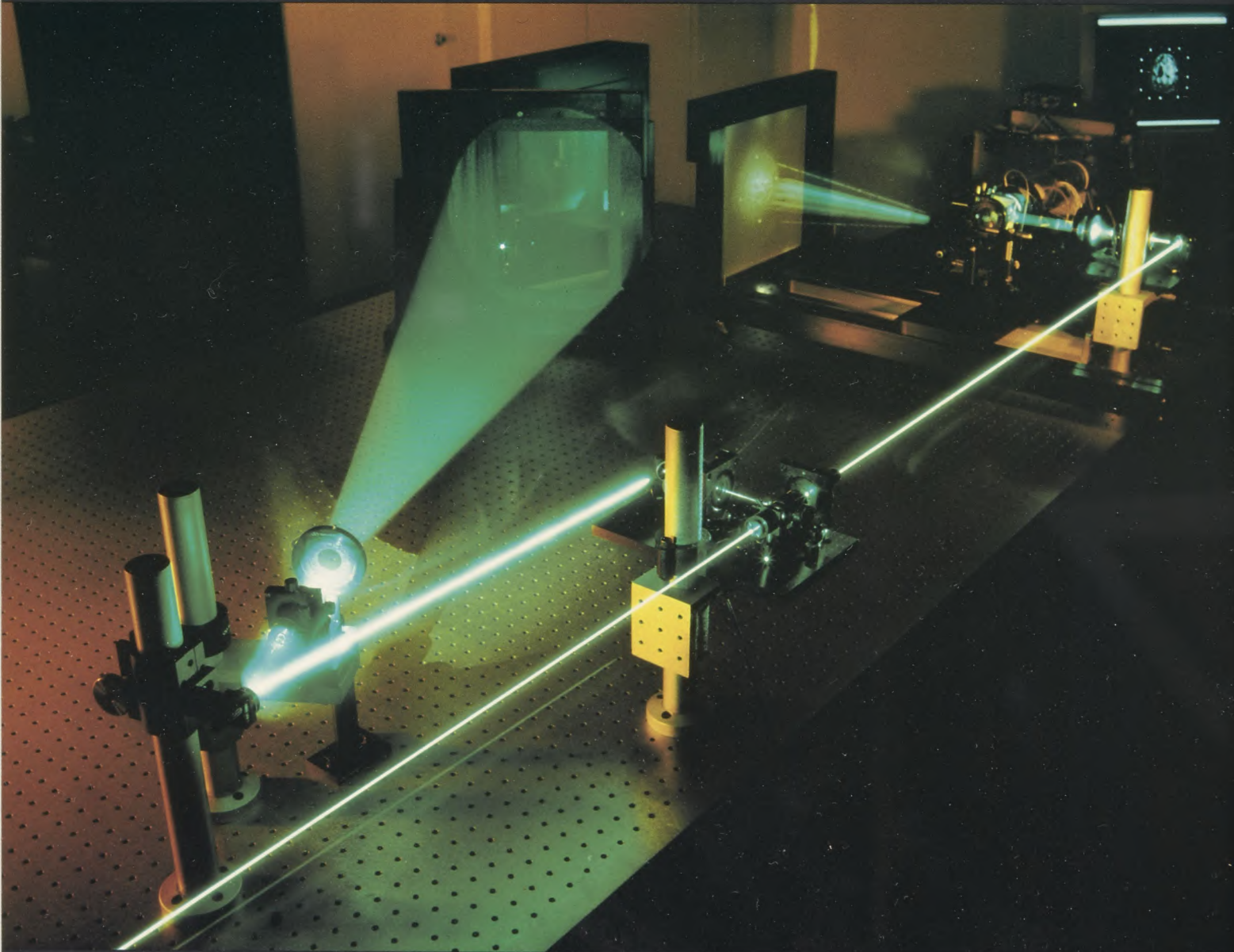
SUMMER, 1994

VOLUME 25, NUMBER 2

FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY

**REACH OUT AND
TOUCH IMAGING**



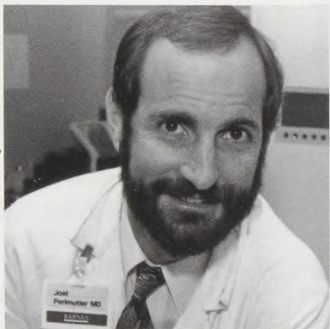
A medical imaging system developed by a California-based company may reform surgical planning techniques. By reflecting light off a diffuse screen on which a computed tomography or magnetic resonance scan is projected, Voxel's technology can produce a life-size volumetric hologram of the body. For more information about Mallinckrodt Institute's role in this research, turn to page 12. Photo courtesy of Voxel.

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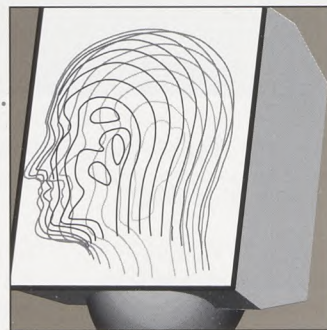


PATHFINDING: TRACING THE ROOTS OF PARKINSON'S DISEASE AND DYSTONIA

Collaborative research among Washington University School of Medicine physicians may lead to a better understanding of the disabling symptoms of Parkinson's disease and dystonia.

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Multicenter trials are comparing data from computed tomography and magnetic resonance scans with data from medical holograms, and the results are promising.



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CELEBRATION OF LIFE

Long-term cancer survivors prove that early detection and effective treatment planning are the key to overcoming cancer.

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MIR
MALLINCKRODT
INSTITUTE OF RADIOLOGY
WASHINGTON UNIVERSITY
MEDICAL CENTER

ON THE COVER:

Accuracy and immediacy in determining the best treatment for pelvic fractures may mean the difference between paralysis or recovery, life or death. Researchers at Mallinckrodt Institute are testing whether or not information from volumetric holograms improves surgical results.

Photography by Tim Parker.

SPOT NEWS



Vannier In Hall of Fame

Michael W. Vannier, M.D., professor of radiology and chief of the image processing laboratory, was named to the United States Space Foundation's Space Technology Hall of Fame for his instrumental role in the development of multispectral magnetic resonance imaging. The technology was hailed as a groundbreaking medical diagnostic tool.

In 1984 Vannier, a former NASA consulting engineer, and a team of researchers transferred NASA technology used to create vivid satellite images

Michael W. Vannier, M.D. (left) and Richard P. MacLeod, president, U.S. Space Foundation

of Earth, known as LANDSAT, into a method for analyzing complex medical images of the human body. By combining the LANDSAT image-processing computer with a magnetic resonance scanner, scientists could identify specific body tissues and realistically color-code them into cross-sectional photographs of the head, chest, and abdomen. This technique — that was said to have advanced medicine as much or more than the X ray — enabled radiologists to see and measure the precise outlines of a particular organ or a collection of tissues.

Hovsepian Selected for Developmental Program

Picker International, Inc. and the Association of University Radiologists annually sponsor the Academic Faculty Development Program. From among the hundreds of nominees who are usually within the first five years of their faculty appointments, only 40 attendees are selected.

This year, David M. Hovsepian, M.D., assistant professor in vascular and interventional radiology, participated in the program which helps promising academic radiologists develop important skills necessary for successful clinical, teaching, and research careers. Radiologists from major research centers spoke on topics such as time management, writing and publishing a scientific paper, and applications for grant funding. Group sessions discussed strategies for research involving functional MRI, PACS, technology assessment and outcomes, interventional methods, and new imaging-guided therapies.

Siegel Reappointed Chair of NRC Committee

The United States Nuclear Regulatory Commission (NRC) has named Barry A. Siegel, M.D., to a third two-year term as chairman of the Advisory Committee on Medical Uses of Isotopes (ACMUI). With his first appointment in 1990, Siegel became the first nongovernmental appointee to serve as chairman of the ACMUI.

Siegel, professor of radiology and director of the Division of Nuclear Medicine, and the ACMUI will formulate proposals for standards and criteria for regulating and licensing uses of radionuclides in medical institutions. He will serve as the principal interface between the Committee and the NRC.

Grigsby on NIH Consensus Panel

A panel for the National Institutes of Health (NIH) Consensus Development Conference on Ovarian Cancer determined that based on current knowledge and technology, there was no proven benefit from routine ovarian cancer screening for certain groups of women: those who have no first-degree relatives with the disease or those who have no other risk factors for the disease. As a member of that panel, Perry W. Grigsby, M.D., professor of radiology and clinical chief of the Radiation Oncology Center at Barnes Hospital, formulated guidelines for screening and treatment of ovarian cancer.

The panel encouraged all women to include annual pelvic examinations as part

of their routine medical care and to have a comprehensive family history compiled by a physician who is knowledgeable about ovarian cancer. The panel's consensus statement also included the following recommendations:

- clinical screening trials to define the potential benefits and risks of screening
- risk counseling by a gynecologic oncologist for women with two or more first-degree relatives who have ovarian cancer
- annual pelvic exams, CA-125 tests, and transvaginal ultrasonography for women with hereditary ovarian cancer syndrome
- specific treatment options, as set forth by the panel, for patients diagnosed with ovarian cancer.

Grigsby also reported on the panel's recommendations at the annual meeting of the American Society of Clinical Oncology in Dallas.

The AAPM was established in 1965 to further the application of physics to medicine and biology and to disseminate technical information in medical physics and related disciplines. The association encourages practicing medical physicists to advance their knowledge and skills while promoting interest and training in the field.

Low Heads AAPM Chapter

Daniel A. Low, Ph.D., an instructor in radiology in the Radiation Oncology Center, was elected president of the Missouri River Valley Chapter of the American Association of Physicists in Medicine (AAPM). The local chapter includes more than 200 members in Nebraska, Iowa, Kansas, and Missouri, and is one of 21 chapters nationwide. Eric E. Klein, M.S., also an instructor in radiology, was elected as a board representative.



Carlos A. Perez, M.D., professor of radiology and director of the Radiation Oncology Center, presented James V. Piephoff, M.D., chief resident, 1993-1994, (left) with the American Cancer Society (ACS) Clinical Oncology Award for 1994. The Missouri Division of the ACS annually recognizes those ACS fellows who have completed advanced cancer studies.

Royal Follows Up on Chernobyl

At the invitation of the World Health Organization, Henry D. Royal, M.D., will serve as an international consultant on the health of workers involved in the cleanup following the 1986 nuclear reactor explosion in Chernobyl. As one of eight international experts, Royal, professor of radiology and associate director of the Division of Nuclear Medicine, will assist in formulating plans and protocols for examining and assessing the medical status of over 800,000 workers who received various radiation doses attributed to the Chernobyl accident.

The project, proposed by the Ministry of Health and Medical Industry of the Russian Federation, will provide clinical and laboratory diagnoses, epidemiology research, and dosimetric examinations for the workers and their family members. The National Centre of Ecological Medicine and the International Programme on the Health Effects of the Chernobyl Accident also are involved in the project.

In 1990, Royal was co-leader of the International Atomic Energy Agency's medical team that travelled to Chernobyl to conduct health studies of inhabitants from both contaminated and noncontaminated villages. He has been involved in several follow-up studies on the accident.

SPOT NEWS



The Mallinckrodt Institute of Radiology Imaging Center at the corner of Scott and Taylor avenues is nearing completion. The three-story facility with its distinctive east facade of green-tinted wraparound glass officially opens November 11, 1994.

Ter-Pogossian Twice Honored

The list of accolades received by Michel M. Ter-Pogossian, Ph.D., for his achievements in nuclear science includes two recent honors: The Distinguished Scientist Award and the Gold Medal Award, both given in recognition of his contributions to the development of positron emission tomography (PET).

Ter-Pogossian, a professor of radiology in the Division of Radiation Sciences, is internationally known for his pioneering efforts in the use of cyclotron-produced radionuclides in biomedical research. His early experiments with short-lived radionuclides led to the development of PET, a collaborative project involving physical scientists, chemists, and physicians in various disciplines.

According to the St. Louis Chapter of the Alliance for the Mentally Ill, who presented Ter-Pogossian with The Distinguished Scientist Award on May 14, "since the introduction of PET in the 1970s, this diagnostic tool has led to the development of many psychotropic medications that have helped thousands of people with mental illness."

On May 27, Ter-Pogossian travelled to La Baule, France, to receive the Gold Medal Award from the French Society of Biophysics and Nuclear Medicine. The presentation of this award carried a dual honor: Ter-Pogossian not only received praise for his scientific work but also for his activities with the French underground during World War II. He was one of the advance scouts who later entered Paris with the first landing of the Allied troops.

Siegel Recognized by Alma Mater

In May, Marilyn J. Siegel, M.D., an alumna of the State University of New York at Brooklyn, was guest lecturer at the school's 114th Annual College of Medicine Alumni Reunion. Not only did she present the keynote address, "Color Doppler Imaging: Current Abdominal Applications," but she returned home with the Harry Z. Mellins Master Teacher Award in Radiology. The annual award, honoring Dr. Mellins who is a 1944 SUNY at Brooklyn alumnus, recognizes outstanding teaching accomplishments in the medical profession.

Siegel, a professor of radiology who is noted for her research in pediatric radiology, is also a highly regarded teacher at MIR. She is a two-time recipient (1984 and 1989) of the Annual Senior Residents' Distinguished Teaching Award, presented annually to the radiology faculty member who made the greatest contribution to resident education during the academic year.

Siemens/RSNA Fellowship Goes to Derdeyn

Colin P. Derdeyn, M.D., instructor in radiology and a fellow in MIR's neuroradiology section, received the Siemens Medical Systems/RSNA (Radiological Society of North America) Research and Education Fund Fellowship. The award will be used to further positron emission tomography (PET) research underway at MIR.

Using PET, Derdeyn will track blood flow and metabolism of the brain in patients at risk for stroke. He hopes to transfer this research into future projects, using not only PET but functional magnetic resonance imaging to study the effects and efficacy of different therapies for patients who have had a stroke or are at high risk of stroke.

Derdeyn, who was diagnostic radiology chief resident, 1993-1994, and his advisor William J. Powers, M.D., associate professor of radiology, will move their PET research into The Mallinckrodt Institute of Radiology Imaging Center when it opens later this year.

Wilson Award Shared by Two Researchers

The Wilson Award is presented annually to the Washington University graduating medical student who made meritorious contributions to the Department of Radiology. The award, now in its 26th year, is a tribute to Hugh M. Wilson, M.D., the second director of the Institute who championed the advancement of education. Because of the outstanding quality of research produced by two nominees, the review committee selected F. Nicholas Franano and Paul C. Ho as dual recipients of the award.

Franano, who plans a career as a physician scientist in academic radiology, focused his research on the development of magnetic resonance imaging contrast agents and radiolabeled agents. His study of the metabolism of gadolinium- and radiometal-chelate-protein complexes resulted in three published papers.

Ho investigated the problem of reduced luminance dynamic range in radiological images displayed on CRTs in highly lighted clinical areas, such as the ICU. His research project, "Image Enhancement for Display of Radiological Images on Cathode Ray Tubes in High Ambient Light Conditions," provided the algorithms necessary for better visualization.



The MIR staff at Jewish Hospital recently moved into new administrative offices on the second floor of JH. Shown are (left to right, front row) Marilyn J. Crawshaw and Amisue E. Rasnic; (back row) Drs. William E. Reinus; Keith C. Fischer; Scott A. Mirowitz, radiologist-in-chief; Richard M. Slone; Harold F. Bennett; and Darryl A. Zuckerman. Not shown are Drs. Lawrence M. Kotner, Elizabeth L. Gerard, David S. Gierada, and James D. Matthews.

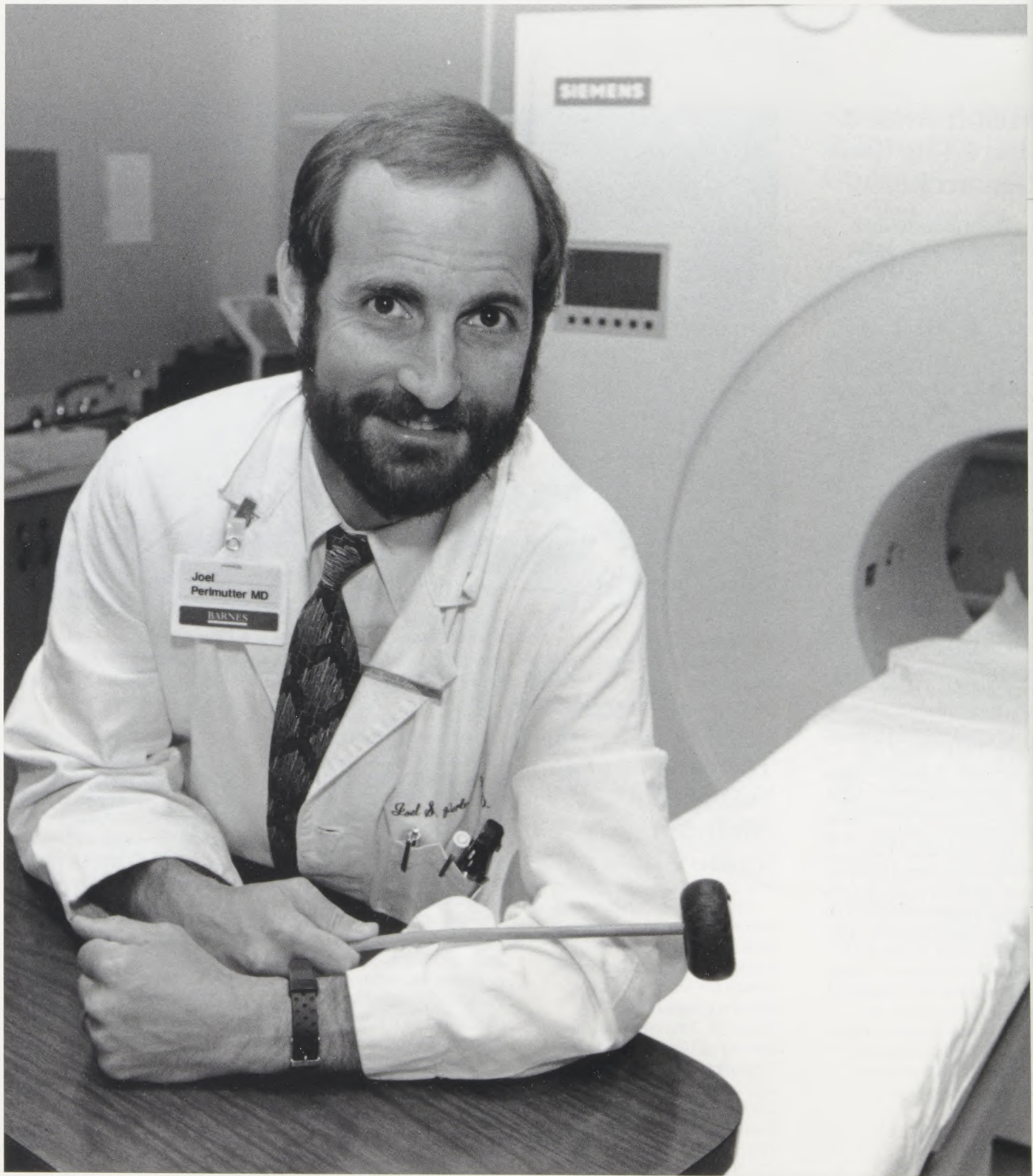
Top Awards For MIR's Abdominal Radiology

For the second consecutive year, an MIR abdominal radiology faculty member brought home the Hounsfield Award for outstanding computed tomography (CT) research. Presented by the Society of Computed Body Tomography and Magnetic Resonance, the award honors Sir Godfrey Newbold Hounsfield, the 1979 Nobel Prize winner who developed CT. This year's winning paper, "CT of the Retroperitoneum: Observations on the Distribution of Fluid Collections" was presented by Den-

nis M. Balfe, M.D., professor of radiology, and coauthored by Drs. Robert Y. Kanterman, assistant in radiology; Ernesto P. Molmenti, from the Department of Anatomy; and Harold F. Bennett, assistant professor of radiology.

The Society's Contrast Award was presented to Drs. James A. Brink, assistant professor of radiology; Jay P. Heiken, professor of radiology; Howard P. Forman, assistant in radiology; Paul A. Molina from the University of North Carolina; and Paul C. Brown of Sanofi-Winthrop, Inc. in New York. Their winning paper was titled "Reduction of Intravenous Contrast Material Required for Hepatic Spiral CT."

The awards each carry a \$7,500 grant for further CT research. Brink and Heiken, along with Drs. Lane A. Deyoe, Ge Wang, and Michael W. Vannier and technologist Roberta L. Yoffie, coauthored the 1993 Hounsfield Award paper, "Spiral CT Angiography for Renal Arterial Stenosis: In Vitro Assessment of Technical Parameters."



Perimutter, shown in the seventh-floor PET facility, displays an innovative tool he uses for testing the reflexes of patients with Parkinson's or dystonia. The "Queen's Square" was developed in England and has a willow handle that provides more flexibility than the standard metal-based instrument.

PATHFINDING

■ TRACING THE ROOTS OF PARKINSON'S DISEASE AND DYSTONIA

More than a million North Americans know firsthand the disabling symptoms of Parkinson's disease: tremors, stiffness, slow movement, difficulties with balancing or walking. Some patients become depressed; others have trouble speaking or even sleeping.

As many as a half million other people suffer from dystonia, an often-undiagnosed syndrome in which tight, painful muscle spasms contort various parts of the body. One person's neck may pull and twist to the side, while another's eyelids may suddenly squeeze shut. Sufferers may grimace, speak in a whisper, or experience such severe hand cramps that they break any pencil they try to hold.

Parkinson's and dystonia are two distinct disease categories, but they are also closely linked, says Joel S. Perlmutter, M.D., associate professor of neurology and radiology. Perlmutter is principal investigator in a series of research projects that may lead to an improved understanding of both conditions.

BY CANDACE O'CONNOR

PATHFINDING

“**F**requently, Parkinson’s disease may begin with a little bit of dystonia in a foot, then the patient goes on to develop Parkinson’s. Or the treatment of Parkinson’s can be associated with the development of dystonia from the drugs that we give,” he says.

The reason for this overlap lies deep in the brain, where both diseases originate. In a normal brain, messages are carried from nerve cells in the substantia nigra (a layer of gray substance in the midbrain) to receptors in the striatum with the aid of a chemical neurotransmitter, dopamine. In Parkinson’s disease, however, those nerve cells in the substantia nigra that produce and store dopamine have degenerated, leading to a dopamine deficiency. The dopamine receptors in the striatum may increase either in number or possibly in “stickiness” (the receptor’s affinity for dopamine) to compensate for this loss.

While most studies to date have suggested a change in number, one paper published in 1987 by Perlmutter and a research team argues that stickiness may also increase. But much of the existing research in this area is problematic, he says. A number of these studies involved patients who had undergone treatments that might have affected the receptors, while other studies were done on brain tissue after death.

In Parkinson’s disease, those nerve cells that produce and store dopamine have degenerated ...

To study this problem under better controlled conditions, Perlmutter is currently investigating a hemi-Parkinsonian condition that is produced in laboratory monkeys, affecting one side of their bodies. This condition is induced by an injection of the toxin MPTP, which selectively destroys the nerve cells that produce the dopamine.

Both animal and human models are used to study another aspect of Parkinson’s disease: the effects of chronic treatment on different dopamine pathways in the brain. Patients suffering from dopamine depletion are most effectively treated today with a drug called L-dopa, which is converted to dopamine in the brain. But this drug treats patients symptomatically; it does not retard the destruction of the dopamine-producing nerve cells.

In fact, as the disease progresses or perhaps as the period of treatment grows longer, the L-dopa begins to lose its effect. Each dose may work for a very short time, forcing patients to take the drug more often; they may also develop dystonia or other involuntary movements from the medicine itself. Sometimes merely cutting down on the medication may solve the problem, but more often there is no way to create the needed balance: giving enough medication to eliminate Parkinson’s symptoms but little enough to avoid involuntary movements.

Perlmutter’s new study, funded by a \$1,349,590 grant from the National Institute of Neurological Disorders and Stroke and by a grant from the Greater St. Louis Chapter of the American Parkinson Disease Association, will investigate the physiological causes of L-dopa-induced involuntary movements. Coinvestigators in this work are Lee W. Tempel, M.D., research instructor in neurology; Stephen M. Moerlein, Ph.D., associate professor of radiology and biochemistry; Richard D. Todd, M.D., Ph.D., professor of psychiatry; Juanita L. Carl, M.S., research instructor in neurology; Mokhtar H. Gado, M.D., professor of radiology; and Lori McGee-Minnich, B.N., R.S.N., clinical coordinator.

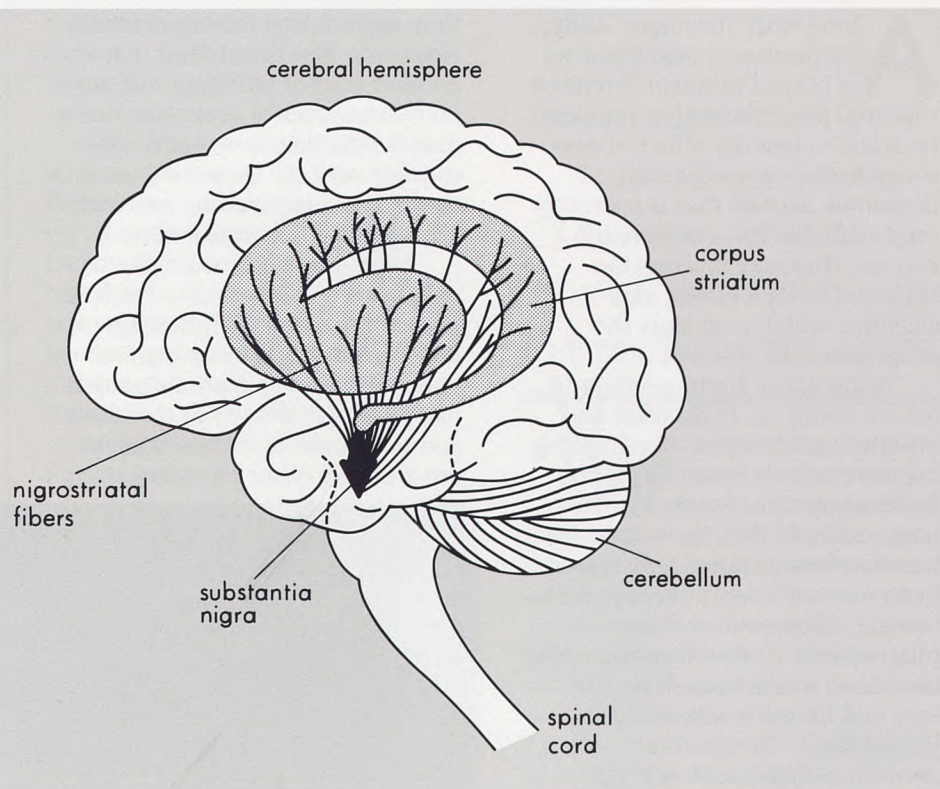
So far, the team has just begun animal studies and is well under way with human research. Over the next three years, they will use Mallinckrodt Institute’s year-old Siemens 953-B positron emission tomography (PET) scanner to examine Parkinson’s patients after they are first diagnosed, then again after they have been treated for a couple of years. The researchers will compare the PET scans of those patients who have developed involuntary movements with those who have not. At each session, patients will be scanned after refraining from L-dopa for one day. Then, while they are still in the scanner, the patients will take their medication and the measurements will be repeated.

This new PET scanner will produce exquisitely detailed information on blood flow through the brain. The Institute's old PET VI scanner, used in previous studies, could produce seven cross-sectional slices of the brain, each one-and-a-half centimeters apart. The new scanner provides 31 slices simultaneously, each one only 3.4 millimeters apart; there are seven slices of the striatum alone. The test before medication shows the research team how active a patient's nerve cells are in a certain area; the repeat scan after medication shows them where L-dopa has affected nerves and to what degree.

"We suspect there are certain dopamine pathways that become more sensitive after chronic treatment and that those pathways produce involuntary movements," says Perlmutter. "If we can see a change in that one kind of pathway—if it becomes more sensitive—and if that corresponds to those people who develop involuntary movements and not the others, then we can begin to design drugs that will selectively activate the beneficial pathways and potentially block the other ones."

Those drugs might include dopamine receptor blockers that are currently available, but even better would be specific "agonists," drugs that would affect only those pathways that need to be activated.

Along with PET, Perlmutter's team uses another modality, magnetic resonance (MR) imaging, to supply anatomical correlation.



While PET shows them how the brain is functioning, it does not show brain structure. MR images allow the research team to localize and identify the exact locations of the functional changes seen on the PET scans.

The animal research will also provide an important correlation to the human studies, Perlmutter says. While it is impossible to precisely control all kinds of medication that human patients may be taking, the drug regimens of animals can be tightly controlled. "We can give drugs that affect one kind of receptor system and other drugs that affect another system, and standard L-dopa, just as we do to human patients. Then we can see which groups develop involuntary movements and how the pathways change," he says.

In this schematic of the left side of the human brain, nerve fibers extend upward from the substantia nigra, carrying dopamine to all areas of the corpus striatum.

PATHFINDING

Along with this major study, Perlmutter is also involved in other Parkinson's-related research projects: major, multicenter trials to test the effect of new drugs such as pramipexole, a dopamine agonist that is currently only available for research; tolcapone, that may prolong the action of L-dopa doses; and selegine, which may slow the progress of the disease.

While these Parkinson's studies are going on, Perlmutter and other researchers are also exploring the riddle of dystonia and its involuntary muscle spasms. In past research, they have observed that dystonia patients may respond in an unusual way to sensory information. "Someone with blepharospasm, or eyelid spasms, may be able to touch himself on the face and his eyes will open," says Perlmutter. "Or somebody with a severely twisted neck will just touch a spot on her face and her cheek will return to mid-position."

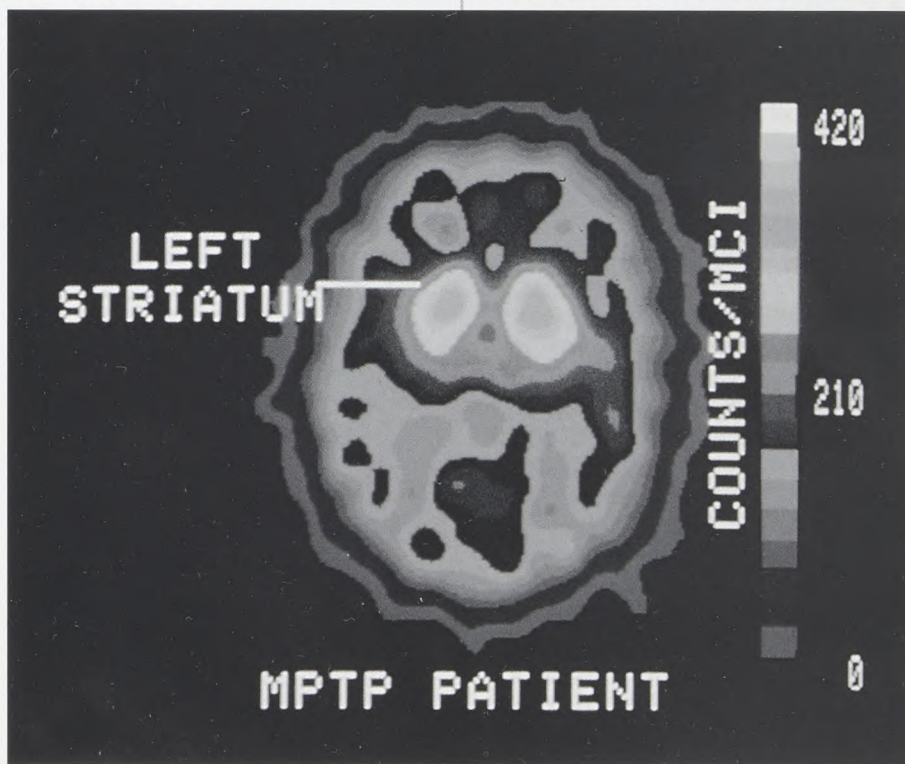
Investigation showed that dystonia patients had a diminished response in the sensory motor cortex while touching a vibrator with one hand. When the researchers used the PETT VI scanner to test a homogeneous group of patients with right-handed writer's cramp,

they again found this diminished response. But they found that another part of the brain, the supplementary motor area, also had a diminished response—and, interestingly enough, these two parts of the brain, connected by a circuit, are important for movement.

Next the team would like to use the new PET scanner, with its better resolution, to follow up on that earlier study. They plan to look at other way stations on this motor circuit, deeper in the brain and back into the cerebellum, to see whether other areas are

responding abnormally or whether there are any differences between patients with blepharospasm and those with writer's cramp. Funding for this work has come from the Dana Foundation and from the Mattie Lou Koster Endowment Fund of the Benign Essential Blepharospasm Research Foundation.

With help from a \$789,161 grant from the National Institutes of Health, the first ever given for PET research in this area, Perlmutter and a team of colleagues have also embarked on



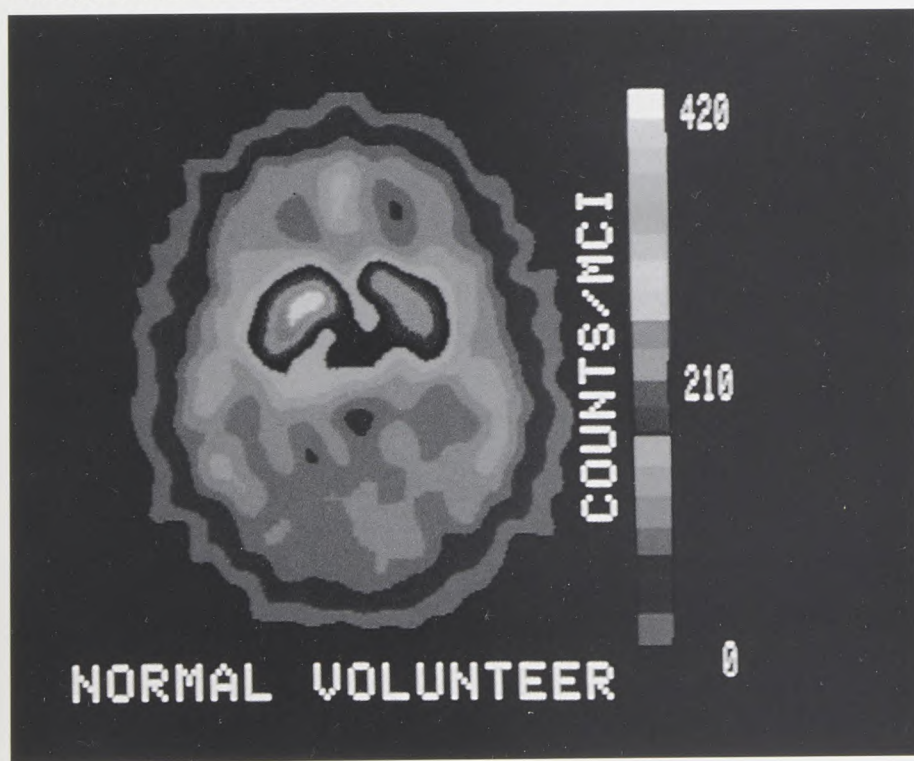
PET produces images of physiology rather than anatomy. These scans of two males in their early twenties show a horizontal cross section through the brain. Above, the "hot spots" indicate an increase in dopamine receptors; the patient is a drug addict whose Parkinson's was caused by his experimentation with "designer drugs" that contained the toxin MPTP. The scan on the right is that of a patient with no symptoms of Parkinson's disease.

a three-year study to examine specific physical and chemical factors associated with dystonia. They suspect that dystonia may be related to changes in the dopamine receptors, perhaps in the striatum. Using PET, they plan to measure receptor function in patients with blepharospasm, in patients with writer's cramp, and in patients without dystonia.

Perlmutter and Parkinson's research team members Carl, Moerlein, and McGee-Minnich are joined in this study by William Hart, M.D., Ph.D., professor of ophthalmology

and visual science, and Joseph Jankovic, M.D., professor of neurology at Baylor University, who is recruiting some of the patients.

This study is inextricably linked with the Parkinson's research," says Perlmutter. "It turns out that when we gave the animals MPTP for our Parkinson's study, they became transiently dystonic on one side, just as some patients who are becoming Parkinsonian are dystonic in a foot. After a month or two, this dystonia usually abates and the animal is left with Parkinsonism."



*MIR's year-old
Siemens 953-B PET
scanner provides
31 slices simultane-
ously, each one only
3.4 millimeters apart.*

“We believe that during that dystonic phase, there is a very marked increase in receptor function, perhaps a case of overcompensation, and that may be the link between Parkinsonism and dystonia,” he adds. “What we don’t know is which of the subtypes of dopamine receptors may be selectively involved here. We have a pretty good idea from our studies, but we need to narrow that down.”

If the researchers are successful, Perlmutter says, they will open up a fresh area for attacking the dystonia problem. “Just our methods for measuring dopamine pathway function represent a whole new approach,” he says. And with the results of this research, he adds, they may be able to design better drugs for both dystonia and Parkinson’s disease. ■

Note: If you are interested in participating in Dr. Perlmutter’s studies, please call 362-7148 for more information.

The shimmering image of a human pelvis appeared to float in the air, several inches in front of an illuminated viewing box where Dr. Douglas Robertson had placed a computed tomography (CT) scan of a pelvic fracture. Robertson, an assistant professor of radiology at Mallinckrodt Institute who also holds an appointment in the Washington University

REACH OUT

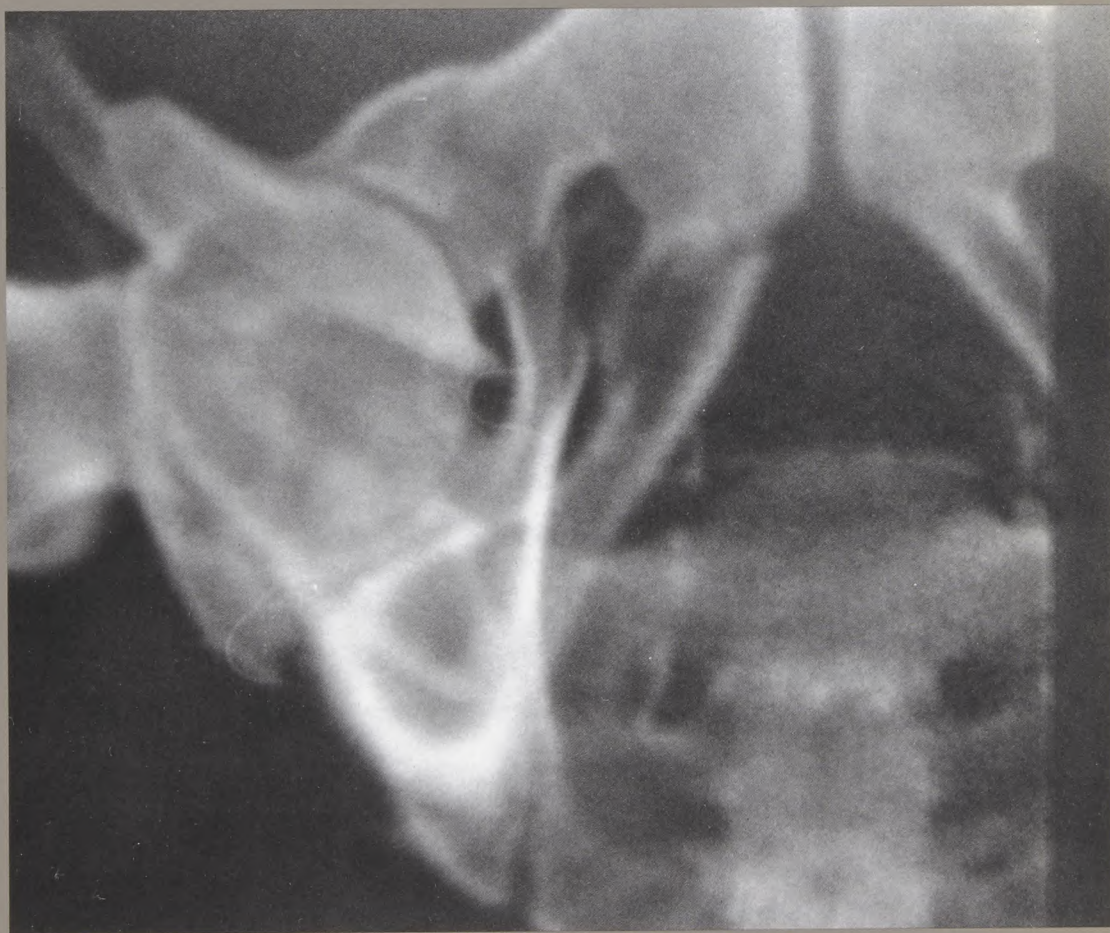
A N D

TOUCH

I M A G I N G

School of Medicine's Department of Surgery, is excited about a new technology that converts two-dimensional CT and magnetic resonance (MR) scans into three-dimensional holograms of human internal anatomy. According to U.S. medical center researchers like Robertson who are testing the technology, holograms may provide physicians with a noninvasive diagnostic tool that can improve preoperative planning.

B Y V I C K I K U N K L E R



REACH OUT AND TOUCH IMAGING

Holograms themselves are not new — they have been used on everything from magazine covers to credit cards to entertainment displays at theme parks. But the clinical application of the holographic process is an idea that began just a little over 10 years ago. Voxel, a company in Laguna Hills, California, is developing a system that is compatible with standard radiographic scanning equipment and software found in most medical centers.

MR and CT scans are a sequential series of two-dimensional, cross-sectional images of the body. To the untrained eye, the flat images of the heart or liver or other organs are not easily equated to the actual body part being scanned.



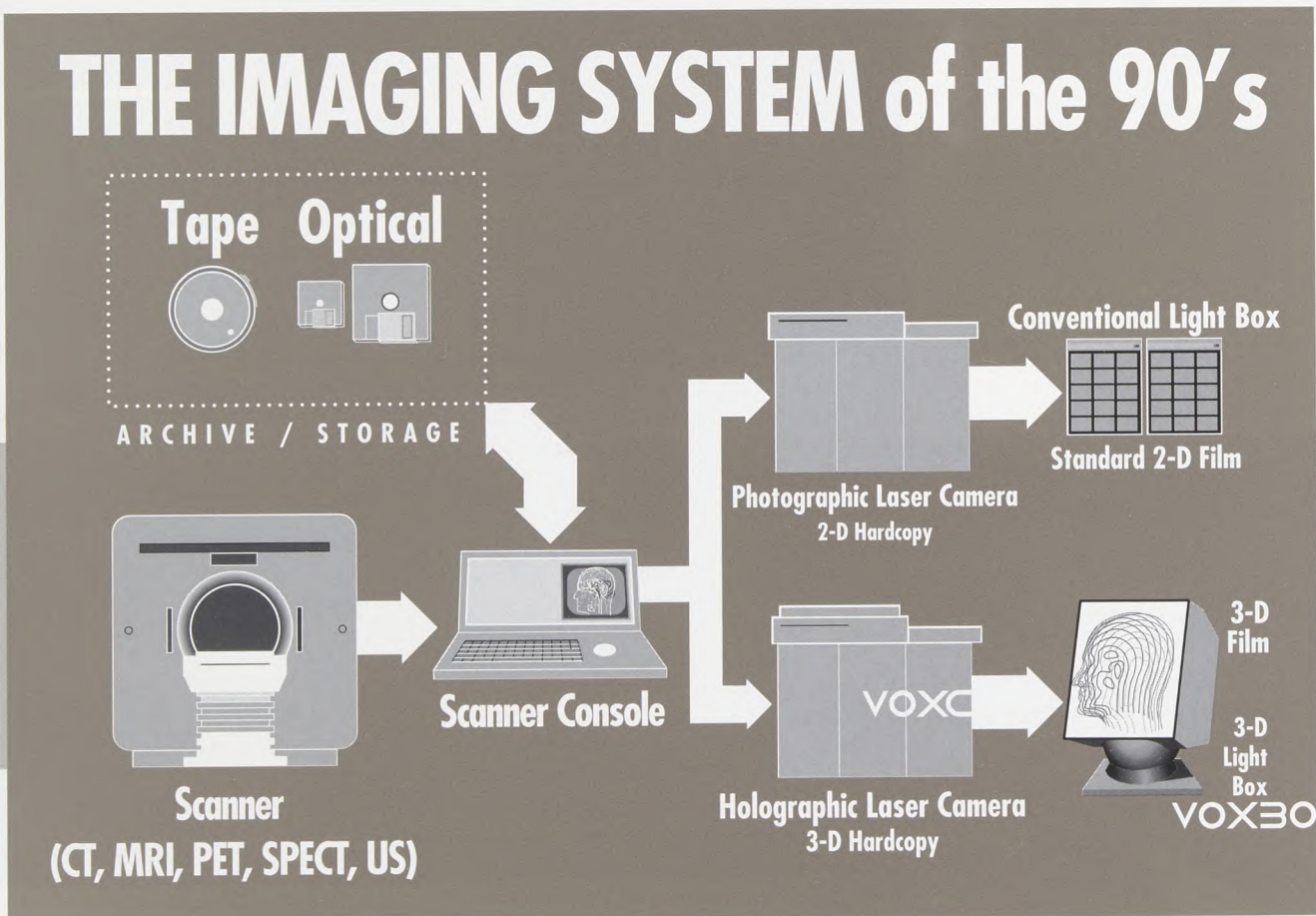
*CT slices are stacked
on top of one another,
allowing all
images to be seen
simultaneously.*

But by projecting the digital CT or MR slices onto a high resolution cathode ray tube (CRT) and reflecting a light beam off the image onto light-sensitive holographic film, the Voxel technology produces a recognizable anatomic structure.

A special laser camera (a Voxcam) and a dispersion compensating lightbox that transmits white light (the Voxbox) are the key components of Voxel's system. Since the equipment will not be on the market for at least another year, Robertson and other researchers now must download the images and send them to Voxel for processing. Within a two-day turnaround, the physician receives a 14-x 17-inch holographic film, called a Voxgram, that can include data from more than 200 CT or MR slices. The Voxgram is a clear film that emits only a faint image until it is viewed on the Voxbox. When the Voxbox is illuminated, a detailed, three-dimensional image floats into view, yielding a variety of information to the clinician.

Robertson also is investigating the preoperative planning benefits of a solid-foam anatomic replica produced from a patient's computerized CT data.

THE IMAGING SYSTEM of the 90's



As Robertson moved a translucent sheet of paper within the hologram, the individual slices making up the original CT scan could be seen. Flipping the film over, he pointed out the anterior portion of the pelvis. The film can be moved around on the Voxbox, providing researchers with a view of what lies above, below, and behind the organ being studied. Measurements can be calculated by placing a ruler within the image, or the image can be enlarged by using a conventional magnifying glass.

Robertson recently completed a study comparing diagnostic information gained from volumetric multiple exposure holograms (VMEHs) with that found on routine radiographs and CT scans. "Pelvic fractures are usually complex," says Robertson, "and even radiographs with special views are often inadequate for accurately defining the fractures."

Axial computed tomography, the gold standard for diagnosing pelvic fractures, can yield more information on the type and degree of fracture than what shows up on plain film. In turn, 3-D reconstructions of CT data reveal complex fracture pathology not shown on axial CT.

The Voxel system components. Graphic courtesy of Voxel.

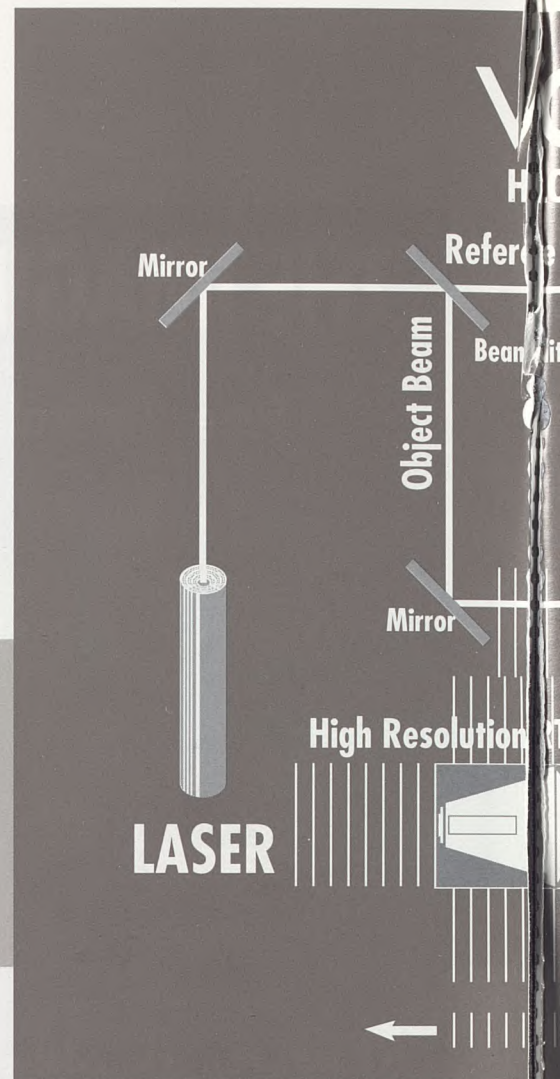
REACH OUT AND TOUCH IMAGING

But even 3-D CT has its drawbacks, says Robertson. The technology produces a pseudo three-dimensional image that lacks depth information. And therein lies the beauty of holographic radiographs, as discovered by Robertson and his coinvestigators Drs. Brandon Chan, William Scott, and Elliot Fishman from Johns Hopkins Medical Institutes; Jacqueline Hodge of MIR's muskeletal radiology section; and Charles Sutherland from Washington University's Division of Orthopedic Surgery. On holograms, CT slices are stacked on top of one another, allowing all images to be seen simultaneously, up and down, right and left, front and back.

Robertson's study included 15 patients with pelvic trauma and suspected fracture. Radiographs as well as axial, multiplanar, and 3-D CT images were made of each fracture. The CT data was sent to Voxel where it was reformatted into a VMEH. The team then evaluated the sensitivity and specificity of each technology as to the detection and characterization of pelvic fractures. The results: When viewed as three-dimensional images, VMEHs proved to be equivalent in diagnostic accuracy to

"Holograms can afford real-time viewing of fractures to the surgeon in the OR."

three-dimensional CT volumetric reconstructions and compared favorably to axial and multiplanar CT images. When a translucent sheet was used to examine individual slices that make up the hologram, VMEHs were equivalent to CT images for detection fractures.

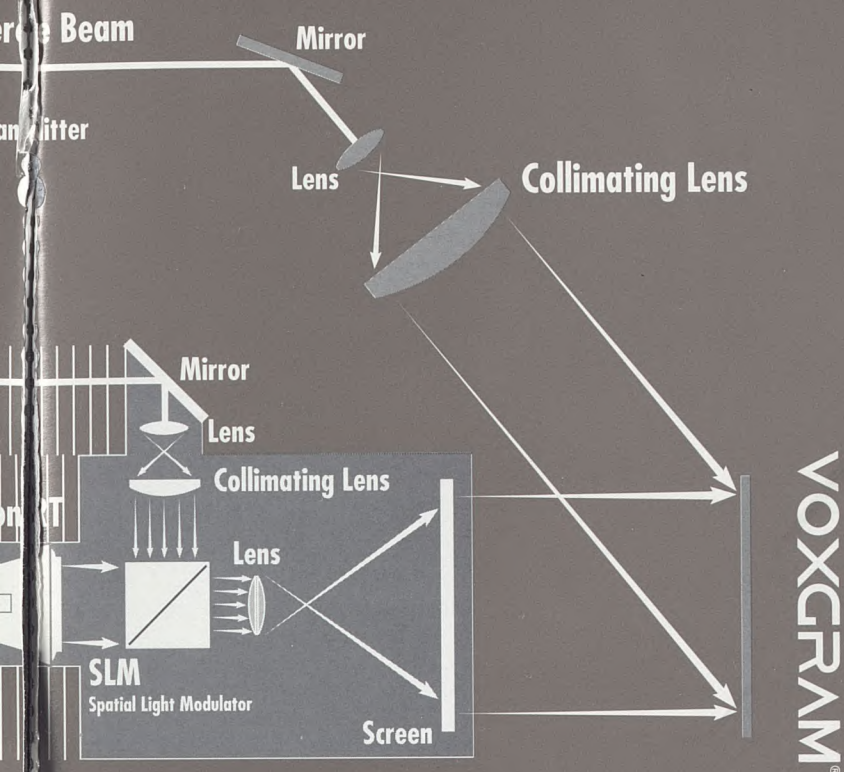


While holograms may not improve the diagnosis of complex fractures, Robertson points out, the true 3-D feature of the technology is extremely beneficial to the surgeon for pre-operative planning. "Holograms can afford real-time viewing of fractures to the surgeon in the OR," adds Robertson.

This option has already proven its worth in a case in New Mexico, as reported in Voxel's newsletter *Voxel In Depth*. Based on diagnostic information captured on CT, MR, and X-ray images, surgery on a patient with a fractured thoracic vertebra was in progress when Voxgrams were delivered to the

VOXCAM[®]

HOLOGRAPHIC LASER CAMERA



The Entire Imaging Assembly Is Moved The Distance Of Each Slice

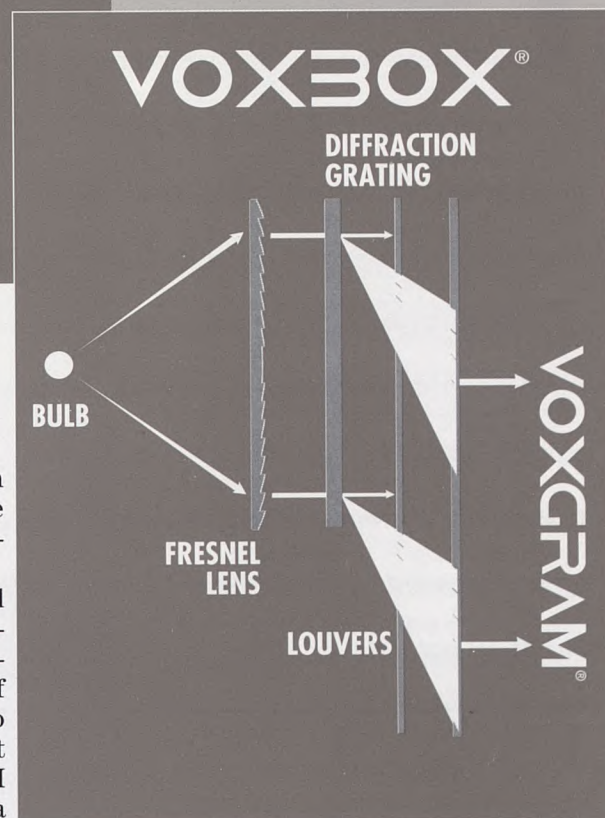
OR. After viewing the Voxgrams, the surgeon discovered that the patient's fracture actually extended two vertebrae above the operating field; an immediate change in the surgical plan was made while the patient was still on the operating table.

Additional clinical studies are underway at major medical research centers including Massachusetts General Hospital, Stanford University, the University of California at Los Angeles, the Mayo Clinic, and Rush Presbyterian. Researchers are evaluating information in a variety of areas,

from skull-based tumors to spinal fractures to coronary and pulmonary vasculature to MR mapping of the brain.

Robertson has been working with Voxel since the early days of the holographic system concept.

"I felt the technology had clinical value for physicians, especially orthopedic surgeons," he says. "If study results continue to be as promising as what we have already seen, I believe VMEHs will be a widely accepted, relatively inexpensive aid in surgical planning." □



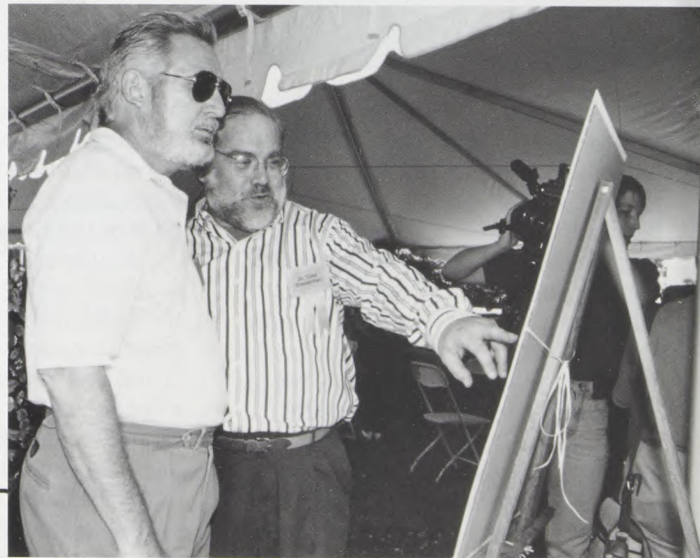
These graphics, provided by Voxel, explain the technology behind the Voxcam and the Voxbox.

MALLINCKRODT INSTITUTE OF RADIOLOGY AT WASHINGTON UNIVERSITY
Celebration of
LIFE
 BARNES-JEWISH RADIATION ONCOLOGY CENTER
 '94

Life is a gift. Among those who cherish that gift are the estimated 8 million cancer survivors in the United States. Early detection of cancer and advanced, carefully tailored, research-based treatments provide cancer patients with emotional and physical assurance so they can continue to celebrate life.

The survival rate for cancer patients has shown a significant improvement since the early days of cancer treatment. In the 1930s, fewer than one in five cancer patients was alive more than five years after treatment. In the 1990s, the prognosis is four out of 10 patients.

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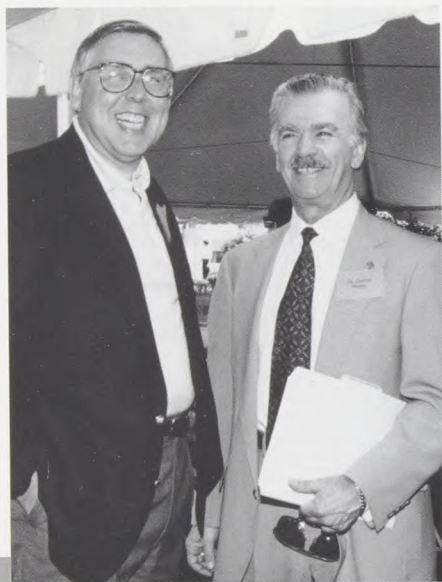
(1) The Clinac 6 linear accelerator in the Radiation Oncology Center at Jewish Hospital was one of the stops on the guided tours. Technologist Barbara Ermer explained how the equipment is used for stereotactic radiosurgery.

(2) The success of Celebration of Life is possible through the generous support of friends like Kim Tucci, whose Pasta House Company, Mike Shannon's Steak & Seafood Restaurant, and Brett Hull's Restaurant provided the picnic lunch. Dr. Todd Wasserman, chairman of the Celebration of Life committee, shared memories and photos of the 1992 gathering.

(3) Fred Brown, president and chief executive officer of the Barnes-Jewish-Christian (BJC) Health System, and (right) Carlos Perez, M.D., director of the Radiation Oncology Center

(4) Sylvan Bealke received a yellow carnation from Technologist Roseanna Siesennop. Bealke was diagnosed with prostate cancer in 1979.

(5) Timothy Cerutti is a 22-year survivor of lymphoma. He and Barbara live in Manchester, Missouri.



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5

In October of 1989 Todd Wasserman, M.D., professor of radiology at Mallinckrodt Institute, organized the first gathering of cancer survivors who were treated at the Washington University Medical Center and were disease-free for at least five years. That first "Celebration of Life" provided patients, families, friends, and caregivers a chance to share the memories of hard-fought battles and sweet victories over a dreaded disease. Through these strong, healthy survivors, Wasserman hoped to show recently diagnosed cancer patients and those currently undergoing treatment that there is hope, that they can enjoy long, productive lives.

Based on the success of a subsequent reunion in May of 1992 where attendance topped 200, Celebration of Life is now a biennial event. This year on June 4, more than 400 cancer survivors, families and friends, and medical center staff gathered under a festive, balloon-filled tent to share reminiscences and to renew acquaintances.

According to Wasserman, "This event is the largest known gathering of long-term cancer survivors treated at a single institution. We feel it's important to focus on the good news about cancer detection and treatment and to share that hope with the thousands of Americans who will be touched in some way by cancer." □



15 YEARS AND COUNTING

On May 10, 1979, Kathryn Hasek celebrated a birthday that was simultaneously the birthday she will always remember and the one she would like to forget. On that day Fleming Harper, a physician at Barnes Hospital, performed a radical mastectomy on Hasek's left breast.

"I think my doctors were more concerned than I was. My mind had stopped working three days before when Doctor Harper informed me that the lump I had found during a routine self-examination might be cancer," said Hasek.

Hasek came through her surgery and recovery period with few complications and began radiation therapy at the Mallinckrodt Institute Radiation Oncology Center on June 18, 1979. Her treatments extended through July 24, and, according to Hasek, "I became good friends with Cobalt Sixty."



(6) Betty Clark, a nine-year cancer survivor, and husband Daniel live in Belleville, Illinois.



(7) Mozelle Bynum (shown with Celebration of Life volunteer Susie Perez) was treated in November of 1971 for cervical cancer.



(8) Kathryn Hasek and Dr. Carlos Perez.

(9) Alice Cohns, with Andrea and Asia Ranson, was diagnosed in 1983 with cancer of the larynx.



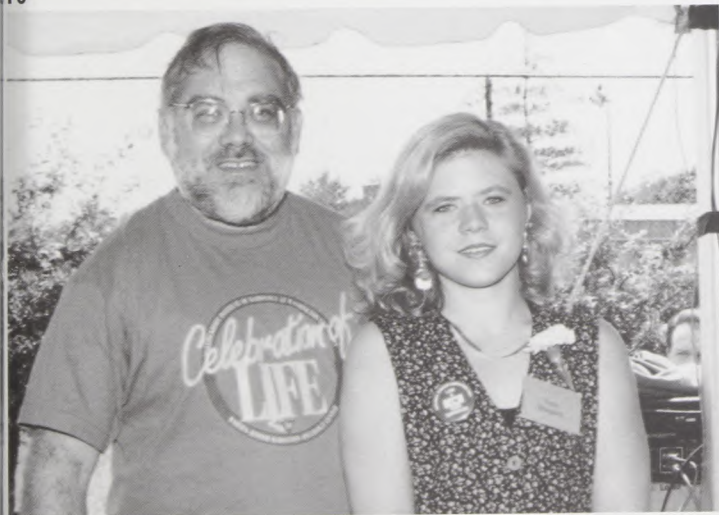
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(12) Bob Knapp, a supervisor in Mallinckrodt Institute's Division of Radiology Research, plays lead trumpet for "Code Blues," who had everyone tapping their feet and humming along with the music. Code Blues is part of "The Hot Docs," a jazz big-band comprised of medical center physicians, faculty, staff, and students.

(13) Tera Wiegand, at age 15, was the youngest cancer survivor attending the event. She was treated by Dr. Todd Wasserman in 1980 for abdominal cancer.

(14) Technologist Tammy Grongdzki pinned a yellow carnation on the lapel of Adrienne Yawitz, who was treated at the Radiation Oncology Center in 1985 for breast cancer.

(10) Bob and Christine Bowman are the proud parents of Adam, Dan, and Erik. Diagnosed with Hodgkin's disease at age 15, Christine was among the first generation of patients in the U.S. to receive radiation treatment delivered by a linear accelerator.

(11) William Bailey, a newscaster for WIN radio in Belleville, Illinois, was treated in 1973 for lymphoma and prostate cancer. Bailey, a dynamic speaker and a strong supporter of the Radiation Oncology Center, was interviewed by KMOX radio reporter Amy Flesch.

In return for the excellent care she received during therapy, Hasek promised the Center's staff that if she remained well, she would return in 10 years and celebrate with all her caregivers. On May 10, 1989, a vibrant Kathryn Hasek celebrated a healthy happy birthday. And true to her promise, Hasek, accompanied by husband Oliver and other family members, brought refreshments and thank-yous to the Radiation Oncology Center staff.

Hasek recently celebrated her eightieth birthday and her fifteenth year of remaining cancer-free. She urges all women to practice breast self-examination and to learn all the facts about cancer. Hasek is living proof that early detection of cancer and continued improvements in cancer treatments make the odds for survival even greater. □

THE DIRECTOR'S OFFICE REPORT

NEW STAFF

Erbil Akbudak, B.S., research assistant, Division of Radiology Research

Carlos F. Aquino-Aponte, M.D., instructor in radiology, Division of Diagnostic Radiology

Mark M. Bahn, M.D., Ph.D., assistant professor of radiology, Division of Diagnostic Radiology

Kun San Chao, M.D., instructor in radiology, Radiation Oncology Center

Venkata R. Devineni, M.D., associate professor of clinical radiology, Radiation Oncology Center

James R. Duncan, M.D., Ph.D., assistant professor of radiology, Division of Radiation Sciences

Fidelma L. Flanagan, M.D., research assistant in radiology, Division of Diagnostic Radiology

Elizabeth L. Gerard, M.D., assistant professor of radiology, Division of Diagnostic Radiology

David S. Gierada, M.D., instructor in radiology, Division of Diagnostic Radiology

Nilesh Gohel, M.S., research assistant in radiology, Division of Diagnostic Radiology

Paul S. Hsieh, M.D., instructor in radiology, Division of Diagnostic Radiology

Linda R. King, M.D., instructor in radiology, Division of Diagnostic Radiology

Yi Li, B.S., research assistant, Division of Radiology Research

James D. Matthews, M.D., instructor in radiology, Division of Diagnostic Radiology

William B. Mehard, M.D., instructor in radiology, Division of Diagnostic Radiology

David Piwnica-Worms, M.D., Ph.D., associate professor of radiology, Division of Radiation Sciences

Vallabheneni V. Rao, Ph.D., instructor in radiology, Division of Radiation Sciences

David E. C. Reichert, Ph.D., research associate in radiology, Division of Radiation Sciences

Vijay Sharma, Ph.D., instructor in radiology, Division of Radiation Sciences

Richard M. Slone, M.D., assistant professor of radiology, Division of Diagnostic Radiology

Zengmin Tian, M.D., research instructor in radiology, Division of Diagnostic Radiology

PROMOTION

Prabhat Goswami, Ph.D., was promoted to assistant professor of radiology, Radiation Oncology Center.

CHANGE IN STATUS

Robert E. Drzymala, Ph.D., was named assistant professor of radiology, clinical track, Radiation Oncology Center.

JOINT APPOINTMENT

Kelly N. Botteron, M.D., assistant professor of radiology, Division of Radiology Research

Steven R. Bergmann, M.D., Ph.D., associate professor of radiology, Division of Radiation Sciences

Wayne C. Drevets, M.D., assistant professor of radiology, Division of Radiation Sciences

John W. Haller, Ph.D., assistant professor of radiology, Division of Radiology Research

Dennis L. Lambert, Ph.D., instructor in radiology, Division of Diagnostic Radiology

Jeffrey L. Marsh, M.D., professor of radiology, Division of Radiology Research

Michael I. Miller, Ph.D., professor of radiology, Division of Radiology Research

Michael K. Pasque, M.D., associate professor of radiology, Division of Radiology Research

Gordon W. Philpott, M.D., professor of radiology, Division of Radiation Sciences

Douglas D. Robertson, M.D., Ph.D., assistant professor of surgery, Department of Surgery

Yvette I. Sheline, M.D., assistant professor of radiology, Division of Radiology Research

Donald L. Snyder, Ph.D., professor of radiology, Division of Radiology Research

Tom O. Videen, Ph.D., research assistant professor of radiology, Division of Radiation Sciences

OFF STAFF

Jorge G. Castillo, M.D., instructor in radiology, Radiation Oncology Center, has accepted a position at the North Broward Medical Center, Pompano Beach, Florida.

Paul Koppel, Ph.D., research instructor, Division of Nuclear Medicine, has transferred to Washington University's Pediatric Computing Facilities.

Zuofeng Li, D.Sc., research associate, Radiation Oncology Center

Ali Soleimani-Meigooni, Ph.D., assistant professor of radiology, Radiation Oncology Center, has accepted a position with the University of Kentucky, Lexington.

Xiao-Rong Zhu, Ph.D., research associate, Radiation Oncology Center, has transferred to the Jewish Hospital of St. Louis as a physics resident.

APPOINTMENTS/ ELECTIONS

Jeffrey J. Brown, M.D., associate professor of radiology and chief of the magnetic resonance imaging section, was appointed director of the MIR Clinical Research Laboratory and chairman of the Clinical Research Committee.

Jay P. Heiken, M.D., professor of radiology and cochief of computed body tomography, was appointed to the Standards Committee of the Society of Computed Body Tomography and Magnetic Resonance. The committee will develop criteria for performing and interpreting diagnostic computed tomographic scans of the abdomen and pelvis; the proposal will be presented to the American College of Radiology.

Bruce L. McClelland, M.D., professor of radiology and chief of abdominal radiology, was elected chairman of the American Roentgen Ray Society Instructional Courses Committee. He was appointed to the American Board of Radiology's Item Writing Committee and will help create the written board examinations for genitourinary radiology. McClelland organized "Radiology 1994: The Demands of Change," the American College of Radiology's Annual Summit Meeting held July 29 - 31 in Keystone, Colorado.

Scott A. Mirowitz, M.D., associate professor of radiology and radiologist-in-chief at Jewish Hospital, was elected as a member of the Society of Computed Body Tomography and Magnetic Resonance.

Eduardo G. Moros, Ph.D., assistant professor of radiology and chief of hyperthermia physics service, was appointed to a three-year term as a member of the American Association of Physicists in Medicine Hyperthermia Committee

Alan E. Schlesinger, M.D., assistant professor of radiology, pediatric radiology, was appointed chairperson of the Society for Pediatric Radiology Education Committee.

Robert G. Swanson, M.D., resident, Radiation Oncology Center, was elected councilor for the Missouri State Medical Association. He was elected treasurer of the American Medical Association - Resident Physician Section, Missouri Delegation.

Jeffrey F. Williamson, Ph.D., associate professor of radiology and chief of brachytherapy physics service, was appointed codirector of the American Association of Physicists in Medicine Summer School, "Modern Clinical Brachytherapy Physics," held July 18 -22 in San Diego. He was appointed to a three-year term as a member of the American Association of Physicists in Medicine Radiation Therapy Committee.

FELLOWSHIPS/ GRANTS

Thomas E. Conturo, M.D., Ph.D., assistant professor of radiology, Division of Radiology Research, is principal investigator for a \$65,000 Mallinckrodt Medical, Inc./Mallinckrodt Institute of Radiology Collaborative Agreement Grant — "Evaluation of New MR Contrast Agents." Coinvestigators for the one-year grant are **Marcus E. Raichle, M.D.**; **William J. Powers, M.D.**; **Michael J. Welch, Ph.D.**;

and Joseph J. H. Ackerman, Ph.D., Washington University departments of Chemistry and Medicine.

Clayton R. Hunt, Ph.D., assistant professor of radiology, Radiation Oncology Center, received a five-year grant in the amount of \$652,784 from the National Cancer Institute for research on "Hyperthermia of Cells Lacking HSP70 Expression."

HONORS/ AWARDS

Louis A. Gilula, M.D., professor of radiology and chief of musculoskeletal radiology, organized and conducted The International Wrist Investigators' Workshop held May 22 at the Mayo Clinic, Rochester, Minnesota.

Jay P. Heiken, M.D., professor of radiology and cochief of computed body tomography, and **Bruce L. McClelland, M.D.**, professor of radiology and chief of abdominal radiology, served as guest examiners for the American Board of Radiology oral examination held June 6 - 9 in Louisville.

Eric E. Klein, M.S., instructor in radiology, Radiation Oncology Center, received the American Association of Physicists in Medicine Medical Physics Travel Award, presented at the AAPM's annual meeting in July in Anaheim. As invited lecturer, Klein will speak at the University of Lund, Uppsala University, Semko Medicinsk Teknik, and Stockholm University, Sweden.

HONORS/ AWARDS

continued from page 23

Todd Wasserman, M.D., professor of radiology and clinical chief of the Radiation Oncology Center, Jewish Hospital, served as chairman for Hodgkin's disease protocols #90-51 and #93-91 (in combination with the SouthWest Oncology Group protocol) and was a member of the Lymphoma Core, Membership, and Radiation Therapy Core committees at the Cancer and Leukemia Group B

meeting held April 27-May 1 in Washington, D.C. He was chairman of the Quality of Life and the Corporate Relations committees, vice-chairman for Modality Studies and of the Chemical and Biologic Modifiers Committee, and a member of the Quality Control, Executive, Steering, and Long Range Planning committees at the Radiation Therapy Oncology Group meeting in Philadelphia, July 14-17.

VISITING PROFESSORS & INVITED LECTURERS

Bahman Emami, M.D., FACR, professor of radiology and associate director for research, Radiation Oncology Center, as invited lecturer, spoke on "RT Fractionation/3D" at the 7th World Conference on Lung Cancer, Colorado Springs, June 26 - July 1.

Julie A. Fiez, Ph.D., research associate, Division of Radiation Sciences, lectured on "Teaching Elementary and Secondary Students about Language and Memory" at the Washington University Education Workshop, St. Louis, April 26. She spoke on "Seeing and Hearing Words in Your Head: Functional Imaging and Lesion-behavior Studies of Language Processing," Carleton University, Northfield, Minnesota, May 27.

Ronald G. Evens, M.D., professor of radiology, chairman of the Department of Radiology, and director of the Institute, presented "Radiology's Place in Managed Competition" and "Panel on Capitation" at the Radiology Assembly MGMA Program, Phoenix, March 7. As invited lecturer, he spoke on "Health Care Reform, Revolution or Reconfiguration — Which Will It Be for Academic Medicine and Radiology?" at the First Annual Department of Radiology Distinguished Lecture, University of Virginia Health Sciences Center, Charlottesville, April 11. He discussed "Managed Care and Managed Competition - Impact on Radiology" at "Managing Radiology in a Competitive Environment," Brigham and Women's Hospital, Harvard Medical School, Boston, May 4. Evens spoke on "The New

World of Managed Care and Its Impact on Specialty Medicine/Radiology" at the 1994 Medical Alumni Reunion, Washington University School of Medicine, St. Louis, May 14. He lectured on "Managed Care" at the Greater St. Louis Society of Radiologists meeting, St. John's Mercy Medical Center, St. Louis, May 16. Evens presented "Managed Competition and Its Impact on Radiologists and Radiology" at the Houston Radiological Society meeting, May 23. He lectured on "How to Analyze Job Opportunities" to house staff at the University of Texas, Houston, and at Baylor College of Medicine, Waco, May 23. Evens spoke on "The Clinton Health Proposal and Its Impact on Radiology" and "The American College of Radiology: Its Importance to Radiologists in Times of Crises" at the Colorado Radiological Society, Colorado Springs, June 11 and 12.

Louis A. Gilula, M.D., professor of radiology and chief of musculoskeletal radiology, presented "Overview: CT of Musculoskeletal System," "Plain Film Approach to Musculoskeletal Neoplasia," and "X-ray Approach to Wrist Pain" to the Thai Physicians' Association, Bangkok, July 7. He spoke on "CT of Musculoskeletal System" at the Singapore Radiologic Society, Singapore, July 13.

Harvey S. Glazer, M.D., associate professor of radiology, Division of Diagnostic Radiology, presented "Mediastinal Masses - Differential Diagnosis on CT" at the Richmond Radiological Society, April 7. He spoke on "Differential Diagnosis in Plain Film Radiography" and "Pitfalls in the Radiologic Evaluation of Bronchogenic Carcinoma," Medical College of Virginia, Richmond, April 7.

Perry W. Grigsby, M.D., professor of radiology and clinical chief of the Radiation Oncology Center, Barnes Hospital, spoke on "Treatment of Endometrial Carcinoma," "Sexual Dysfunction in Gynecologic Oncology Patients," and "Clinical Trials in Cervical Cancer" as a participant in the American Cancer Society's Traveling Oncology Consultant Program, southern California, March 21 - 25. As invited lecturer and panel member, Grigsby discussed and presented "Combined Modality Therapy for Treatment of Cervical Cancer" at the American Radium Society's 76th Annual Meeting, Bermuda, April 22 - 26. He lectured on "Socioeconomic Aspects of Remote Afterloading" at the American Association of Physicists in Medicine Summer School, University of California, San Diego, July 18 - 22.

William B. Harms, B.S., instructor in radiology, Radiation Oncology Center, spoke on "3-D Conformal Treatment Planning" at the American Society for Radiologic Technologists 66th Annual Conference, St. Louis, June 20 - 24.

Jay P. Heiken, M.D., professor of radiology and cochief of computed body tomography, lectured on "CT and MR Evaluation of Renal Neoplasms" and "Contrast Enhancement Techniques for Hepatic CT" and, in workshops, presented "Practical Approach to Retroperitoneal Fluid Collections and Masses" and "CT and MRI of the Aorta" at the Seventeenth Annual Course of the Society of Computed Tomography and Magnetic Resonance, Seattle, April 18 - 22.

Eric E. Klein, M.S., instructor in radiology, Radiation Oncology Center, spoke on "Dosimetry and Clinical Implementation of Dynamic Wedge and Multi-leaf Collimation" at William Beaumont Hospital, Royal Oak, Michigan, May 23. He presented "New Technologies on Linear Accelerators" at the American Society for Radiologic Technologists 66th Annual Conference, St. Louis, June 20 - 24. Klein lectured on "Dynamic Wedge Dosimetry" at the 36th Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine, Anaheim, July 24 - 28.

Hsiu-san Lin, M.D., professor of radiology, Radiation Oncology Center, lectured on "Adaptation in Cancer Therapy" at General Veterans Hospital, Taipei, May 10.

Daniel A. Low, Ph.D., instructor in radiology, Radiation Oncology Center, spoke on "Evaluation of Ratio-TAR Photon and Electron Pencil Beam Dose Calculation Algorithms for 3D Treatment Planning" at the ICCR Meeting, Manchester, England, March 20 - 24. He presented "On-line Imaging" at the American Society for Radiologic Technologists 66th Annual Conference, St. Louis, June 20 - 24.

Bruce L. McClelland, M.D., professor of radiology and chief of abdominal radiology, as invited guest lecturer, presented "Staging Renal Cancer - 1994" and "Contrast Media Reaction - Recognize & Respond" at the British Institute of Radiology meeting, Harrogate, England, May 23 - 25. He spoke on "Contrast Reactions - Treatment" at the International Special Procedures Conference, Chicago, May 11 and 12. McClelland presented "Performance Evaluations of Soft Copy Display for Imaging Evaluations and Diagnosis in a GI/GU Environment" at the Symposium for Computer Assisted Radiology (SCAR '94), Winston-Salem, June 13 - 15.

Eduardo G. Moros, Ph.D., assistant professor of radiology and chief of hyperthermia physics service, spoke on "A Scanning Ultrasound Reflector - Linear Array System (SURLAS) for External Superficial Simultaneous Thermo-Radio-Therapy (STRT)" at the 36th Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine, Anaheim, July 24 - 28.

Gilbert H. Nussbaum, Ph.D., associate professor of radiology, Radiation Oncology Center, chaired a workshop on "Temperature Distributions Produced in Clinical Applications of Interstitial and Intracavitary Hyperthermia" at the 14th Annual Meeting of the North American Hyperthermia Society, Nashville, April 29 - May 4.

Carlos A. Perez, M.D., professor of radiology and director of the Radiation Oncology Center, presented "Radiation Therapy and Chemotherapy in Carcinoma of the Uterine Cervix" and "Advances in Radiation Therapy" at the Circulo de Radioterapeutas Ibero-Latinoamericanos, Buenos Aires, April 10 - 13. As visiting professor, he spoke on "Update: Role of Radiation Therapy in Carcinoma of the Cervix" and "Radiation Therapy in Carcinoma of the Vagina" at Methodist Hospital, New York, April 20. Perez lectured on "Techniques of Intracavitary Application in the Treatment of Cancer of the Cervix: Low, Medium, and High Dose Rate," "Role of Irradiation in the Management of Carcinoma of the Cervix," and "Role of Postoperative Irradiation in the Treatment of Carcinoma of the Cervix and Endometrium" at the Endocurietherapy & Hyperthermia Workshop/Symposium, Long Beach, May 5 - 7. He presented "Multimodality of Treatment for Locally Advanced Breast Cancer" at the American College of Radiology 26th National Conference on Breast Cancer, Palm Springs, May 8 - 13.

Joel S. Perlmutter, M.D., associate professor of neurology and radiology, Division of Radiation Sciences, as part of The Scientific Basis of Neurology Course, spoke on "PET Investigations of Dopaminergic Pathways" and cochaired a session on "Movement Disorders: Neuroimaging" at the American Academy of Neurology meeting, Washington, D.C., May 1 - 4. He presented "PET Investigations of Movement Disorders" at Grand Rounds, the University of Missouri Medical School, Columbia, June 9.

James A. Purdy, Ph.D., professor of radiology and associate director of the Radiation Oncology Center, lectured on "Optimization of 3-D Conformal Radiation Therapy - A Physicist's Perspective" at the Radiation Research Scientific Meeting, Nashville, May 2 - 4. He spoke on "Linear Accelerator Acceptance Testing and Quality Assurance," "Photon Beam Dosimetry," "Dose Distribution and Scatter Analysis," "Treatment Planning," and "Recent Advances in Radiation Oncology" at the American Association of Physicists in Medicine International Scientific Exchange Program - Course/Workshop on Radiation Oncology Physics, Shahid Beheshti Medical Sciences University, Tehran, Iran, May 22 - 26. Purdy presented "QA of Prostate and 3-D CRT Multi-institutional Clinical Trial" to the National Cancer Institute - Division of Cancer Treatment, Board of Scientific Counselors, Washington D.C., June 13.

VISITING PROFESSORS & INVITED LECTURERS

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Stuart S. Sagel, M.D., professor of radiology, chief of chest radiology, and cochief of computed tomography, spoke on "Imaging of Vascular Mediastinal Lesions" and "Spiral CT of the Thorax" at the 17th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Seattle, April 18 - 22. He presented "CT of the Pericardium" and "Optimized Display of Digital Chest Radiographs" at the 24th Annual Symposium on Chest Disease and Meeting of the Fleischner Society, Florence and San Miniato, Italy, May 5 - 10.

Peter E. Shile, M.D., assistant professor of radiology, breast imaging section, spoke on "Stereotactic Needle Core Biopsy" at the Missouri Society of Radiologic Technologists meeting, St. Louis, March 19. As part of a Teleconferencing Series titled "Rounds in Adult Health" (which was broadcast to Alton Memorial Hospital, Barnes-St. Peters Hospital, Blessing Hospital, and Cox Medical Center South), Shile presented "American College of Radiology Breast Imaging Reporting System," March 30.

Barry A. Siegel, M.D., professor of radiology and director of the Division of Nuclear Medicine, as the 17th Annual Ted Bloch Memorial Lecture guest speaker, presented "How the FDA Regulates Radiopharmaceuticals" and, as a participant in the Nuclear Medicine Update Session, spoke on "How to Interpret V/Q Studies in Light of PLOPED" at the Southwestern Chapter of the Society of Nuclear Medicine's 39th Annual Meeting, Albuquerque, April 7 - 10.

Marilyn J. Siegel, M.D., professor of radiology, pediatric radiology, presented "CT of Abdominal Masses in Children," "CT of the Pediatric Retroperitoneum," and "MRI of Hematopoietic Diseases" at the 17th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Seattle, April 18 - 22. As visiting professor, she lectured on "Chest Applications of CT and MRI in Children" and "CT and MRI of Abdominal and Pelvic Masses in Children," Tulane Medical School, New Orleans, April 25. Siegel spoke on "Transcranial Doppler Sonography and Sick Cell Anemia" at the Society of Pediatric Radiology Annual Meeting, Colorado Springs, April 28 - May 1.

Joseph R. Simpson, M.D., Ph.D., FACR, associate professor of radiology, Radiation Oncology Center, spoke on "Brain Tumor Treatment Decisions" at the Neuroscience Care Symposium, St. Louis University Health Sciences Center, June 27.

Celette Sugg Skinner, Ph.D., research instructor in radiology, Division of Radiology Research, presented "Another Look at Barriers to Screening Mammography" (a scientific exhibit coauthored with Dirk-Jan den Boer, Ph.D., University of Amsterdam, and Victor J. Strecher, Ph.D., University of North Carolina School of Public Health) at the 16th Annual Meeting of the Society of Behavioral Medicine, Boston, April 15.

Richard K. Valicenti, M.D., resident, Radiation Oncology Center, presented "Validation of Monte Carlo Dose Calculations about a High-Intensity Ir-192 Source for Pulsed Dose Rate Brachytherapy Using Thermoluminescent Dosimetry" at the 36th Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine, Anaheim, July 24 - 28.

Ge Wang, Ph.D., assistant professor of radiology, Division of Radiology Research, as invited speaker, presented "Further Generalization of Feldkamp Algorithm for X-ray Microtomography" at "SCANNING 94/SEEMS 94," The Sixth International Scientific Meeting sponsored by the Foundation for Advances in Medicine and Science held jointly with the Annual Meeting of The Southeastern Electron Microscopy Society, May 18, Charleston, South Carolina.

Todd H. Wasserman, M.D., professor of radiology and clinical chief of the Radiation Oncology Center, Jewish Hospital, as a member of the 1994 Program Committee, served on a panel discussion of "Combined Modality Therapy" and lectured on "Lymphomas" at the American Radium Society meeting, Bermuda, April 22-26.

Jeffrey F. Williamson, Ph.D., associate professor of radiology and chief of brachytherapy physics service, spoke on "New Directions in Brachytherapy Physics" and "Monte Carlo Photon Transport Calculations: A New Clinical Dosimetry Tool for Brachytherapy" at the Cross Cancer Institute, Edmonton, Alberta, Canada, March 7 - 9. He presented 12 lectures on "External Beam Treatment Planning," "Brachytherapy Physics," "Dose Specification," "Treatment Optimization," and "Conformal Radiotherapy" for an International Atomic Energy Agency-sponsored treatment-planning training course, Caracas, Venezuela, May 5 - 13.

O. Clark West, M.D., instructor in radiology, musculoskeletal radiology, presented "Current Concepts in the Imaging of the Blunt Trauma Patient" at the Spring Seminar - Trauma, Freeman Hospital, Joplin, Missouri, June 11.

Anthony J. Wilson, M.B., Ch.B., associate professor of radiology and director of emergency radiology, presented "Musculoskeletal MRI" at St. Gorans Hospital, Stockholm; the University of Lund Radiology Department, Lund; and The Radiologic Society, Gothenberg, Sweden, May 2 - 8. He spoke on "Musculoskeletal MRI" at the Thai Physicians' Association, Bangkok, July 7.

Franz J. Wippold, M.D., associate professor of radiology, neuroradiology section, as visiting consultant, lectured on topics in neuro-radiology and head-and-neck radiology and taught a Board Review Course at the Walter Reed Army Medical Center, Washington D.C.; the National Naval Medical Center, Bethesda; and the Uniformed Services University of the Health Sciences, Bethesda, May 16 - 27.

Darryl A. Zuckerman, M.D., assistant professor of radiology, vascular and interventional radiology, presented "Interventional Radiology in 1994" at Medical Grand Rounds, Jewish Hospital, St. Louis, April 5.

SYMPOSIA

MEDICAL IMAGING 1994

The following Mallinckrodt Institute staff members (highlighted in boldface type) participated in Medical Imaging 1994, sponsored by The Society of Photo-Optical Instrumentation Engineers, Newport Beach, February 13 - 18.

R. Gilbert Jost, M.D., symposium cochair.

PHYSIOLOGY AND FUNCTION FROM MULTIDIMENSIONAL IMAGES

Daniel P. Schuster, M.D., chair, Session 4, "Pulmonary Structure/Function."

Daniel P. Schuster, M.D.; Joanne Markham, M.S.*; "Effect of Acute Lung Injury on the Spatial Correlation of Regional Pulmonary Perfusion." *Biomedical Computing Laboratory, Washington University School of Medicine, St. Louis.

PACS: DESIGN AND EVALUATION

R. Gilbert Jost, M.D., conference chair.

R. Gilbert Jost, M.D., chair, Session 14 "Modeling, Development, and Planning for the Future."

Robert A. Whitman, M.S.; **G. James Blaine, D.Sc.**; Matthew J. Orland, M.D.*; **Stephen M. Moore, M.S.**; **Thomas R. Leith, B.S.**; **David E. Beecher, M.S.**; **Barrett R. Madden, lab assistant**, "Performance of a Teleradiology Medical Doctor's Workstation Supported by N-ISDN."

*Department of Internal

Medicine, Washington University School of Medicine, St. Louis.

Stephen M. Moore, M.S.; Fred W. Prior, Ph.D.*; **G. James Blaine, D.Sc.**; David S. Channin, M.D.*; Judy Kilday, M.S.*; "Measured Performance of DICOM-TCP and DICOM-ISO Implementations." *Pennsylvania State University, College of Medicine, University Park.

Anthony J. Wilson, M.B., Ch.B.; **William G. Totty, M.D.**; **Evren Senol, M.S.**; **Thomas K. Pilgram, Ph.D.**; **G. James Blaine, D.Sc.**, "Digitization and Remote Transmission of Magnetic Resonance Hard-copy Images: A Clinical Comparison of Original and Soft-copy Images."

Steven C. Horii, M.D.*; Harold L. Kundel, M.D.*; **Peter E. Shile, M.D.**; Bruce Carey**; Sridhar B. Seshadri, M.S.E.E., M.B.A.*; Eric Feingold, M.S.E.E.*; "Intensive Care Unit Referring Physician Usage of PACS Workstation Functions Based on Disease Categories." *University of Pennsylvania Hospital, Philadelphia. **Abington Memorial Hospital, Abington, Pennsylvania.

Peter E. Shile, M.D.; Harold L. Kundel, M.D.*; Sridhar B. Seshadri, M.S.E.E., M.B.A.**; Sheel Kishore, M.S.E.E.**; Inna Brickmann, B.S.**; Eric Feingold, M.S.E.E.**; Paul N. Lanken, M.D.**; "Clinical Demand for and Access to Images and Interpretations of Chest Radiographs in a Medical Intensive Care Unit Serviced by an Integrated PACS-radiology Information System." *Pendergrass Diagnostic Research Lab, University of Pennsylvania, Philadelphia. **University of

Pennsylvania Hospital, Philadelphia.

Harold L. Kundel, M.D.*; Sridhar B. Seshadri, M.S.E.E., M.B.A.**; **Peter E. Shile, M.D.**; Marcia Polansky, Ph.D.***; Paul N. Lanken, M.D.**; Steven C. Horii, M.D.**; Jenine A. Purcell, M.S.**; Sheel Kishore, M.S.E.E.**; Inna Brickmann, B.S.**; Mary T. Bozzo, R.N.**; Regina R. Redfern, R.T.**; "Evaluation of PACS in a Medical Intensive Care Unit: The Effect of Computed Radiography." *Pendergrass Diagnostic Research Lab, University of Pennsylvania, Philadelphia. **University of Pennsylvania Hospital, Philadelphia. ***Hahnemann University and Hospital, Philadelphia.

Stephen Moore, M.S.; **David E. Beecher, M.S.**; **Sheldon A. Hoffman, M.S.**, "DICOM Shareware: A Public Implementation of the DICOM Standard."

THE AMERICAN ROENTGEN RAY SOCIETY

The following Mallinckrodt Institute staff members (highlighted in boldface type) participated in the 94th Annual Meeting of The American Roentgen Ray Society, New Orleans, April 24 - 29.

Ronald G. Evens, M.D., "The Importance of Technology Assessment to the Specialty of Radiology."

CATEGORICAL COURSES

Dennis M. Balfe, M.D., "CT of the Retroperitoneal Spaces."

SYMPOSIA

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Stuart S. Sagel, M.D., "CT of Vascular Mediastinal Lesions."

Marilyn J. Siegel, M.D., "CT of the Pediatric Abdomen."

INSTRUCTIONAL COURSES

Resident-Master Tutorial

Bruce L. McClennan, M.D., director, Introduction to Research Program for Residents.

Bruce L. McClennan, M.D., "Historical Perspectives and Current Concepts in GU Radiology."

SCIENTIFIC SESSIONS

Bruce L. McClennan, M.D., moderator, "GU - Prostate."

L. Santiago Medina, M.D.;
Marilyn J. Siegel, M.D.;
Harvey S. Glazer, M.D., "Imaging of Airway Complications in Pediatric Lung Transplantation."

Shawn P. Quillin, M.D.;
Marilyn J. Siegel, M.D., "Perforating Appendicitis: Color Doppler Sonography."

James E. Stark, M.D.;
Marilyn J. Siegel, M.D., "Ovarian Torsion in Pre- and Postpubertal Girls."

Colin P. Derdeyn, M.D.;
Christopher J. Moran, M.D.;
DeWitte T. Cross, M.D.;
Robert L. Grubb, M.D.;
Ralph G. Dacey, M.D.*, "Intraoperative Digital Subtraction Angiography: A Review of 100 Consecutive Examinations." *Department of Neurological Surgery, Washington University School of Medicine, St. Louis.

Carey L. Siegel, M.D.;
Richard H. Cohan, M.D.*;
Melvyn Korobkin, M.D.*;
Michael A. Alpern, M.D.*, "CT Features of Ruptured and Non-Ruptured Abdominal Aortic Aneurysms."

*University of Michigan, Ann Arbor. **Henry Ford Hospital, Ann Arbor.

Lane A. Deyoe, M.D.;
Michael D. Darcy, M.D.;
William D. Middleton, M.D.;
Sharlene A. Teeffey, M.D.;
James A. Brink, M.D.;
Shawn P. Quillin, M.D., "Ultrasound of TIPS Complications."

Colin P. Derdeyn, M.D.;
Christopher J. Moran, M.D.;
John O. Eichling, Ph.D.;
DeWitte T. Cross, M.D., "Radiation Exposure to Patients and Personnel During Intraoperative Neuroangiography."

Richard M. Slone, M.D., "The Contribution of Coauthors to Major Papers."

SCIENTIFIC EXHIBITS

Jacqueline C. Hodge, M.D.;
Louis A. Gilula, M.D.;
Frederick A. Mann, M.D.*, Silver Medal award for "Diagnosis of Wrist Trauma - When Experts Differ: Separate Effects of Interreader Variation and Educational Bias." *Harborview Hospital, University of Washington Medical Center, Seattle.

Richard M. Slone, M.D.;
Harvey S. Glazer, M.D.;
Sudhar Sundaresan, M.D., Certificate of Merit award for "Understanding the Staple Line Patterns Seen on Chest Radiographs Following Lobectomy."

Mitchell A. Miller, M.D.;
Kevin W. McEnery, M.D.;
O. Clark West, M.D.;
Anthony J. Wilson, M.B., Ch.B., "Spiral CT Evaluation of Acetabular Fractures."

Robert Y. Kanterman, M.D.;
Thomas M. Vesely, M.D., "Diagnosis and Percutaneous Treatment of Complications Associated with Hemodialysis Access."

Alan E. Schlesinger, M.D.;
Michael A. DiPietro, M.D.*, "Common Applications of Musculoskeletal Sonography in Children." *University of Michigan, Ann Arbor.

James E. Stark, M.D.;
Marilyn J. Siegel, M.D.;
Edward Weinberger, M.D.*;
Dennis W. W. Shaw, M.D.*, "MRI of the Pediatric Knee." *University of Washington Medical Center, Seattle.

Scott A. Mirowitz, M.D.;
Peter L. Apicella, M.D., "Pitfalls and Artifacts in Liver MR Imaging."

Zhiyun Yang, M.D.;
Yi Wang, M.D.;
Louis A. Gilula, M.D., "Radiologic Appearance of Kashin-Beck's Disease in the Hand and Wrist."

Richard M. Slone, M.D., "Reproducing Radiographs from Slides."

Mitchell A. Miller, M.D.;
Kevin W. McEnery, M.D.;
O. Clark West, M.D.;
Anthony J. Wilson, M.B., Ch.B., "Musculoskeletal Trauma Evaluation with Spiral CT."

Jeffrey A. Friedland, M.D.;
Robert Y. Kanterman, M.D.;
Fernando R. Gutierrez, M.D., "Patterns of Calcification Seen on Chest Radiographs."

Shawn P. Quillin, M.D.;
Lane A. Deyoe, M.D.;
William D. Middleton, M.D.;
Michael D. Darcy, M.D.;
Sharlene A. Teeffey, M.D.;
James A. Brink, M.D., "Evaluation of Doppler Criteria Used to Diagnose TIPS Complications."

THE SOCIETY OF NUCLEAR MEDICINE

The following Mallinckrodt Institute staff members (highlighted in boldface type) participated in the 41st Annual Meeting of The Society of Nuclear Medicine, Orlando, June 5 - 8.

SCIENTIFIC PAPERS

Carolyn J. Anderson, Ph.D., moderator, "Radio-pharmaceutical Chemistry: Proteins/Antibodies/Peptides I," Session 18.

Robert J. Gropler, M.D., comoderator, "Cardiovascular PET: Assessment of Tissue Availability," Session 24.

Stephen M. Moerlein, Ph.D., moderator, "Radio-pharmaceutical Chemistry: Positrons I."

Sally W. Schwarz, R.Ph., M.S., moderator, "Radio-pharmaceutical Chemistry: Proteins/Antibodies/Peptides II," Session 40.

Barry A. Siegel, M.D., moderator, "Pulmonary I," Session 15.

Thomas A. Bonasera, M.A.;
Tammy S. Pajean, M.S.;
Michael J. Welch, Ph.D., "D3FES, A Doubly Labeled (F-18 and H-2) Estrogen Receptor Ligand with Reduced In Vitro 17-Oxidation as Compared to FES."

Gordon W. Philpott, M.D.*; **Farrokh Dehdashti, M.D.**; **Sally W. Schwarz, R.Ph., M.S.**; Judith M. Connett, Ph.D.*; **Carolyn J. Anderson, Ph.D.**; Kurt R. Zinn, D.V.M., Ph.D.**; Claude F. Meares, Ph.D.***; **Michael J. Welch, Ph.D.**; **Barry A. Siegel, M.D.**, "Positron Emission Tomography (PET) with Cu-64-Labeled Monoclonal Antibody (Mab 1A3) in Colorectal Cancer." *Department of General Surgery, Washington University School of Medicine, St. Louis. **Research Reactor, University of Missouri, Columbia. ***Department of Chemistry, University of California, Davis.

Patricia J. Rubin, M.D.; **Dong Soo Lee, M.D., Ph.D.**; Edward M. Geltman, M.D.*; Julio E. Perez, M.D.*; Steven R. Bergmann, M.D., Ph.D.*; **Robert J. Gropler, M.D.**, "The Superiority of PET with C-11 Acetate Compared with F-18 Fluorodeoxyglucose for Prediction of Functional Recovery Early after Myocardial Infarction." *Department of Internal Medicine, Washington University School of Medicine, St. Louis.

Tammy S. Pajean, M.S.; **Carolyn J. Anderson, Ph.D.**; Yizhen Sun, Ph.D.*; Ramunas J. Motekaitis, Ph.D.*; Arthur E. Martell, Ph.D.*; **Michael J. Welch, Ph.D.**, "The Biological Evaluation of Three In-111 Labeled Noncyclic, Sulfhydryl-substituted Ethylenediamines." *Department of Chemistry, Texas A&M University, College Station.

Ming Xu, M.S.; **P. Duffy Cutler, Ph.D.**; Paul K. Luk, M.S.*; "Local Threshold Segmented Attenuation Correction with Emission Data Subtraction for PET Thorax Imaging." *CTI PET Systems, Inc., Knoxville.

Thomas A. Bonasera, M.A.; James P. O'Neil, Ph.D.*; Yearn S. Choe, Ph.D.*; **Lennis L. Lich, cyclotron supervisor**; **John T. Hood, Jr., senior medical research technician**; **Michael J. Welch, Ph.D.**; John A. Katzenellenbogen, Ph.D.*; "Imaging the Prostate in Baboons with Fluorine-18 Labeled Androgen Receptor Ligands." *Department of Chemistry, University of Illinois, Urbana.

Lei Zheng, Ph.D.; **Chun Ma, Ph.D.**; **Timothy J. McCarthy, Ph.D.**; **Michael J. Welch, Ph.D.**, "Synthesis of 1-(2-Nitro-1-Imidazolyl)-3-(2-[F-18]-Fluoromethyl-1-Aziridinyl)-2-Propanol, A Potential Hypoxic Radiosensitizer for PET."

Jerold W. Wallis, M.D.; **Tom R. Miller, M.D., Ph.D.**; **Paul L. Koppel, Ph.D.**, "Attenuation Correction in Cardiac SPECT without a Transmission Source."

Carolyn J. Anderson, Ph.D.; **W. Barry Edwards, M.S.**; **Tammy S. Pajean, M.S.**; Kurt R. Zinn, D.V.M., Ph.D.*; **Michael J. Welch, Ph.D.**, "Cu-64-TETA-D-Phe-1-Octreotide: A Positron-emitting Somatostatin Receptor Imaging Agent with Receptor Binding and Renal Clearance Similar to In-111-DTPA-D-Phe-1-Octreotide." *Research Reactor, University of Missouri, Columbia.

W. Barry Edwards, M.S.; **Carolyn J. Anderson, Ph.D.**; **Michael J. Welch, Ph.D.**; Cynthia G. Fields, M.S.*; Gregg B. Fields, Ph.D.*; "Solid-phase Synthesis of D-Trp-4(boc)-Lys-5(boc)-Thr-6(tBu)-Octreotide: A Precursor to Radiolabeled Octreotide Analogs." *Department of Laboratory Medicine and Pathology, University of Minnesota, Minneapolis.

Stephen M. Moerlein, Ph.D.; **Joel S. Perlmutter, M.D.**; **Michael J. Welch, Ph.D.**, "PET Measurement of Reversibility and Noninternalization of N-Methyl-[F-18]Benperidol Binding to Dopamine Receptors."

Farrokh Dehdashti, M.D.; Joanne E. Mortimer, M.D.*; Landis K. Griffith, M.D., Ph.D.**; Andrea H. McGuire, M.D.***; Diane M. Radford, M.D.****; **Maureen J. Fusselman, M.S., B.S.N.**; **Renee J. Burney, C.N.M.T.**; **Thomas A. Bonasera, M.S.**; **Barry A. Siegel, M.D.**; John A. Katzenellenbogen, Ph.D.*****; **Michael J. Welch, Ph.D.**, "Positron Tomographic Assessment of Breast Lesions with FDG and FES." *Department of Internal Medicine, Washington University School of Medicine, St. Louis. **Department of Radiology, Baylor University Medical Center, Dallas. ***Mercy Hospital, Des Moines. ****Department of General Surgery, Washington University School of Medicine, St. Louis. *****Department of Chemistry, University of Illinois, Urbana.

POSTER SESSIONS

Robert J. Gropler, M.D.; Joanne Markham, M.S.*; Janet B. McGill, M.D.**; Edwin Hsu,***; Ali Hamzei***; **Deborah A. Garrison, R.N.**; **Patricia J. Rubin, M.D.**, "Limitation of Quantification of Myocardial Glucose Utilization Rates by Patlak Graphical Analysis in Patients with Coronary Artery Disease." *Biomedical Computing Laboratory, Washington University School of Medicine, St. Louis. **Department of Internal Medicine, Washington University School of Medicine, St. Louis. ***4th-year student, Washington University School of Medicine, St. Louis.

P. Duffy Cutler, Ph.D.; **Sally W. Schwarz, R.Ph., M.S.**; **John O. Eichling, Ph.D.**; Gordon W. Philpott, M.D.*; **Michael J. Welch, Ph.D.**, "Whole-body Dosimetry from PET Images of Mono-clonal Antibodies Labeled with Cu-64." *Department of General Surgery, Washington University School of Medicine, St. Louis.

Carolyn J. Anderson, Ph.D.; Judith M. Connett, Ph.D.*; Li W. Guo, M.S.*; **Sally W. Schwarz, R.Ph., M.S.**; Gordon W. Philpott, M.D.**; Kurt R. Zinn, D.V.M., Ph.D.*; **Michael J. Welch, Ph.D.**, "Initial Comparison of Cu-67- and Cu-64-Labeled Anticorectal Carcinoma Mab 1A3 as Agents for Radioimmunotherapy in Tumor-bearing Hamsters." *Department of General Surgery, Washington University School of Medicine, St. Louis. **Research Reactor, University of Missouri, Columbia.

SYMPOSIA

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Farrokh Dehdashti, M.D.; Landis K. Griffeth, M.D., Ph.D.*; Andrea H. McGuire, M.D.**; **Barry A. Siegel, M.D.**, "FDG-PET Evaluation of Osseous Lesions."

*Department of Radiology, Baylor University Medical Center, Dallas. **Mercy Hospital, Des Moines.

Teresa J. Jones-Wilson, research assistant; **Michael J. Welch, Ph.D.;** Yizhen Sun, Ph.D.*; Arthur E. Martell, Ph.D.*; "Studies of New Hydroxyphenyl and Hydroxypyridyl Substituted Triazacyclononane Ligands for Use with Gallium and Indium." *Department of Chemistry, Texas A&M University, College Station.

Gregory G. Gaehle, B.S.; **Carmen S. Dence, M.S.;** **Michael J. Welch, Ph.D.;** Barbara J. Hughey, Ph.D.*; Robert E. Klinkowstein, Ph.D.*; Ruth E. Shefer, Ph.D.*; "Production of Clinically Useful Amounts of Oxygen-15 Radiopharmaceuticals with a Tandem Cascade Accelerator." *Science Research Laboratory, Somerville, Massachusetts.

Elio N. Napolitano, Ph.D.*; **Carmen S. Dence, M.S.;** **Michael J. Welch, Ph.D.;** John A. Katzenellenbogen, Ph.D.*; "Carbon-11 Labeled Estrogens as Imaging Agents for Breast Tumors." *Department of Chemistry, University of Illinois, Urbana.

CONTINUING EDUCATION *Radiopharmaceutical: Use of Radiolabeled Peptides for Diagnostic Imaging*

Edward A. Deutsch, Ph.D., "The Chemistry of Octreoscan and Other Radiolabeled Peptides."

Radionuclide Monitoring of Organ Transplants

Henry D. Royal, M.D., "The Evaluation of Heart and Lung Transplants."

Nuclear Medicine Review Course

Henry D. Royal, M.D., "Nuclear Accident Management."

TECHNOLOGISTS SECTION

Deborah Garrison, R.N.; Victor G. Davila-Roman, M.D.*; **Patricia J. Rubin, M.D.;** **Theron R. Baird, electronic technician;** **Robert J. Gropler, M.D.**, "Simultaneous Dobutamine PET and Echocardiography for the Evaluation of Patients with Ischemic Cardiomyopathy." *Department of Internal Medicine, Washington University School of Medicine, St. Louis.

ALUMNI NEWS

H. Jerry Murrell, M.D., was named the 136th president of the Missouri State Medical Association. An MIR resident from 1967 to 1969 and an instructor in radiology from 1969 to 1970, Murrell is director of radiation oncology at Boone Hospital Center in Columbia and at the Mid-Missouri Medical Foundation in Jefferson City. He is codirector of the radiation oncology department at the University of Missouri-Columbia School of Medicine.

CALENDAR

August 17 - 20, 1994
International Skeletal Society Annual Course
Berlin

August 6 - 12, 1994
Society of Magnetic Resonance Annual Meeting
San Francisco

August 20 - 21, 1994
Missouri State Medical Association Meeting
Jefferson City

August 21 - 26, 1994
World Congress of Medical Physics and Biomedical Engineering
Rio de Janeiro

September 17 - 21, 1994
American College of Radiology Annual Meeting
New Orleans

September 22 - 25, 1994
American College of Nuclear Physicians International Symposium
Washington, D.C.

October 3 - 7, 1994
American Society for Therapeutic Radiology and Oncology
San Francisco

October 21 - 26, 1994
World Congress on Medical Physics & Biomedicine
Rio de Janeiro

October 28 - 31, 1994
Royal Australasian College of Radiologists 45th Annual Meeting
Christchurch, New Zealand

November 19 - 20, 1994
Missouri State Medical Association Meeting
Jefferson City

November 27 - December 2, 1994
80th Scientific Assembly and Annual Meeting of the Radiological Society of North America
Chicago

Residents'/Fellows' Annual Farewell Dinner



(Left to right) Dr. Carlos and Susie Perez, Dr. Jorge and Susana Medina, and Drs. Olga and Santiago Medina



Above: (left to right) Michael Rigsby; Cynthia Karlias Rigsby, M.D., diagnostic chief resident, 1994-1995; Henny Muldowney; and Sean Muldowney, M.D., diagnostic cochief resident, 1994-1995



Left: Len Wilger, Eastman Kodak's account manager for diagnostic imaging, Health Sciences Division, presented farewell gifts to Colin Derdeyn, M.D., and (right) James Duncan, M.D., Ph.D., diagnostic chief and cochief resident, respectively, for 1993-1994



Residents, trainees, and fellows for 1993-1994 were (front row, left to right) Doctors Steven M. Roth; Valerie C. Reichert; John A. Butman; L. Santiago Medina; Cynthia K. Rigsby; James R. Duncan, cochief resident; R. Gilbert Jost, chief of the Division of Diagnostic Radiology; Ronald G. Evens, director of the Institute; Colin P. Derdeyn, chief resident; Donald V. Heck; Debra M. Lau; Mary G. Alderman; Michele D. Semin; Anthony M. Foti; (second row, left to right) Neda Yagan; Felix Song; Steven S. Winn; Kyongtae Tyler Bae; Maria E. Schmidt; Gary D. Luker; Howard P. Forman; James D. Matthews; Patrick D. Dato; Constance S. Courtois; David Hillier; Rachel F. Oser; Eric R. Weidman; Scott A. Werden; Andrew J. Fisher; Gregory R. Saboeiro; (third row, left to right) Chi-Lai Ho; Benjamin J. Bartnicke; H. Scott Beasley; William P. James; Anthony Zelazny; John A. Stahl; Kevin L. Shady; Scott C. St. Amour; John G. Felker; Stephen J. Kennedy; James W. Farn; Scott M. Baker; Frank J. Schlueter; John V. Catasca; Myles B. Koby; Thomas E. Vaughan; Marc A. Borge; Richard N. Edelstein; (back row, left to right) Farrell K. VanWagenen; Marc G. Koenig; Linda R. King; Thomas H. R. Farmer; Robert C. Wood; Gregory A. Hatfield; Kurt R. Simpson; John J. Healey; Martin M. Anbari; William B. Mehard; Rory A. Satterfield; Eric S. Malden; Jeffrey A. Friedland; Shawn P. Quillin; Peter L. Apicella; Robert C. McKinstry; Hamid R. Latifi; Spencer M. Smith. Not pictured are Drs. John J. Crowley, Bradley A. Kramer, Timothy R. O'Leary, Shepherd M. Abrams, Edward E. Angtuaco, Clifford D. Barker, Michael G. Beat, Higinia Cardenes, Kun San Chao, Gopal R. Desai, Lane A. Deyoe, Matthew J. Fleishman, John A. Freeby, David S. Gierada, Carolyn A. Haerr, D. Daniel Hassell, Robert Y. Kanterman, Daniel Keleti, Saleem Mahmood, Charles T. McConnell, Mitchell A. Miller, Astrid E. Morrison, Sean M. Muldowney, Allen B. Oser, Helen Philips, James Piephoff, Michael C. Roarke, Joseph A. Schoenberger, Richard M. Slone, John E. Sunderland, Robert G. Swanson, Nitin K. Tanna, Alfred Tinger, Richard K. Valicenti, Thomas H. Vreeland, Tinko Zlatev.

SPOTLIGHT

Teleradiology on the Road to Reality

It might have been a routine consultation among an obstetrician, an internist, and a radiologist — except that the physicians were more than 15 miles apart and were simultaneously viewing the image of a fetus as the mother was undergoing ultrasonography.

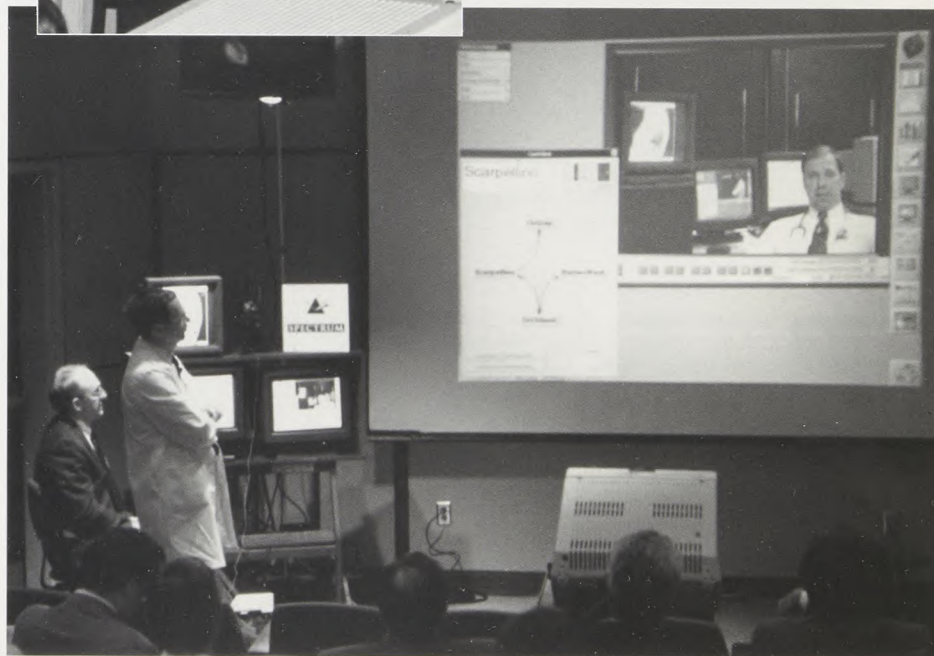
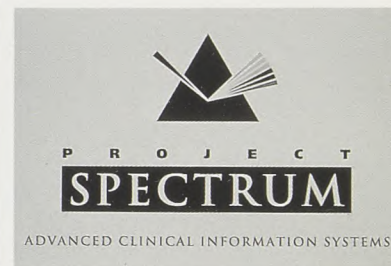
At a June 21st press conference, BJC Health System and Washington University School of Medicine jointly announced their alliance with IBM, Eastman Kodak, and Southwestern Bell Telephone in the development and implementation of a community-wide medical information system. While St. Louis-area reporters watched from the Institute's Scarpellino Auditorium, R. Gilbert Jost, M.D., chief of the Division of Diagnostic Radiology, and G. James Blaine, D.Sc., director of the Institute's Electronic Radiology Laboratory, put the technology through its paces.

The multi-computer hookup allowed Drs. Diana Gray, an obstetrician in her office at the medical center; Matthew Orland, an internist in his office at Barnes West County Hospital; and William Middleton, an MIR radiologist in the ultrasound imaging area at Barnes West, to see the patient, the radiology images, and each other on the same computer screen. Jost led the other doctors in a discussion of the patient's medical case. They all concluded that mother and baby were doing well.

The three-year pilot, called "Project Spectrum," promises to make medical care more convenient, efficient, and cost-effective by

- integrating patient medical information from all 15 BJC hospitals into one seamless medical system,

- using advanced networks to connect the more than 5,000 doctors affiliated with BJC Health System to the information system, and



Paving the way for healthcare information superhighways nationwide, Project Spectrum will offer better healthcare service to thousands of Missouri and Illinois patients. Here, Drs. R. Gilbert Jost and G. James Blaine (seated) consult with Dr. Matthew Orland at Barnes West County Hospital.

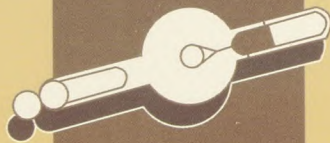
- creating a workstation that will access both data and images from all BJC hospitals.

Collaborative research begun almost a decade ago (called the "Fast Packet Project") pointed the way for electronic storage, transmission, and display of medical images. The team of Jonathan Turner, Ph.D., and Jerome Cox, D.Sc., of Washington University's Department of Computer Science;

MIR's Jost and Blaine; and representatives from Southwestern Bell's Technology Resources, Inc. envisioned a high-speed, fiber optic communications system that could transmit voice, data, video, and high-resolution images. With Project Spectrum, that dream of high-performance teleradiology is on its way to becoming reality. □



RADIOLOGY
 Diagnosis • Treatment • Research



1895-1995

Radiology Centennial Incorporated (RCI), the organization created to develop a yearlong series of activities celebrating 100 years of achievement in the radiation sciences, commissioned artist Greg Harlin to design this official Radiology Centennial poster. The postal meter imprint (left) features the RCI's Crookes tube logo. The imprint will appear on all Mallinckrodt Institute mail sent during the Centennial.

FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY

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