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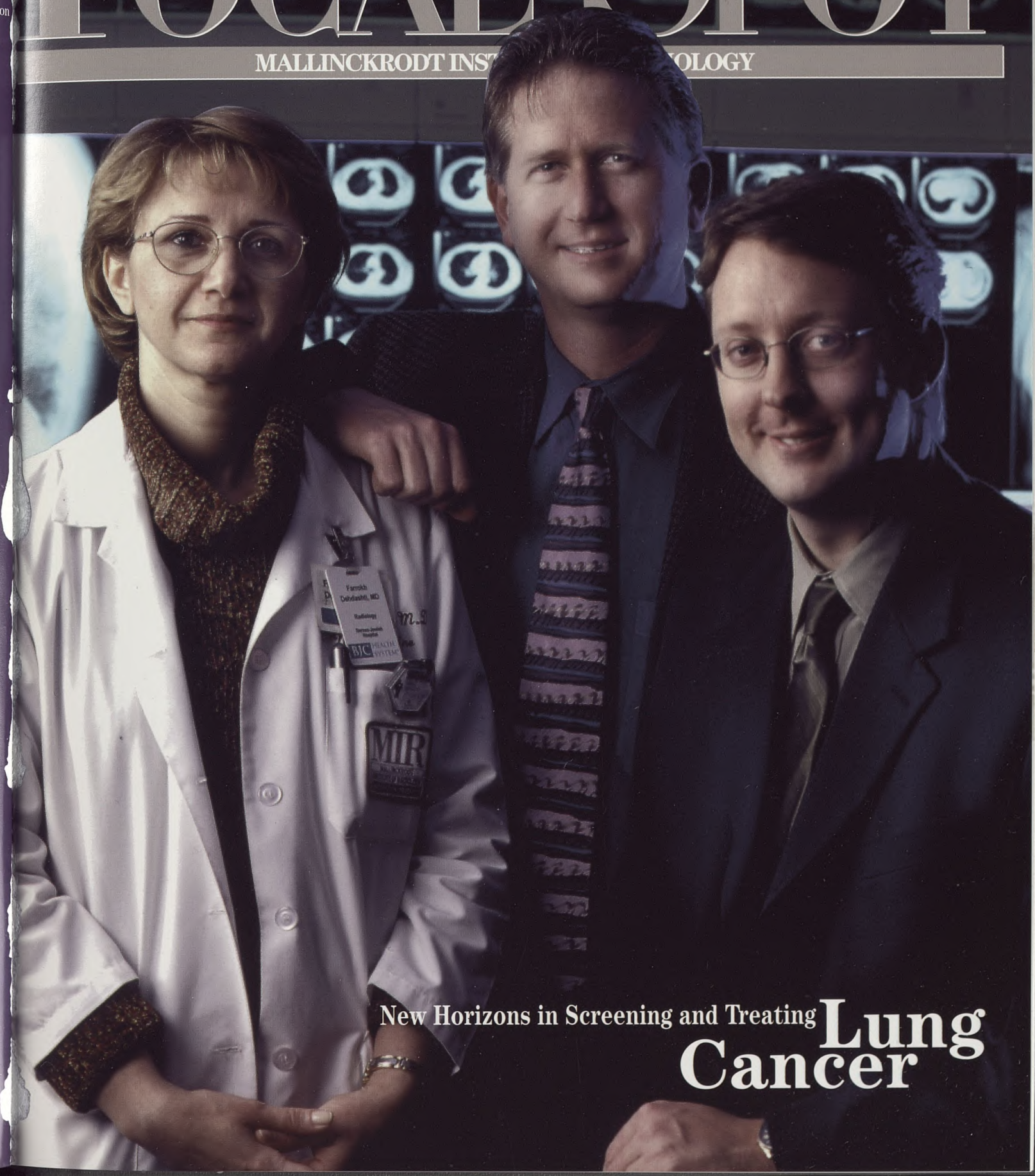
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FALL/WINTER 2000

VOLUME 31, NUMBER 3

FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY



New Horizons in Screening and Treating **Lung Cancer**



SCHOOL OF MEDICINE

R. Gilbert Jost, MD
Interim Chair, Department of Radiology
Interim Director of the Institute

Dear Colleagues and Friends of Mallinckrodt Institute:

Chancellor Mark Wrighton recently presented to the academic community a new logotype for Washington University in St. Louis—a logo that “draws upon our history, traditions, and location.” The logotype was heartily approved by the University Council and the Board of Trustees. All departments and schools were encouraged to use the logotype as a clear and consistent means of showing association with the University.

As we prepare to meet the challenges facing academic medicine, it is extremely important that our national and international audiences easily and consistently recognize the name of Mallinckrodt Institute of Radiology as well as its affiliation with one of the nation’s top-ranked universities and medical schools. Therefore, I am pleased to present the Institute’s official, new logo, which has been approved by the University and by the School of Medicine. A larger version of the logo appears on the inside back cover of this publication.

Sincerely,

A handwritten signature in black ink that reads "R. Gilbert Jost".

R. Gilbert Jost, MD

MIR Mallinckrodt Institute
of Radiology

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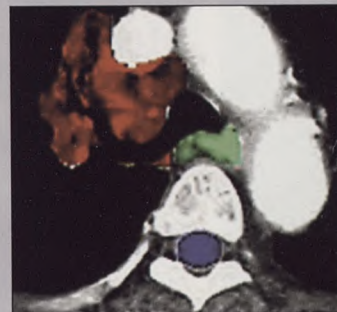
As part of a multi-institutional study, researchers at Washington University Medical Center are evaluating spiral computed tomography as a diagnostic tool for acute pulmonary embolism, a condition that annually affects an estimated 600,000 patients in the United States.



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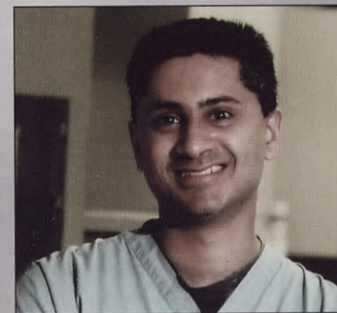


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Interventional radiologists, vascular and cardiothoracic surgeons, and cardiologists combine radiological and endovascular techniques to provide revolutionary, minimally invasive treatments for patients with thoracic aortic dissection.



ON THE COVER According to the American Cancer Society, an estimated 164,000 new cases of lung cancer were diagnosed in the year 2000. If lung cancer is found and treated early before it has spread to lymph nodes and other organs, the five-year survival rate is about 42 percent. Doctors Farrokh Dehdashti, Richard Slone, and Jeffrey Bradley (right) are working to boost patient survival. Photograph by Tim Parker.

SPOT NEWS



ASTRO Gold Medal for Purdy

James Purdy, PhD, professor of radiology and chief of the radiation oncology physics section, received the American Society for Therapeutic Radiology and Oncology's (ASTRO) highest honor, the Gold Medal Award, at the society's annual meeting in Boston in late October.

Established in 1958, ASTRO is the largest society of radiation oncologists worldwide. The first Gold Medal Award was presented in 1977 to highlight ASTRO members' outstanding contributions to radiation oncology.

Purdy's research efforts in computer-aided treatment planning, particularly 3-D conformal radiation therapy (3-D CRT) and intensity-modulated radiation therapy (IMRT), continue to have a profound effect on the practice of radiation therapy. An early advocate of 3-D CRT quality assurance (QA), Purdy now serves as director of the national 3-D QA Center that oversees 3-D CRT clinical trials. The 3-D QA Center is based at Mallinckrodt Institute of Radiology (MIR) and is funded by the National Cancer Institute.

Prior to joining the MIR faculty in 1973, Purdy trained with doctors Robert Shalek and Gilbert Fletcher, both former ASTRO Gold Medal recipients, at the University of Texas M.D. Anderson Cancer Center. In his acceptance speech, Purdy said that at M. D. Anderson, he "learned the importance of the close interaction of physicists and physicians needed in a radiation oncology clinic." That interaction, he added, continued with his physician colleagues in St. Louis, particularly doctors Carlos Perez and William Powers. Perez, professor of radiology and director of the Institute's Radiation Oncology Center for the past 25 years, and Powers, who preceded Perez as director, received the ASTRO Gold Medal in 1992 and 1988, respectively.

Purdy was named chief of radiation physics at MIR in 1976 and was appointed professor of radiology in 1983. He directs the physics residency program, the first such program to be approved by the Commission of Accreditation of Medical Physics Education Programs. Purdy has authored and coauthored more than 230 scientific articles and book chapters and has edited seven textbooks. He also serves as senior physics editor for *The International Journal of Radiation Oncology, Biology, and Physics*.

Purdy is a former president and chairman of the board of the American Association of Physicists in Medicine (AAPM) and a past chairman of the Board of Chancellors of the American College of Medical Physics (ACMP). In 1996 he received the ACMP's Marvin M.D. William Professional Achievement Award and, in 1997, the AAPM's William D. Coolidge Award—the two highest honors bestowed by United States medical physics societies. He is a fellow of the American College of Radiology, the ACMP, and the AAPM.

Wippold named neuro-radiology chief

Franz Wippold, MD, associate professor of radiology, was named chief of MIR's neuroradiology section. He succeeds Daniel Kido, MD, who left the Institute in late August to join the faculty of Loma Linda University Medical Center in California.

Wippold came to Mallinckrodt Institute as a fellow in neuroradiology, having previous residency training in neurology and in radiology (chief resident, diagnostic radiology) at Walter Reed Army Medical Center. Prior to joining the MIR faculty in 1986, Wippold was chief of neuroradiology at Walter Reed and assistant professor of radiology at the Uniformed Services University of the Health Sciences (USUHS) in Bethesda, Maryland. Wippold currently holds the academic title of adjunct professor of radiology/nuclear medicine at the F. Edward Hébert School of Medicine, USUHS.

Wippold is a fellow of the American College of Radiology and of the American College of Angiology. He received the MIR Fellow Teaching Award in 1983 and the Teacher of the Year Award in 1991. He serves as a reviewer for the medical journals *Radiology* and the *American Journal of Roentgenology*.

Researchers share prize

Three pioneers in the field of cognitive neuroscience received the 2001 Grawemeyer Award for Psychology presented by the University of Louisville, Kentucky: Marcus Raichle, MD; Steven Petersen, PhD; and Michael Posner, PhD.

Raichle, professor of radiology and of neurology and neurobiology, and codirector of MIR's Division of Radiological Sciences; Petersen, professor of neurology and neurobiology and of radiology, and chief of WUSM's neuropsychology division; and Posner, a Washington University alumnus and founding director of the Sackler Institute at Weill Medical College of Cornell University, collaborated in the mid-1980s to advance the methods for isolating and measuring the brain's mental functions. Their success in imaging the brain's functions led to discoveries of neuroanatomical networks that support language and attention processes.

The Grawemeyer Foundation at the University of Louisville annually has awarded \$1 million for accomplishments in music composition, education, ideas improving world order, and religion. This year marks the first presentation of the Grawemeyer Award for Psychology.

RSNA awards seed grants

Programs sponsored by the Radiological Society of North America (RSNA) Research and Education Foundation annually assist young investigators in the early stages of their careers in radiology research, education, and related scientific disciplines. RSNA has announced the presentation of seed grants to the following Mallinckrodt Institute physicians and scientists:

- Steven Don, MD, assistant professor of radiology, received an award of \$25,000 for his research on "Exposure reduction in neonatal chest radiography using computed radiography."
- James Duncan, MD, PhD, assistant professor of radiology, received a \$25,000 seed grant for his investigation of "Optical imaging of peripheral vascular disease."
- Jie Zheng, PhD, instructor in radiology, received an award of \$25,000 for his research on "Diagnosis of pulmonary emboli with MR perfusion and angiography: validation in a porcine model."

Myerson and Williamson named ACR fellows

At the American College of Radiology's (ACR) annual meeting in September, Robert Myerson, PhD, MD, a radiation oncologist, and Jeffrey Williamson, PhD, a radiation physicist, were among the 96 outstanding clinicians and scientists named as ACR fellows.

Fellowships are awarded to ACR members for significant accomplishments as a teacher of radiology, for scientific or clinical research, or for service to organized medicine. More than 32,000 radiologists, radiation oncologists, and medical physicists support the ACR's programs focusing on the practice of radiology and the delivery of comprehensive radiological health services.

Myerson joined the MIR faculty in 1984 and was appointed professor of radiology in 1997. He serves as chairman of MIR's Radiation Oncology Center Research Committee and as chief of the hyperthermia and GI service. He was elected in 1999 as the North American Hyperthermia Society's councilor for medicine and has been included in several editions of *The Best Doctors in America*. Myerson is a member of the ACR's Com-

mittee on Residency Training in Radiation Oncology of the Commission on Education. He was the associate director of residency training for MIR's Radiation Oncology Center from 1990 to 1998. He currently serves as a manuscript referee for the scientific publications *Cancer*; *International Journal of Radiation Oncology, Biology, and Physics*; *International Journal of Hyperthermia*; and *Journal of Clinical Oncology*.

Williamson is professor of radiology and associate chief of the Radiation Oncology Center's physics section. Prior to joining the MIR faculty in 1989, he held academic appointments at the University of Arizona and the University of Minnesota. Williamson is a fellow of the American Association of Physicists in Medicine (AAPM). He is associate editor of the journal *Medical Physics* and past associate editor of *The International Journal of Radiation Oncology, Biology, and Physics*.

He is a past member of the AAPM's Board of Directors and currently serves as chair of the AAPM Radiation Therapy Committee. Williamson is a member of the U.S. Nuclear Regulatory Commission's Advisory Committee on Medical Use of Isotopes and serves on the Joint ACR/American Society for Therapeutic Radiology and Oncology (ASTRO) Government Relations Committee.



Profile

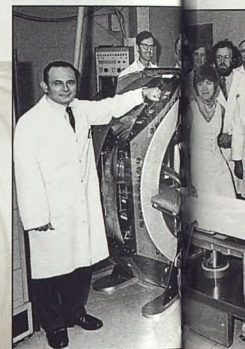
John Eichling, PhD
professor of radiology and
Washington University's
radiation safety officer

by Kirstin Blase and Vicki Kunkler

As with many of life's experiences that often lead to memorable events, the beginnings are usually happenstance. Such was John Eichling's career at Mallinckrodt Institute of Radiology (MIR).

In 1963 Eichling and his wife Carol lived in Oklahoma, where he was head of the Department of Physics at Northeastern Oklahoma State University. A native Oklahoman, Eichling earned a Bachelor of Science degree at Northeastern Oklahoma State and a master's degree at Oklahoma University, Norman.

Carol, a pre-med student, had received a scholarship to attend Washington University



The PET team (circa 1974).
Michel Ter-Pogossian
is at left front; John Eichling
is sixth from right.

School of Medicine (WUSM). Although Eichling was not quite sure what he would do in Missouri, he knew this was a good opportunity for Carol. After Eichling arrived in St. Louis, WUSM's Dean Dempsey suggested Eichling contact Michel Ter-Pogossian, a research scientist who was planning the installation of a cyclotron in the basement of Barnard Free Skin and Cancer Hospital at Washington University Medical Center.

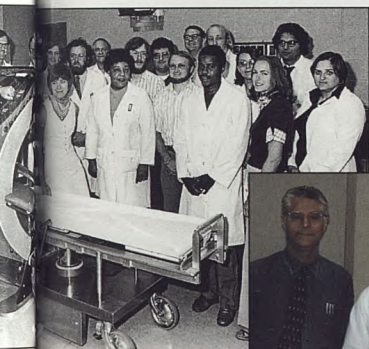
As it turned out, this would be the nation's first cyclotron installed in a medical center and dedicated to biomedical research. Armed with a master's degree in nuclear physics, Eichling was the first professional hired to work with the WUSM cyclotron.

After 37 years at the medical center, Eichling decided to retire on December 31, 2000. He and Carol plan to spend much of their time on a 130-acre farm in Warren County, Missouri. Portions of the old farmhouse on the property were built in 1820, and the Eichlings' passion for antiques and restoration have turned the homestead into "something of a museum and

by Mallinckrodt Institute was in step with Doctor Sherwood Moore's (MIR's first director) visionary plan to keep the Institute at the forefront of radiology technology developments. The early studies of radionuclide brain tumor detection conducted by Ter-Pogossian and Dr. Henry Schwartz were milestones in nuclear medicine science. The decision to install a cyclotron at the new medical center and to consolidate radioactive tracer production into a centralized radioisotope laboratory at Mallinckrodt Institute came at a time when the field of nuclear medicine was relatively new.

In 1963 MIR's nuclear medicine group [*The*

This era, of course, was before the advent of portable units, image intensifiers, magnetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET), ultrasound imaging, and dedicated mammography. In fact, the Nuclear Regulatory Commission (NRC), the U.S. Department of Energy, and the National Institutes of Health did not exist. The University's first cyclotron was funded by the Atomic Energy Commission, from which the NRC and the Energy Research and Development Agency were formed.



...of Memories

private park." But before he turned in his badges and closed his office door for the last time, Eichling shared some history and a bit of nostalgia about his early days at MIR.

The application of radionuclide tracers to the biomedical sciences began at Washington University in the early 1930s, with the construction of a cyclotron on the University's main campus following shortly thereafter. The construction of the cyclotron and partial funding

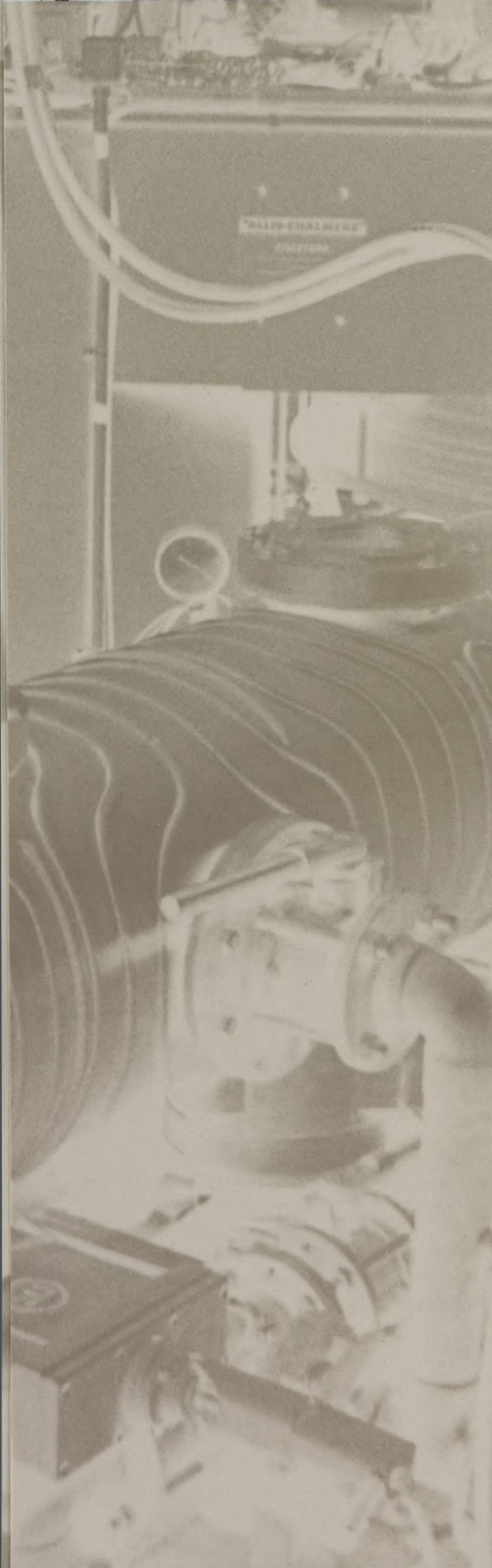
group officially became the *Division of Nuclear Medicine in 1966.*] was located on the fifth floor of Barnard Hospital and was comprised of only three pieces of diagnostic equipment: a rectilinear scanner, a thyroid uptake unit, and a well counter for *in vitro* tests. And the only types of equipment in MIR's diagnostic radiology area were fixed radiographic units for taking individual films and several fluoroscopic units.

Left: At his last Radiation Safety Committee meeting in December, Eichling is shown with (left to right) doctors Barry Seigel, Gilbert Jost, and Carlos Perez.

Above: A special memorabilia case was constructed and presented to Eichling at the December Radiation Safety Committee.



Profile



Most of the early radionuclide research dealt with improving images or intensifying images so the radiation dose to the patient could be reduced. Eichling was one of a four- or five-member team responsible for research and cyclotron operation. It was a result of Ter-Pogossian's encouragement that Eichling pursued his doctorate in biophysics. While working full-time at MIR, Eichling attended classes at Washington University on a part-time basis. By 1970 he had completed his doctoral research on O-15 compounds and their use to successfully measure blood flow, oxygen metabolism, and blood volume in the brain.

Throughout his career, Eichling says he has worked with some talented researchers on a diverse range of projects, including Ter-Pogossian, who led the research team that developed PET; Mokhtar Gado, MD, a neuroradiologist, as they demonstrated computed tomography's ability to work on a quantitative level; Marcus Raichle, MD, an internationally known neurologist/neurobiologist as they discovered that water, when used as a radiotracer, does not behave as a freely diffusible marker in biological tissues; and the team of radiologists Judy Destouet, Barbara Monsees, and Louis Gilula, and surgeon Leroy Young who developed and patented a radiolucent breast implant medium.

In 1970 Eichling was asked by Juan Taveras, MD, then director of Mallinckrodt Institute, to serve as radiation safety officer, a position that would serve not only the Institute but the medical campus and the main campus as well. Eventually more than 900 laboratories working with radioactive materials and medical programs, such as nuclear medicine and radiation oncology, would come under Eichling's radiation safety watch. According to Eichling, Washington

University has one of the most extensive and diverse radiation safety programs worldwide.

In 1970 the radiation safety program consisted only of wearing external monitors and testing field sources. Since then, with the guidance of the NRC, a thorough program has been developed that now includes extensive training in the receiving, shipping, and handling of radioactive materials; restricted ordering; and laboratory inspections. The Radiation Safety group performs many periodic internal audits and on-site inspections to evaluate the effectiveness of the radiation safety program.

Eichling adds that he could not have handled the tremendous radiation safety responsibilities without a remarkable staff, including Jeanette Hardin, Fritzi Imming, Larry Johnson, and Bonnie Kelly.

There is a multitude of information and regulation guidelines covering every category of radiation safety, says Eichling. Currently in the radiation safety group's responsibilities are five gamma irradiators; approximately 900 research laboratories; a large nuclear medicine service; five clinical chemistry groups; Barnes-Jewish Hospital north and south campuses, Children's Hospital, and Barnes-Jewish Hospital Heart Care Institute; radiation oncology's numerous accelerators for therapy; and 160 diagnostic X-ray units.

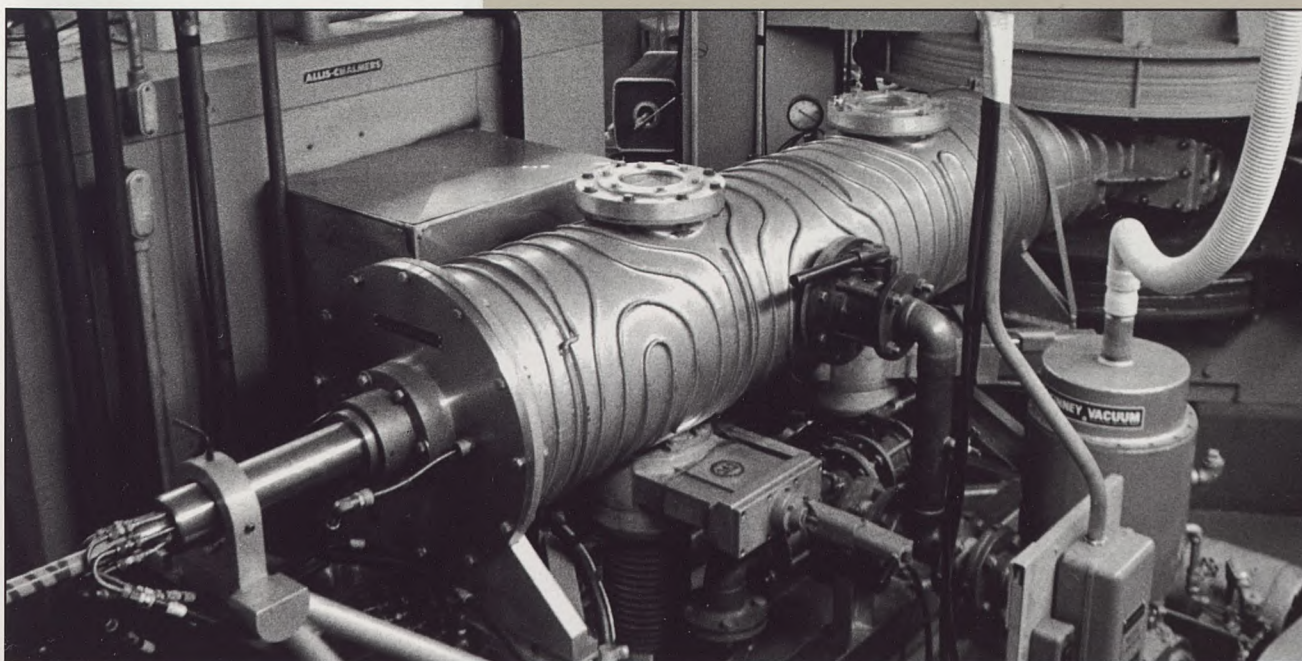
During his Washington University career, Eichling says he has been involved in "just about everything that is radiation-related at Mallinckrodt Institute—research, clinical, and education." He has been a member of the Institutional Radiation Safety Committee since 1970 and a member of the Radioactive Drug Research Committee since its inception in 1975. He was a charter member of the Barnes Hospital Electrical Safety Committee.

Eichling hopes that former coworkers will remember him as someone who never rejected a request for help and always investigated a problem thoroughly. An interesting footnote to

Eichling's career: Until his retirement Eichling had never been away for longer than a few days because he wanted to be close by in case the University needed him.

The most memorable aspect of his career Eichling says was "the opportunity to interact with and deal with bright talented people. Working with the best in the field has been a rare and enjoyable experience." He says he specifically appreciated his long-time work with doctors Carlos Perez and Barry Seigel. And as his colleagues would probably attest, that feeling is mutual. **MIR**

The Washington University Medical Center
Cyclotron (circa 1964).



John Eichling is not only known for his dedication to the University and MIR, his vast wealth of knowledge, and his kind caring manner. He also has a dry sense of humor.

In the early days of MIR, Eichling says that he and coworkers enjoyed "pulling pranks" on each other. One of his favorite reminiscences follows:

When the cyclotron was first installed in 1964, the researchers wanted to measure the energy of the deuteron beam. One way was to measure the distance the ionization path traveled in air through a foil. When the lights were turned off in the cyclotron vault, the ionization path would be visible—although the radiation level would be very high. Eichling and Gene Hood, the cyclotron operator at the time, conspired to double-expose some films so the visible ionization path would appear in the photographs as though it was apparently striking their hands or abdomens. When they presented the photos to William Powers, MD, then director of MIR's Radiation Oncology Center, Powers was horrified. He told them in no uncertain terms that they were fools and would probably expire in a few hours. Eichling says he and Hood had to do a lot of explaining, but the incident did not inhibit future pranks.

DIAGNOSING

Pulmonary Embolism

A study at Mallinckrodt Institute may benefit patients who develop pulmonary embolism.

by Vicki Kunkler

According to the American Heart Association, pulmonary embolism (PE) has become a national health problem in the United States and other developed countries. An estimated 600,000 patients in the U.S. annually develop PE, with women affected more often than men. The disease causes more than 60,000 deaths each year.

Pamela Woodard, MD, assistant professor of radiology, is Washington University Medical Center's chief investigator for a multi-institutional study to determine if contrast-enhanced spiral computed tomography (CT) can be used to definitively diagnose acute PE. The study, called Prospective Investigation in Pulmonary Embolism Diagnosis-II (PIOPED-II), is the second phase of the original PIOPED study that developed criteria for diagnosing PE by ventilation/perfusion scintigraphy.

Pamela Woodard, MD

Seven additional clinical centers are participating in the National Institutes of Health-funded study: Cornell Medical Center (New York City); Duke University (Durham, North Carolina); Emory University (Atlanta); Henry Ford Hospital (Detroit); University of Calgary (Canada); University of Michigan (Ann Arbor); and Massachusetts General Hospital (Boston). George Washington University (Maryland) will serve as the study's data coordinating center.

PULMONARY EMBOLISM

PE is usually a result of deep vein thrombosis (DVT). While DVT and PE can occur in normal individuals, they are common complications in patients who have undergone orthopedic surgery, have cancer, or have other chronic illnesses. Clots, called deep venous thrombi, form in the deep veins of the leg in areas where blood flow is slower, or in veins that have been exposed to direct trauma. When emboli from the deep venous thrombi break off, they travel to the lungs, lodging in the pulmonary arteries as pulmonary emboli. These emboli obstruct pulmonary arterial blood flow, causing shortness of breath, sharp pleuritic chest pain, hypoxia, and even death.

DVT and PE often occur without warning. Because many of the symptoms also occur with other diseases, PE is difficult to diagnose clinically, thus contributing to increased mortality, prolonged hospitalization, and increased healthcare costs.

DETECTING AND TREATING PE

Ventilation/perfusion scintigraphy, a nuclear medicine procedure that uses radioisotopes to produce two-dimensional images of lung ventilation and perfusion, has been the most common method used to diagnose acute PE. Ventilation/perfusion scintigraphic studies are read as "normal," "low-probability for PE," "high-probability for PE," and "indeterminate," based on previously determined criteria. Although normal and high-probability results provide clinicians with useful information, a large number of patients have results that are indeterminate. While ventilation/perfusion scintigraphy is highly sensitive in detecting pulmonary emboli, other etiologies such as tumor or fibrosis can cause similar ventilation/perfusion results, producing false-positive findings that result in unnecessary treatment for patients.

In order to directly visualize PE, pulmonary angiography can be performed in patients who have an indeterminate ventilation/perfusion lung scan. However, because pulmonary angiography is an invasive procedure, it is not often performed.

An early diagnosis and an aggressive treatment regimen can save lives. Patients who are diagnosed with DVT or acute PE are initially treated with intravenous heparin, followed by three to six months of an oral anticoagulant. Patients with smaller emboli are usually treated on an outpatient basis, whereas those with larger emboli are hospitalized.

SPIRAL CT

In the early 1970s, researchers at Mallinckrodt Institute played a key role in the development of the medical application of CT, a technology that revolutionized the field of radiology. For the first time in medical history an imaging device could produce cross-sectional images of the body. The technology's direct visualization of internal anatomy allowed physicians to differentiate between diseased and healthy tissue, to detect blood clots and enlarged organs, and to detect early-stage tumors. Numerous studies conducted in the following 20 years proved that the specific and unique information gained from the noninvasive CT procedure could eliminate exploratory surgery, shorten hospital stays, and reduce actual surgery time. In most cases CT has replaced some of the more expensive radiological procedures, such as angiography, lymphangiography, and myelography.

In 1990 Mallinckrodt Institute received one of the first spiral CT units developed by Siemens Medical Systems, Inc. An improved version of computed tomography, spiral CT offers reduced scanning time and lower risks to patients with the use of nonionic contrast material. Total scanning time ranges from a few seconds up to one-half minute. Volume CT acquisition is achieved with the patient taking a single breath-hold, thus eliminating respiratory misregistration and image artifacts.

Washington University PIOPED-II Study Coinvestigators

Roger Yusen, MD, Department of Medicine, Division of Pulmonary and Critical Care Medicine

Jay Heiken, MD, Mallinckrodt Institute of Radiology, Division of Diagnostic Radiology (computed body tomography)

Henry Royal, MD, Mallinckrodt Institute of Radiology, Division of Nuclear Medicine

Daniel Brown, MD, Mallinckrodt Institute of Radiology, Division of Diagnostic Radiology (vascular and interventional radiology)

Brian Rubin, MD, Department of Surgery, Division of General Surgery (vascular)

Audrea Lamb, RN, study coordinator

Sheila Agen, RT, research assistant

In the PIOPED-II study Woodard will use the latest Siemens Medical Systems multidetector spiral CT system. This new system with its four detectors can scan four times faster and provide four times better resolution than the older single detector spiral CT scanner.

STUDY CRITERIA

Over the next 18 months the national study hopes to enroll 133 patients at each study center, based on the area's gender and ethnic population. In St. Louis, Woodard will begin recruiting patients in September.

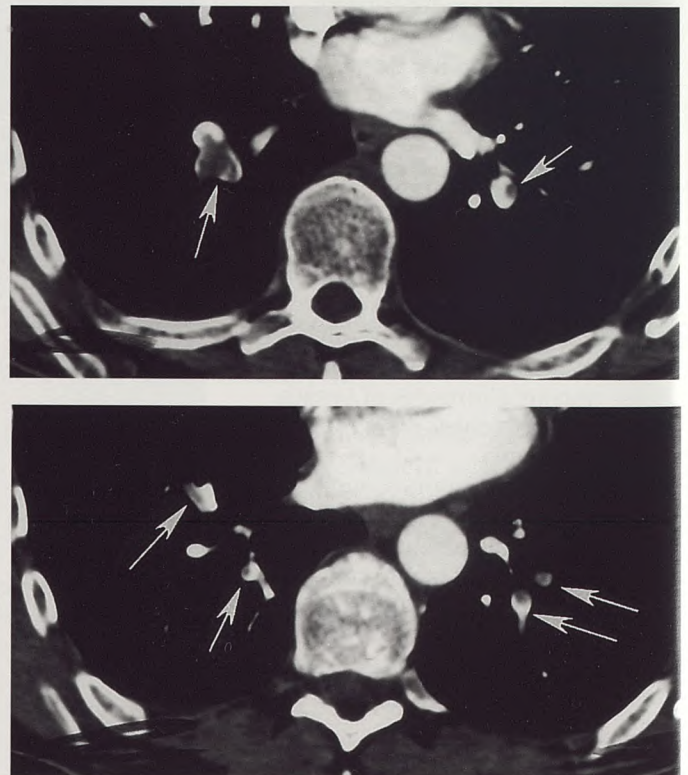
Volunteers for the study must be 18 years of age or older and suspected of having acute PE.

They may be treated on either an in- or out-patient basis. Patients who are allergic to contrast media, have renal insufficiency, or who are pregnant may not participate in the study. Each patient will undergo ventilation/perfusion scintigraphy and spiral CT. A non-ionic contrast agent will be used during the spiral CT scan. Some patients may also undergo pulmonary

angiography and ultrasonography of the lower extremities. Follow-up assessments will be conducted at one, three, and six months following enrollment. **MIR**

Editor's note: Physicians who are interested in enrolling patients in the PIOPED-II study can contact the patient coordinator, Audrea Lamb, RN, at 314-855-5393 (pager) or 314-747-4633 (office).

Contrast-enhanced multidetector spiral CT images demonstrate emboli (PE) in bilateral lower lobe pulmonary arteries.





New Horizons in Screening and Treating **Lung Cancer**

Radiation oncologists, diagnostic radiologists, and nuclear physicians at Mallinckrodt Institute of Radiology are working toward the common goal of reducing lung cancer mortality rates.

by Candace O'Connor

Lung cancer is a formidable disease. Every year, it kills nearly 160,000 men and women—most of them smokers—and accounts for some 28 percent of all cancer deaths in the United States. It is, in fact, the leading cause of cancer death worldwide. More people die as a result of

lung cancer than of breast, colon, and prostate cancers combined.

Lung cancer is difficult to detect in time for a cure. Although tiny breast cancers turn up on mammograms, colon cancers are found during colonoscopy, and prostate cancers are detected through PSA screening, there is no reliable

screening test to detect lung cancer at an early, resectable stage. By the time patients develop symptoms, the cancer has usually invaded their mediastinal lymph nodes—and, despite the best chemotherapy and radiation therapy available, the five-year survival rate is only 10 to 15 percent.

Lung Cancer



Richard Slone, MD

“However, lung cancer is so common that even a *small* impact made on this disease can have a *huge* effect in the number of patients saved,” says Jeffrey Bradley, MD, a radiation oncologist and chief of thoracic service at Mallinckrodt Institute of Radiology’s (MIR) Radiation Oncology Center. “For example, if we can bump that survival rate up to twenty percent, we can save about eight thousand more lives in one year. So, new diagnostic tools and techniques can make a great difference to patients.”

From the latest screening methods to newer, more aggressive therapies, MIR’s radiologists and radiation oncologists are aggressively fighting nonsmall cell lung cancer while working to boost patient survival.

Lung Cancer Screening

In August 2000, Richard Slone, MD, associate professor of radiology, received a grant of nearly \$400,000 from the National Cancer Institute (NCI) to participate in a pilot project called the Lung Screening Study. The study would assess the effectiveness of spiral computed tomography (CT), as compared to conventional chest X rays, in detecting asymptomatic lung cancer. The study, involving some 3,000 patients at six centers nationwide, would recruit people from 55 to 74 years of age who were current heavy smokers or were past smokers who had quit within the previous 10 years.

The NCI sponsored this pilot project to test the feasibility of conducting a much larger, more definitive study that would again examine the efficacy of spiral CT for lung cancer screening and would also follow the patients long-term. There were some stumbling blocks for the project: Could Washington University and the other centers recruit sufficient numbers of patients in a short time? Could they perform the exams, interpret the studies, and handle the logistics of sending reports to patients and physicians?

Slone and his group answered these questions with a resounding “yes.” In only 10 weeks, they managed to recruit, randomize, and image 500 patients—half of the patients received a single-view chest X ray; half received a low-dose spiral chest computed tomography examination. Altogether, a seven-member team worked full-time to complete the study on this fast-track schedule. Some of the team came from Volunteer for Health, an organization that matches appropriate patients with research studies, and helped in this study by handling telephone calls, patient eligibility checks, and scheduling.

Lung Screening Study Research Assistants

Roberta Yaffie, BS, RT, CCRC
Sheila Agan, RT, (R)(CT)
Danielle Gherardini, RN, BSN
Robin Haverman, RT (R)
Lora Crouch, BS, RT

The NCI was so pleased with the Washington University team's achievement that they awarded an additional grant of nearly \$40,000 to enroll an additional 100 patients beyond the original contract of 500. "We are considered one of the key contributing centers to this study, since we have been more successful than others at recruiting and managing the caseload," says Slone. "From the beginning, our goal was to play a key role in the next phase of this study."

Slone's research focused on spiral CT, a technology that requires the patient to lie on a movable table within the CT scanner and hold one deep breath for 20 seconds while the CT detectors rotate continually around the table. The resulting scan offers a detailed view of the chest, including the lungs, and may reveal tiny abnormalities of just a few millimeters in size. The researchers compared these results to those of a chest X ray, which was first tested as a lung cancer screening tool during the late 1970s and early 1980s. Results showed that routine chest X rays do not have a significant impact on the ability to detect lung cancer early.

Spiral CT is clearly a more sensitive, effective screening tool, and Slone's team has proven that use of spiral CT can be streamlined enough to be implemented as public health policy. However, the economic feasibility of this approach still needs to be resolved. And another issue remains: Does

spiral CT detect cancers early enough to significantly impact the outcome of treatment?

Over the coming year, Slone's study group will follow patients who have positive scans to see how many of these abnormalities prove to be cancerous. The researchers also will track the number of benign abnormalities that lead to additional testing and even surgery, with all the associated costs and risks. The next, much larger phase of testing, with its years of patient follow-up, will provide still more answers.

"We hope spiral CT will prove to be a useful method for screening asymptomatic lung cancers. If it is useful, then what age groups of patients should be targeted? How much of a history of smoking should patients have? How often should patients be screened? We want to shed light on some of these questions," says Slone.

Lung Cancer Treatment

Mallinckrodt Institute radiation oncologists are involved in cutting-edge intramural and cooperative group protocols aimed at testing the latest lung cancer therapies and improving patient care. In one pilot intramural study, funded by a grant from the Siteman Cancer Center at Washington University Medical Center, radiation therapists are studying the use of CT combined with positron emission tomography (PET) to detect mediastinal lymph node involvement.



Figure 1A

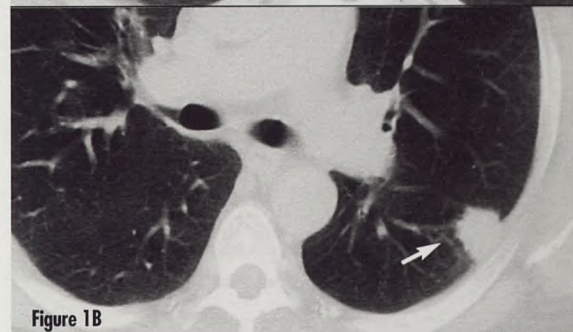


Figure 1B

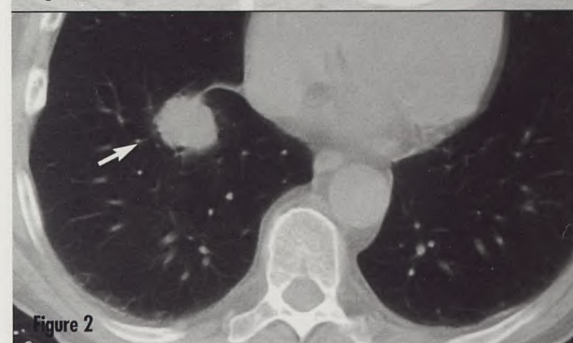


Figure 2

Figure 1A and B: SYNCHRONOUS PRIMARY LUNG CANCERS Screening chest CT of asymptomatic 59 year-old man who had smoked 2 to 3 packs of cigarettes per day for over 30 years. *Figure A* shows lung destruction from pulmonary emphysema as well as a 1.5-cm spiculated pulmonary nodule in right upper lobe (arrow), highly suspicious for bronchogenic carcinoma. *Figure B* shows a 2-cm lobulated nodule in left lower lobe (arrow), also suspicious for bronchogenic carcinoma.

Figure 2: NONBRONCHOGENIC MALIGNANCY Screening chest CT of asymptomatic 61 year-old man who had smoked 1 to 2 packs of cigarettes per day for over 30 years. CT revealed a 3-cm lobulated mass in right lower lobe (arrow), suspicious for lung cancer.

Lung Cancer



Above: Jeffrey Bradley, MD

Below: These images represent an image-fused volumetric CT scan and PET scan for the purposes of radiation therapy planning. The gross tumor volume is contoured in red on the CT images on the left. The PET images show corresponding areas of FDG accumulation on the right.

Developed at Mallinckrodt Institute in the early 1970s, PET is a noninvasive technique that uses radiopharmaceuticals to provide vivid functional images of various organ systems.

“CT scans alone have fifty to sixty percent sensitivity and specificity in detecting this involvement, but the addition of PET scanning increases that number to eighty-five or ninety percent,” says Bradley. “So by fusing these two types of imaging, the radiation therapist can target therapy more precisely to the primary tumor and lymph nodes.”

Washington University is one of the leading patient recruiters for lung cancer protocols sponsored by two large cooperative groups: the Radiation Therapy Oncology Group (RTOG) and the Cancer and Leukemia Group B (CALGB). One trial nearing completion is RTOG 9311, developed by MIR’s Radiation Oncology Center physicians and physicists. The 150 patients in this trial have been treated with doses of 90-gray radiation or greater, an increase over the usual dose of 60- or 70-gray, with no apparent toxicity. These patients will be followed until June 2001 to establish their long-term reactions.

Already, Bradley—in conjunction with medical oncologist Ramaswamy Govindan, MD, and former MIR staff member Mary Graham, MD—has written a new protocol, RTOG 1051, to follow the 9311 trial. This time, the physicians will escalate the

dose of radiation therapy while using concurrent chemotherapy and will carefully gauge how high the dose can safely be raised. The data from this trial will be archived in a queryable database headquartered at MIR and will contain a wealth of knowledge about normal tissue tolerance to radiation in the chest.

Along with clinical trials, the Institute is advancing lung cancer therapy in other aspects of care. In 1991, the MIR Radiation Oncology Center pioneered the clinical use of three-dimensional conformal radiation therapy for planning and treatment. With the help of sophisticated, imaged-based computers, researchers can create an exact model of a patient’s anatomy that allows for more precise calculation of radiation doses. With this technique, higher and more effective doses can be safely targeted to the tumor, and potential toxicity can be estimated and minimized.

Currently, MIR researchers are also investigating an “active breathing control device” that teaches breath-holding techniques to patients, thus stopping respiratory motion and improving the delivery of radiotherapy.

The Radiation Oncology Center will soon acquire a new, highly sophisticated addition to the treatment arsenal: a state-of-the-art, large-bore CT simulator used for radiation therapy planning. While standard simulators have a 70-centimeter bore, this scanner has an 85-centimeter opening that will accommodate larger patients.

Nuclear Medicine and Lung Cancer

PET is one of the most important advances in imaging non-small cell lung cancer. The technology is beneficial in both the initial diagnosis and staging of lung cancer, where it has proven to be more sensitive and more specific than other imaging modalities.

When patients are first diagnosed with a pulmonary nodule, CT is most frequently used to characterize the nodule, but sometimes follow-up CT scans or a biopsy is needed to confirm. "PET is useful for differentiating benign from malignant nodules when the nodule is indeterminate by CT," says Farrokh Dehdashti, MD, a nuclear medicine physician and an associate professor of radiology.

Currently, PET is routinely used at Washington University Medical Center, as well as other medical facilities, to stage patients with non-small cell lung cancer. Mallinckrodt Institute is currently participating in a prospective multicenter trial, sponsored by the American College of Surgeons Oncology Group, to further define the role of PET in staging lung cancer.

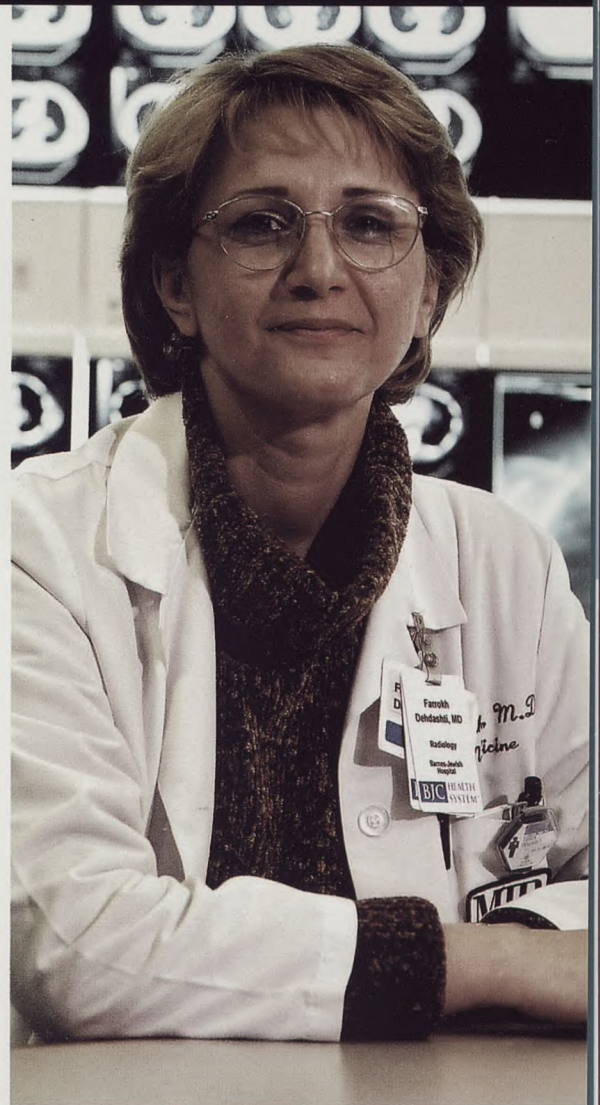
In addition to detection and staging lung cancer, PET has a potential usefulness in monitoring and assessing response to therapy in patients with non-small cell lung cancer.

Currently, Dehdashti and several colleagues—Mark Mintun, MD; Jason Lewis, PhD; Michael Welch, PhD; and Bradley and Govindan—are involved in a promising


research study, funded by a grant from the National Institutes of Health (NIH). This study will assess a new positron-emitting tracer [^{60}Cu -labeled diacetyl-bis (^4N -methylthiosemicarbazone) (^{60}Cu -ATSM)] that can measure tumor hypoxia (oxygen deficiency), a critically important factor in tumor behavior. Tumors with a high degree of hypoxia have been shown to be more malignant, more resistant to treatment, and more likely to metastasize or recur. Thus, these tumors require more aggressive treatment.

In this study Dehdashti and her colleagues studied nonsmall cell lung cancers, using ^{60}Cu -ATSM to measure tumor hypoxia. Then they compared the degree of hypoxia measured by PET with the patients' responses to therapy. Although results were preliminary, the team discovered an inverse relationship between the degree of tumor hypoxia and its response to therapy: Patients with a low level of hypoxia responded better to treatment than did those with a high degree of hypoxia. As these results indicate, PET may have an important impact on management of patients with nonsmall cell lung cancer.

"This tracer will allow us to study therapeutic approaches that can improve tumor oxygenation by directly assessing the effect of such therapies on tumor hypoxia. This new PET tracer will also help us determine the regions of the tumor that are more hypoxic and, therefore, more aggressive and resistant to therapy," says Dehdashti. **NIH**



Farrokh Dehdashti, MD



*Nonsurgical
Treatment
Alternatives
for Patients with*

Aortic Dissection

The unique advantages of having well-trained, experienced personnel and state-of-the-art equipment at Mallinckrodt Institute of Radiology is providing new hope for patients with aortic dissection.

by Thomas Peters

Suresh Vedantham, MD

Aortic dissection is the most common catastrophe of the aorta. If left untreated, 33 percent of patients with aortic dissection die within 24 hours; by two weeks, the mortality rate approaches 75 percent. Two thirds of the patients diagnosed with aortic dissection are treated immediately by surgical aortic reconstruction, a procedure that is very complex, requires a long recovery time, and can be life threatening for these critically ill patients. Currently, at Mallinckrodt Institute of Radiology (MIR) and at only a few other medical centers in the world, revolutionary nonsurgical treatments are being created by coupling cutting-edge radiological and endovascular (inside the blood vessel) techniques. Together these nonsurgical approaches are quickly becoming viable and durable alternatives to extensive reconstructive surgical procedures for patients with thoracic aortic dissection.

The aorta is a large, elastic, multilayered blood vessel that comes from the heart and supplies blood to peripheral tissues and organs. Aortic dissection refers to a tear or hole in the inner elastic walls of the aorta that results in pulsatile blood flow moving through nonelastic outer layers of the aorta. In other words, blood flow forges a new path through the tear and into a very weak outer wall of the aorta that cannot respond well to the extreme forces of blood pressure. Although the exact causes of aortic dissection are not clear, patients with hypertension (high blood pressure) or Marfan's disease are the most common victims of this condition. Over time this leak of pulsatile blood flow into the weaker sur-

rounding layers of the aorta can lead to complications, including ballooning of the vessel walls (aneurysms), interruption of blood flow, and consequently oxygen to peripheral organs resulting in organ damage and/or eventually aortic rupture.

Suresh Vedantham, MD, a vascular and interventional radiologist at Mallinckrodt Institute of Radiology (MIR), is part of a multi-departmental effort at Washington University Medical Center (WUMC) to provide unique nonsurgical options for patients with aortic dissection. "At our medical center, we are fortunate to have a good team approach for solving these types of complex problems," says Vedantham. "The number of institutions that have these cutting-edge treatment options is relatively small."

Radiological diagnosis

Patients with aortic dissection are often diagnosed with severe chest pain, often with associated ischemia (low oxygen), in one or more organs. Once a patient is suspected of aortic dissection, imaging procedures can be performed to further identify whether the patient actually has aortic dissection. Angiography, often considered the standard radiological imaging procedure for identifying aortic dissections, has been replaced by newer, less invasive methods. Indeed, the aorta can be imaged radiologically by transesophageal echocardiography (TEE), magnetic resonance imaging (MRI), or helical computed tomography (HCT). According to Vedantham, Washington University Medical Center has the most current TEE, MRI, and HCT devices available.



Figure 1A

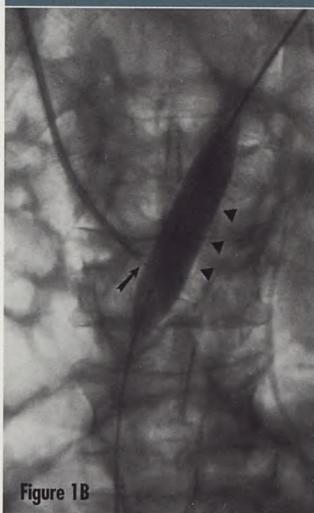


Figure 1B

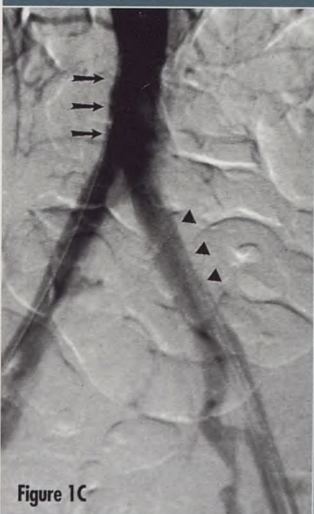


Figure 1C

Figures 1A, 1B, 1C: BALLOON FENESTRATION PROCEDURE TO RELIEVE LEFT LEG ISCHEMIA IN A PATIENT WITH AORTIC DISSECTION

Figure A: Digital subtraction angiogram shows severe collapse of aortic channel, or "true lumen," (arrowheads) that brings blood to left iliac artery and left leg.

Figure B: Through 3 to 4 mm incisions in each groin, a guided needle (arrow) is passed from left iliac artery into "false lumen" of the aorta. A catheter-mounted balloon (arrowheads) in the false lumen is used as a target for the needle pass.

Figure C: After new re-entry tear has been dilated and stented, angiogram shows contrast and, therefore, blood flowing from false lumen of the aorta (arrows), across newly created fenestration, and into left leg (arrowheads).

Figures 2A, 2B, 2C:
AORTIC STENT PLACE-
MENT IN A PATIENT WITH
AORTIC DISSECTION

Figure A: Digital subtraction angiogram shows aortic dissection (2 aortic channels, labeled A and B) with severe collapse of true lumen (arrows) of aorta in chest and upper abdomen. Arteries supplying liver, bowel, and right kidney are not seen because of poor blood flow. Artery to left kidney (arrowheads) has very low blood pressure.

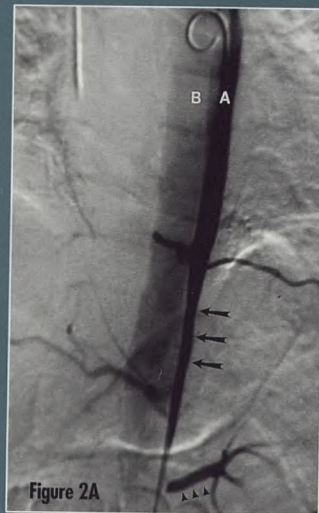


Figure 2A

Figure B: Through a 3 to 4 mm incision in the groin, a metallic stent is placed in the aorta to expand and support collapsed true lumen, permitting more blood flow. Balloon angioplasty will expand stent to proper size.



Figure 2B

Figure C: After stent placement, angiogram shows re-expansion of true lumen of the aorta with excellent blood flow.



Figure 2C

“HCT is a great method for scanning rapidly. We can scan the aorta in sub-seconds, and this helps to decide if the patient is a candidate for our aortic procedures,” he says. “HCT is quickly becoming the best way to evaluate acute aortic dissection and its complications.”

After reviewing the radiological images, determining if the tear is in the descending aorta, and consulting with the other team members, patients are classified into two groups.

Patients diagnosed with Stanford Type A dissection (involving the ascending aorta) are immediately sent for surgical intervention because of the high risk of aortic rupture. Patients diagnosed with Stanford Type B dissection (involving the descending aorta) without complications are managed with medications to reduce blood pressure and might be considered for stent-grafts in the future.

Type B dissection patients who do show complications of organ ischemia were previously treated with emergency aortic surgery, but at Mallinckrodt Institute these patients are now considered key candidates for innovative, minimally invasive approaches. Dissection complications can now be treated without the risks of major aortic surgery at the Institute and at a few other institutions worldwide.

However, Vedantham cautions that “we never do these procedures without input from vascular surgeons, cardiologists, and cardiothoracic surgeons. Everyone on our medical team must collaboratively decide what is best for the patient.”

First generation of nonsurgical treatments

According to Vedantham, the nonsurgical treatment of aortic dissection currently involves a “first generation” of radiological intervention techniques, including balloon fenestration and stent placement—both effective methods for treating the **complications** of dissection but not the dissection itself. Each of these techniques requires threading the balloon or stent devices through a catheter placed into an artery of the leg, as well as close radiological monitoring to help guide the devices to the aorta. Vedantham indicates these techniques are preferred since “they are a small operation through the groin instead of a massive operation in the chest.”

In balloon fenestration, the interventional radiologist makes a second, small tear in the aorta and below the initial tear. The radiologist then uses an inflatable balloon to prop this tear open, thereby creating a small re-entry tear. This re-entry tear brings the blood flow back into the elastic-containing inner walls of the aorta, restoring blood flow into its important branches. One disadvantage of the balloon fenestration technique is the risk of puncturing the aorta with the needle used to create the second tear—although this rarely occurs with experienced interventional radiologists.

Stents are small, expandable, metal mesh inserts that are placed in collapsed blood vessels to allow blood to again flow through the blood vessel and to help prevent future collapse of the blood vessel. Although only a limited number of patients have received the stent placement procedure in the

thoracic aorta, the procedure has been effective in restoring blood flow into the compromised aortic branches, relieving the ischemia. One disadvantage is that stent placement often requires large areas of blood vessels to be encompassed by these devices. Further studies must be performed to validate whether this is a viable long-term solution for complicated dissection.

Both of these techniques require guidance by radiological monitoring systems, including fluoroscopy (the standard procedure for most hospitals) or the more modern intravascular ultrasound, which is available at MIR. "Having access to intravascular ultrasound is another way to minimize the risks of the procedure. We can give patients less contrast dyes and prevent patients from developing complications," he says.

Overall, these first-generation techniques have been successful in restoring blood flow to over 90 percent of ischemic organs in patients with complicated dissection. However, remember the tear that gave rise to the aortic dissection is often not closed and, in the long term, may become more pronounced or may lead to further tears. Furthermore, each procedure is difficult to translate to the general medical community because these lengthy procedures are performed on critically ill patients and require well-trained staff and state-of-the-art radiological equipment available at only a few centers in the country.

Second generation of treatments

A new "second generation" approach that will soon be tested at WUMC involves placing a stent-graft across the primary tear of the dissection. The stent-graft is an expandable tube with a wall, whereas the stent is just expandable mesh used to prop open blood vessels. Therefore, the stent-graft can cover the region of the blood vessel that has a tear and hold open the blood vessel simultaneously.

"The number of patients treated with stent-grafts is small, but the graft is a promising solution. We are creating the repair much like the surgeons do surgically, but we are not exposing the patient to the upfront risks of having major surgery on the aorta," says Vedantham.

Current and future studies

Vedantham estimates that minimally invasive alternatives to aortic dissection are promising because of these three factors: improved biomaterials technology; improvements in imaging, including HCT, intravascular ultrasound, and digital subtraction angiography; and the current interest of biotechnology companies in pursuing less invasive methods of treating vascular diseases. He further explained that any procedure giving less invasive options to critically ill patients with aortic dissection requires further investigation of the long-term effects and whether that procedure can be expanded. Vedantham views stent-grafts as a major advance in the evolution of aortic dissection treatments.

The Washington University Medical Center team

Alan Braverman, MD, Internal Medicine
David Hovsepian, MD, Vascular and
Interventional Radiology
Daniel Picus, MD, Vascular and
Interventional Radiology
Luis Sanchez, MD, Vascular Surgery
Gregorio Sicard, MD, Vascular Surgery
Thoralf Sundt, MD, Cardiothoracic
Surgery
Suresh Vedantham, MD, Vascular and
Interventional Radiology

Local hospitals have referred patients with Stanford Type B aortic dissection to WUMC with good results, and Vedantham believes the number of patient referrals will probably increase. "We hope the aortic stent-graft will develop into a treatment that can be applied not just to the complicated Type B patients with ischemia but to all Type B patients," he says.

Overall, Vedantham indicates that the success of providing minimally invasive options to patients with aortic dissection can only occur through collaborative efforts, involving interventional radiologists, vascular surgeons, cardiothoracic surgeons, cardiologists, and attending critical care staff. ■■■

Editor's note: Vedantham recently coauthored "Nonoperative management of acute aortic dissection," with Michael Dake, MD, of Stanford University. The scientific material appears as a book chapter in Current Therapy in Vascular Surgery.

FYI

In this section, the names of employees who are full-time faculty or staff or who have an appointment in the Department of Radiology are highlighted in boldface type.

PROMOTIONS

Richard LaForest, PhD, research associate, was promoted to instructor in radiology, Division of Radiological Sciences.

Mai Xu, PhD, research associate, was promoted to instructor in radiology, Radiation Oncology Center.

NEW FACULTY

Deepa Chadha, MD, instructor in radiology, Division of Diagnostic Radiology, Barnes-Jewish St. Peters Hospital.

Mary Dyszlewski, PhD, visiting instructor in radiology, Division of Radiological Sciences.

Susan Langhorst, PhD, CHP, assistant professor of radiology, Division of Radiological Sciences, and radiation safety officer and assistant director of environmental health and safety for Washington University Medical Center.

Jie Zheng, PhD, instructor in radiology, Division of Radiological Sciences.

JOINT APPOINTMENTS

Thomas Conturo, MD, PhD, associate professor of radiology and adjunct assistant professor of physics, was appointed adjunct associate professor of physics and adjunct associate professor in biomedical engineering.

Victor Song, PhD, research associate, Department of Chemistry, was appointed instructor in radiology, Division of Radiological Sciences.

FIRST-YEAR FELLOWS

Hiten Malde, MD, is a clinical fellow in neuroradiology. He received an undergraduate degree from Valhind College of Science, India, and a medical degree from Grant Medical College, India. Malde completed four years of training in diagnostic radiology at New York Medical College, Valhalla.

Paul Wong, MD, is a clinical fellow in neuroradiology. He received an undergraduate degree from Santa Clara University, California, and a medical degree from St. Louis University, Missouri. Wong completed four years of training in diagnostic radiology at the Kaiser Foundation Hospital, Los Angeles.

APPOINTMENTS/ELECTIONS

Kyongtae Bae, MD, PhD, assistant professor of radiology, was elected to a three-year term on the American College of Radiology's Committee on Drug and Contrast.

Colin Derdeyn, MD, assistant professor of radiology, was appointed to the Editorial Board of the *American Journal of Neuroradiology*.

Eric Klein, MS, assistant professor of radiology, was appointed to two-year terms on the American Society for Therapeutic Radiology and Oncology's Physics Committee and the Refresher Course Subcommittee.

Robert McKinstry, MD, PhD, assistant professor of radiology, was appointed director of the neuroradiology fellowship training program at Mallinckrodt Institute.

Tom Miller, MD, PhD, professor of radiology, was appointed as a member of the American Board of Nuclear Medicine.

Scott Mirowitz, MD, professor of radiology, chief of radiology at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, was appointed by the Board of Directors of the Radiological Society of North America to serve as chair of its Health Policy and Practice Committee. Mirowitz has served on the committee since 1998.

Jason Sohn, PhD, assistant professor of radiology, was named president-elect of the American Association of Physicists in Medicine, Missouri River Valley Chapter.

Sally Wagner-Schwarz, MS, RPh, research instructor in radiology, was appointed to the U.S. Nuclear Regulatory Commission's Advisory Committee on Medical Use of Isotopes.

Jeffrey Williamson, PhD, professor of radiology, was appointed to the U.S. Nuclear Regulatory Commission's Advisory Committee on Medical Use of Isotopes.

Franz Wippold, MD, professor of radiology and chief of neuroradiology, was appointed to a one-year term on the American College of Radiology's Committee on Education—Neuro, Commission on Neuroradiology & Magnetic Resonance. He was appointed as adjunct professor of radiology/nuclear medicine by the F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, Bethesda, Maryland.

GRANTS

Robert Myerson, PhD, MD, professor of radiology, as principal investigator, received a National Institutes of Health grant for research on "Simultaneous thermoradiotherapy for breast carcinoma." Coinvestigators for the grant are **Eduardo Moros, PhD**, associate professor of radiology; **William Straube, MS**, instructor in radiology; **Marie Taylor, MD**, instructor in radiology; and **Carlos Perez, MD**, professor of radiology and director of the Radiation Oncology Center.

Nobuyuki Oyama, MD, PhD, visiting instructor in radiology, received a 2000 CaP CURE Research Award from the Association for the Cure of Cancer of the Prostate (CaP CURE) to fund research for one year on "PET imaging of prostate cancer recurrence: earlier diagnosis and treatment leading to better quality of life and prognosis." Coinvestigators for the \$100,000 award are MIR's **Tom Miller, MD, PhD**, professor of radiology; **Barry Siegel, MD**, professor of radiology and of medicine; **Farrokh Dehdashti, MD**, associate professor of radiology; **Jeff Michalski, MD**, assistant professor of radiology; and **Michael Welch, PhD**, professor of radiology and of chemistry; and Washington University's Adam Kibel, MD; Gerald Andriole, MD; and Joel Picus, MD.

Joseph Roti Roti, PhD, professor of radiology, associate director of the Radiation Oncology Center, and chief of cancer biology, as principal investigator, received a five-year, \$1.4 million grant from the

National Cancer Institute to study the molecular mechanisms that allow hyperthermia to kill cancer cells.

Jeffrey Williamson, PhD, professor of radiology, as principal investigator, received a five-year grant from the National Institutes of Health for research on "Heterogeneity corrections in brachytherapy." Coinvestigators are **Joseph Deasy, PhD**, assistant professor of radiology; **Clifford Chao, MD**, assistant professor of radiology; and David Rogers, PhD, National Research Council of Canada. Collaborators on the grant are **Sicong Li, DSc**, research associate; **Milos Vicic, PhD**, research associate; and Randal Baker, PhD, Los Alamos National Laboratory.

HONORS/ AWARDS

Kyongtae Bae, MD, PhD, assistant professor of radiology, received an Editor's Recognition Award of Distinction 2000 from the journal *Radiology*.

Louis Gilula, MD, professor of radiology and of surgery, was named organizer of the International Wrist Investigative Workshop held in October in Seattle, Washington.

Barry Siegel, MD, professor of radiology and of medicine and director of the Division of Nuclear Medicine, received the American Board of Radiology's Distinguished Service Award for his "time, expertise, and energy donated toward the American Board of Radiology's certification process."

LECTURES/PRESENTATIONS

Carolyn Anderson, PhD, associate professor of radiology, presented "Copper-64-labeled somatostatin analogs for cancer imaging and therapy" at the American Chemistry Society Regional Meeting, St. Louis, Missouri, October 26.

Jeffrey Brown, MD, associate professor of radiology, director of clinical research, and codirector of magnetic resonance imaging, presented "Abdominal MRA" and "MRI of the kidneys and pancreas" to the Colorado

Radiological Society, Denver, October 19. He spoke on "MRI of the female pelvis" at Grand Rounds at the University of Colorado Department of Radiology, Denver, October 20.

Clifford Chao, MD, assistant professor of radiology, spoke on "Head and neck IMRT: Washington University experience" at the IMRT Symposium: From Physics to Clinical Medicine, Milan, Italy, September 27-October 4.

MIR receives digital patient monitoring systems

Under a purchase agreement between Invivo Research, Inc. of Orlando, Florida, and MIR investigators Thomas Conturo, MD, PhD, and Robert Gropler, MD, chief of the cardiovascular imaging laboratory, MIR received two of the nation's first Invivo MAGNITUDE® MRI-compatible digital monitoring systems, which received U. S. Food and Drug Administration approval in September, 2000. This revolutionary technology will provide more reliable, noninvasive physiologic monitoring (heart rate, oxygen saturation, and blood pressure), invasive monitoring (arterial blood pressure), anesthesia monitoring (nitrous oxide, oxygen, and 5 vaporized anesthetics), and cardiac and pulse gating of MR imaging acquisitions. The MAGNITUDE® systems will be used for neurologic and cardiac imaging research in MIR's East Building.

LECTURES/PRESENTATIONS

Continued from page 21

Colin Derdeyn, MD, assistant professor of radiology, as invited lecturer, spoke on "Emerging therapies: intra-arterial thrombolysis and carotid angioplasty and stenting" at the Stroke Prevention and Treatment in the New Millennium Symposium, sponsored by The Stroke Center at Washington University, St. Louis, October 14.

Louis Gilula, MD, professor of radiology and of surgery, as visiting professor, presented "Ligamentous instabilities of the wrist" at the University of California, San Diego, August 18. He spoke on "Technical problems of vertebroplasty and how to handle them" at the International Skeletal Society, Barcelona, Spain, September 15. Gilula presented "Imaging approach to wrist pain" to the American Society of Plastic Surgeons, Los Angeles, October 11. He presented "Vertebroplasty in osteoporosis" to the National Rehabilitation Society, San Francisco, November 3. He spoke on "Kyphoplasty vs. vertebroplasty" at the Update on Spine Treatment, St. Louis, Missouri, November 11.

Perry Grigsby, MD, MBA, professor of radiology, presented "Post-operative management of endometrial carcinoma" to the Jacksonville Area Gynecologists/Oncologists Society, Jacksonville, Florida, August 22. He spoke on "Cervical cancer: combined modality therapy" at the 2nd Annual National Oncology Forum,

Chicago, Illinois, October 14-15. Grigsby presented "FDG-PET imaging for carcinoma of the cervix" and "Carcinoma of the thyroid in women" at the 10th European InterUniversity Symposium: Highlights in Female Cancers, Thessaloniki, Greece, November 2-5. He spoke on "Carcinoma of the ovary: role of radiotherapy" at the First International Conference of Rajiv Gandhi Cancer Institute and Research Center, Delhi, India, November 30-December 1.

Jay Heiken, MD, professor of radiology, chief of abdominal radiology, and codirector of body computed tomography, spoke on "Contrast media physiology for multidetector CT," "Imaging of the liver and pancreas with multidetector CT," and "CT colonography: state of the art" at CT in the Year 2000: Multidetector and Trauma CT, Milan, Italy, October 6 and 7. He presented "Radiology of small bowel obstruction: role of plain films, CT, and barium studies" and "Spiral CT for the evaluation of patients with renal colic: Do we still need IVP?" at the Eighth Annual Radiology Update for the Clinician, Carbondale, Illinois, November 4.

Anil Khosla, MD, instructor in radiology, spoke on "High resolution BOLD venography in tumors" at the All India Institute of Medical Sciences, New Delhi, India, August 5. He presented "Extramedullary cysts of spine" at the Delhi Radiology Association, New Delhi, India, August 8.

Moros discusses radio-frequency exposure systems

In response to public concern about the possible health hazards caused by radiofrequency exposure, the U.S. Food and Drug Administration has formed the Radiofrequency Micronucleus Working Group. Eduardo Moros, PhD, associate professor of radiology, was invited to join this national and international team of scientific/technical experts. At the group's initial meeting in August in Rockville, Maryland, Moros discussed the *in vitro* radiofrequency exposure systems and dosimetry research and development performed at MIR's Radiation Oncology Center. This public meeting was the first step of the Cooperative Research and Development Agreement formed between the FDA's Center for Devices and Radiological Health and the Cellular Telecommunications Industry Association.

Jason Lewis, PhD, research instructor in radiology, presented "Positron emission tomography (PET) as a diagnostic tool in oncology" at Pharmacia, St. Louis, Missouri, October 5. Lewis spoke on "Copper-64-labeled somatostatin analogs for cancer imaging and therapy" at the American Chemistry Society Regional Meeting, St. Louis, Missouri, October 26.

Daniel Low, PhD, assistant professor of radiology, spoke on "Difference between IMRT and conformal therapy" at University of Wisconsin, Madison, October 13, and at the Marconi Users Group Meeting, Boston, Massachusetts, October 20.

Robert McKinstry, MD, PhD, assistant professor of radiology, as invited speaker for the American Medical Association/Intel Health Internet Roadshow, presented "Novice Internet training," "Web resources for physicians," "Web resources for consumers," and "Solutions for enhancing your practice" to the Michigan State Medical Society, Beverly Hills, Michigan, September 14, and "Web resources for physicians" and "Solutions for enhancing your practice" to the Kentucky State Medical Society, Louisville, September 21. He spoke on "Diffusion tensor imaging of human neural development" at the Mapping Function and Anatomy in the Brain Symposium, sponsored by the Department of Radiology, Michigan State University, East Lansing, November 3.

Jeff Michalski, MD, assistant professor of radiology, presented "Radiation therapy for localized prostate cancer" at the University of Arkansas Medical Center, Fort Smith, September 7. He spoke on "New perspectives on prostate cancer: redefining patient care" at the Medical Education Collaborative, New York City, New York, September 23. Michalski presented "New perspectives on prostate disease: redefining patient care" at the Medical Education Collaborative, St. Louis, Missouri, October 27. He spoke on "3D CRT and IMRT in pediatric clinical trials" at the Children's Oncology Group Meeting, Phoenix, Arizona, November 2. Michalski presented "Pediatric brain tumor trials in the Children's Oncology Group" to the Greater St. Louis Society of Radiologists, St. Louis, Missouri, November 21.

Scott Mirowitz, MD, professor of radiology, chief of radiology at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, as visiting professor, presented "MRI artifacts: challenges and solutions" and "MRI of the rotator cuff: techniques and interpretation at Grand Rounds" to the Department of Radiology, University of Missouri Medical Center, Columbia, October 31.

Robert Myerson, PhD, MD, professor of radiology, spoke on "A joint U.S.-Italian phase I/II trial of three dimensionally planned concurrent boost radiotherapy and protracted venous infusion of 5FU chemotherapy for locally advanced rectal carcinoma: response to treatment," Rome, Italy, November 17.

Vamsidhar Narra, MD, assistant professor of radiology, presented "3D contrast enhanced MRA" to the Illinois State Society of Radiologic Technologists, Collinsville, Illinois, September 22. He presented "3D contrast enhanced MRA and the value of VIBE" at William Beaumont Hospital, Royal Oak, Michigan, October 4. He spoke on "MRCP for clinicians" at Michigan State University, Flint, October 5. Narra presented "3D CE MRA" at the University of Louisville, and "MRCP" to the Greater Louisville Radiological Society, Louisville, Kentucky, October 18. He spoke on "Dynamic MRI in the evaluation of pelvic floor abnormalities" at the 86th Annual College of the American College of Surgeons, Chicago, Illinois, October 25. He presented "MRCP clinical applications: Can MRCP replace ERCP?" to the Carbondale Radiological Society, Carbondale, Illinois, November 4.

Nobuyuki Oyama, MD, PhD, visiting instructor in radiology, as invited lecturer, presented "Clinical use of PET imaging in prostate cancer" to the Division of Nuclear Medicine, University of Washington, Seattle, August 28.

James Purdy, PhD, professor of radiology, associate director of the Radiation Oncology Center, and chief of radiation oncology physics, as invited lecturer, presented "Dose-volume specification and reporting for radiation oncology," "Quality assurance of 3D treatment planning systems," "Quality assurance of 3D CRT and IMRT multi-institutional trials," and "Intensity modulated radiation therapy" at the 4th Annual National Symposium for Radiation Oncology, Johannesburg, South Africa, August 21 and 22. As invited speaker, he presented "Image-based treatment planning" at the University of Witwatersrand, Johannesburg, South Africa, August 23. Purdy spoke on "Review of ICRU Reports 50 & 62: prescribing, recording, and reporting photon beam therapy" and "Radiation therapy in the new millennium: future directions" at Tygerberg Hospital, Cape Town, South Africa, August 29 and 30.

Marcus Raichle, MD, professor of radiology and of neurology and neurobiology and codirector of the Division of Radiological Sciences, as the invited Willis Lecturer, presented "A default mode of brain function" to the Montreal Neurological Institute, Montreal, Canada, September 21.

Joseph Roti Roti, PhD, professor of radiology, associate director of the Radiation Oncology Center, and chief of cancer biology, as invited speaker, presented "Using animals to assess health effects of radiofrequency radiation from cell phones" to the Metro St. Louis Branch Association of Laboratory Animal Science, St. Louis, Missouri, October 19.

Stuart Sagel, MD, professor of radiology, chief of chest radiology, and codirector of body computed tomography, spoke on "CT of asbestos-related thoracic disease," "CT of the pleura," "CT of non-vascular mediastinal masses," and "Problematic case discussions" at the Summer Practicum of the Society of Computed Body Tomography and Magnetic Resonance, Whistler, British Columbia, August 13-17. He spoke on "CT angiography for pulmonary embolism" and "CT of the thorax: anatomic variants and pitfalls" at the South Florida and University of Miami Radiological Meeting, Miami, Florida, September 20. As visiting professor, Sagel presented "CT of non-vascular mediastinal masses," "CT of the thorax: anatomic variants and pitfalls," and "CT angiography for pulmonary embolism" to the Department of Radiology, Brown University, Providence, Rhode Island, October 2.

LECTURES/PRESENTATIONS

Continued from page 23

Barry Siegel, MD, professor of radiology and of medicine and director of the Division of Nuclear Medicine, spoke on "PET in nuclear oncology: clinical applications" at the 7th Asia and Oceania Congress of Nuclear Medicine and Biology/4th International Congress of Nuclear Oncology, Istanbul, Turkey, October 2. In celebration of the opening of the first PET center in Turkey, Siegel, as invited speaker, presented "Oncological applications of PET" at International Hospital, Istanbul, October 3. He presented "PET imaging in oncology: overview of tumor imaging" and "Choices in positron imaging: PET" at the 14th Annual Northeast Regional Scientific Meeting of the New England and Greater New York Chapters of the Society of Nuclear Medicine, Newport, Rhode Island, November 3 and 4.

Marilyn Siegel, MD, professor of radiology and of pediatrics, spoke on "Mediastinal CT: pitfalls in children and adolescents," "Pediatric abdominal masses: imaging strategies," "Adolescent gynecologic lesions: CT/MRI," and "Pediatric kidney" at the 10th Summer Practicum of the Society of Computed Body Tomography and Magnetic Resonance Imaging Meeting, Whistler, British Columbia, August 13-17. As an invited speaker, she presented "CT of the pediatric mediastinum" and "Spiral CT of the liver in children" at the Spiral/Helical CT 2000: National Symposium, Las Vegas, Nevada, September 7 and 8. As an invited guest speaker, she presented "CT/MR of pediatric retroperitoneal tumors," "Hepatic CT in children," "Ultrasonography of acute abdominal pain in children," and "MR imaging of bone marrow" at the New Orleans Fall Radiology Conference, New Orleans, Louisiana, September 21 and 22. Siegel spoke on "CT/MR imaging of abdominal pediatric tumors" at the International Cancer Imaging Society, 1st Annual Teaching Course, London, England, October 9 and 10. She presented "Sonography of neonatal intracranial hemorrhage and ischemia,"

"Pediatric gynecologic ultrasonography," "Ultrasonography of neonatal renal disease," "Ultrasonography of acute abdominal pain in children," "CT of the pediatric kidney," and "CT and MRI of pediatric pelvic masses" at the 29th Brazilian Congress of Radiology, Salvador da Bahia, Brazil, November 12-15.

Jason Sohn, PhD, assistant professor of radiology, as invited lecturer, presented "Intensity modulated radiation therapy" at the Korean Society of Medical Physicists Annual Meeting, September 22 and 23; at Seoul National University Medical School, September 25; at Samsung Medical Center, September 27; and at Hallym University Medical Center, Seoul, Korea, September 27.

Marie Taylor, MD, instructor in radiology and chief of breast service, presented "Neoadjuvant therapy-radiation management for operable breast cancer" and "Management of local-regional recurrence after definitive treatment of operable breast cancer" at the Breast Cancer Symposium 2000, Bangkok, Thailand, November 9 and 10.

Jerold Wallis, MD, associate professor of radiology, spoke on "Web-based image interpretation" at the Missouri Valley Chapter of the Society of Nuclear Medicine Annual Chapter Meeting, Des Moines, Iowa, October 8.

Todd Wasserman, MD, professor of radiology, presented "Protectors" at the Institute of Oncology, Chaim Sheba Medical Center, Tel-Hashomer, Israel, August 17, and to the Cancer Education Program-Tumor Board, Elkhart General Healthcare System, Elkhart, Indiana, December 20. He presented "Radiation protectors in clinical radiotherapy" to the Oncology Department of Rambam Medical Center, Haifa, Israel, August 21. He spoke on "Adjunctive care of the cancer patient: optimizing nutritional status for improved outcomes" at the SynerMed Development Meeting, Philadelphia, Pennsylvania, September 9. Wasserman spoke on "Ethyol and its clinical benefits" at the U.S. Oncology Fall Conference, Phoenix, Arizona, October 9. He spoke on "Overviews of head and neck cancer and new strategies in radioprotection" at Medicom of Princeton, Inc., Augusta, Maine, November 27. He spoke on "Ethyol as a radioprotectant in head and neck cancers" at Medicom of Princeton, Inc., Cape Elizabeth, Maine, November 28.

Michael Welch, PhD, professor of radiology and of chemistry and codirector of the Division of Radiological Sciences, presented "Cu-64-pyruvaldehyde-bis(N4-methylthiosemicarbazone) (Cu-64-PTSM) as a radiotherapy agent to prevent the growth of tumors at wound sites following laparoscopy" at the EANM Congress, Paris, France, September 4.



Melson Visiting Professorship and Lecture

On September 25, Barbara Hertzberg, MD, professor of radiology and associate professor of obstetrics and gynecology at Duke University, presented the Eighth Annual G. Leland Melson Visiting Professorship and Lecture, "Ultrasound evaluation for ectopic pregnancy." Hertzberg received a commemorative plaque from (left to right) Drs. Jay Heiken, chief of abdominal radiology; Sharlene Teefey, ultrasound; and William Middleton, head of ultrasound.

Jeffrey Williamson, PhD, professor of radiology, as invited speaker, presented "Dosimetry & calibration of low energy brachytherapy sources" at the Council of Ionizing Radiation Measurements and Standards Workshop on a Measurements and Standards Infrastructure for Brachytherapy, Washington, DC, October 30 and 31.

Franz Wippold, MD, associate professor of radiology and chief of neuroradiology, spoke on "Laryngeal cancer imaging" and "Cervical lymph nodes-anatomy and pathology" at the University of Montreal and at McGill University, Montreal, Canada, September 12. He presented "Imaging the post therapy oral cavity and oropharynx" and a film interpretation session at the XV International Congress of Head and Neck Radiology, Kumamoto, Japan, October 19.

SYMPOSIA

In this section of FYI, only those faculty and staff who have MIR appointments are listed.

AMERICAN SOCIETY FOR THERAPEUTIC RADIOLOGY AND ONCOLOGY (ASTRO)

*42nd Annual Meeting
Boston, Massachusetts
October 22-26, 2000*

James Purdy, PhD, ASTRO Gold Medal Award recipient.

Imran Zoberi, MD, ASTRO Research Fellow Award recipient.

REFRESHER COURSE

David Gius, MD, PhD, "Novel combinations of biologic and radiation therapy—emphasizing gene and anti-angiogenic therapeutic strategies."

SCIENTIFIC SESSIONS

Ana Botero, MD; Clifford Chao, MD; Ineke Duijndam, MD; Joseph Simpson, MD, PhD; Carlos Perez, MD, "High dose radiation therapy yields satisfactory tumor control and the quality of voice as compared with those of hemilaryngectomy in early stage glottic carcinoma."

Jeffrey Bradley, MD; Joseph Deasy, PhD; James Purdy, PhD; Todd Wasserman, MD; Nantakan Ieumwananonthachai, MD; Mary Ann Lockett, MBA, "Gross tumor volume is an independent predictor of survival in non-small cell lung carcinoma patients treated with conformal radiotherapy."

Mustafa Cengiz, MD; Clifford Chao, MD; Carlos Perez, MD, "Intensity-modulated radiotherapy (IMRT) with concurrent cisplatin chemotherapy (CT) yields superior therapeutic outcome than conventional techniques with or without chemotherapy in locally advanced nasopharyngeal carcinoma."

Clifford Chao, MD; Joseph Deasy, PhD; Joanne Markham, MS; Carlos Perez, MD; James Purdy, PhD; Daniel Low, PhD, "Functional outcome of parotid gland sparing in patients with head and neck (H&N) cancers receiving intensity-modulated (IMRT) or 3-D radiation therapy."

Clifford Chao, MD; Perry Grigsby, MD; Kim Nguyen, dosimetry QA specialist; **James Dempsey, PhD; Fritz Lerma, PhD; Kyongtae Bae, MD, PhD; Jeffrey Williamson, PhD**, "Prospects for image-based dose planning of intracavitary brachytherapy: registration of serial-imaging studies using deformable anatomic templates."

Perry Grigsby, MD, MBA, "Long-term follow-up of RTOG 92-10: cervical cancer with positive para-aortic lymph nodes."

Chih-Jen Huang, MD; Clifford Chao, MD; Carlos Perez, MD; Daniel Low, PhD, "Tumor response and salivary function sparing in patients with oropharyngeal squamous cell carcinoma treated with intensity modulated radiation therapy (IMRT) with/without chemotherapy: The Mallinckrodt Institute of Radiology initial results."

SYMPOSIA

Continued from page 25

Shervin Karimpour, MD; Christopher Bradbury, research technician; **Imran Zoberi, MD; Ana Botero, MD; David Gius, MD, PhD,** "The role of thioredoxin reductase in the regulation of AP-1 DNA-binding activity and in the cytotoxic response to ionizing radiation."

Eric Klein, MS; Daniel Low, PhD, "Interleaf leakage testing for 0.5 and 1.0 CM DMLC systems incorporating patient motion."

Daniel Low, PhD; James Dempsey, PhD; Joanne Markham, MS; Sasa Mutic, MS; Jeffrey Williamson, PhD; James Purdy, PhD, "Applicator-guided intensity modulated radiation therapy."

Jeff Michalski, MD; James Purdy, PhD; Carlos Perez, MD; William Harms, BS, "Update of toxicity following 3D radiation therapy for prostate cancer on RTOG 9406."

Jeff Michalski, MD; Walter Bosch, DSc, "Mean dose of radiation to the bulb of the penis correlates with risk of impotence at 24 months: preliminary analysis of Radiation Therapy Oncology Group (RTOG) phase I/II dose escalation trial 9406."

Marie Taylor, MD; Carlos Perez, MD; Mary Ann Lockett, MBA, "The effect of medical co-morbidities of diabetes, hypertension and obesity on the incidence of arm edema after breast conservation therapy for stage I and II breast cancer-patients."

Jeffrey Williamson, PhD, "Prospects for image-based dose planning of intracavitary brachytherapy: registration of serial imaging studies using deformable anatomic templates."

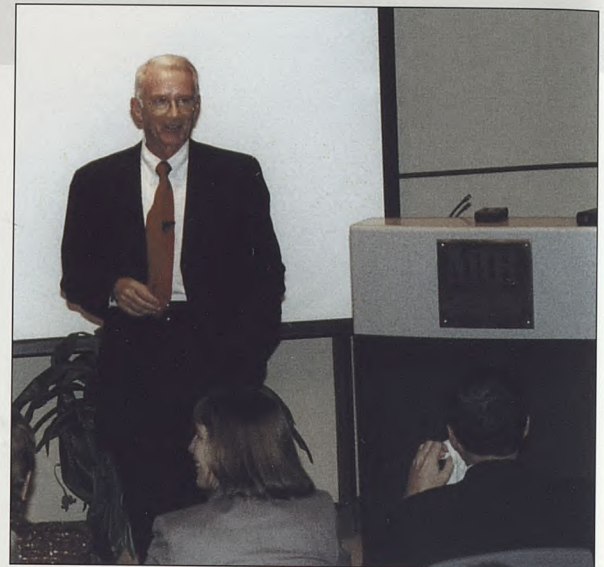
Imran Zoberi, MD, "The role of thioredoxin in the regulation of AP-1 DNA-binding and cytotoxicity in response to ionizing radiation."

POSTER PRESENTATIONS

Joseph Deasy, PhD, "Acceleration of monte carlo dose calculations via denoising techniques."

Robert Drzymala, PhD; Jason Sohn, PhD; Eric Klein, MS, "Preliminary study for frameless spinal radiosurgery using a stereoscopic camera system."

Todd Grigereit, PhD; Daniel Low, PhD; Jennifer Britt, dosimetry QA specialist; **Jeffrey Bradley, MD,** "Helical arc radiation therapy."



Scott Lecture

Ronald Evens, MD, president of Barnes-Jewish Hospital and former director of Mallinckrodt Institute, was the 29th Annual Wendell G. Scott Memorial Lecturer. On October 16 in Scarpellino Auditorium, Evens spoke on "Radiology from a hospital president's point of view."

William Harms, BS; Russell Gerber, MS; James Purdy, PhD, "Three dimensional conformal radiation therapy treatment planning and delivery verification for multi-institutional dose escalation trials using an anthropomorphic phantom."

Jacob Locke, MD; Imran Zoberi, MD; Douglas Spitz, PhD; David Gius, MD, PhD, "Indomethacin induced inhibition of AP-1 DNA-binding activity inhibits resistance of H202-resistant tumor cells to the cytotoxicity of hyperthermia, H202, and CIS-platin."

Robert Myerson, PhD, MD; Anurag Singh, MD; Mary Ann Lockett, MBA, "Pre-treatment clinical findings predict outcome following preoperative radiation for rectal cancer."

Jason Sohn, PhD; Daniel Low, PhD; Eric Klein, MS, "Dynamic multileaf collimator performance for Intensity Modulated Radiation Therapy."

RADIOLOGICAL SOCIETY OF NORTH AMERICA (RSNA)

86th Scientific Assembly and Annual Meeting
Chicago, Illinois
November 26-
December 1, 2000

Louis Gilula, MD, presiding officer, Musculoskeletal (elbow, hand, and wrist).

Jay Heiken, MD, presiding officer, Gastrointestinal (CT colonography: technical advances); keynote speaker, Gastrointestinal.

Gilbert Jost, MD, session chair, Integrating the Healthcare Enterprise (IHE): clinical goals and technical challenges.

William Middleton, MD, presiding officer, Musculoskeletal ultrasound.

Barry Siegel, MD, speaker, Opening Session, Positron emission tomography in clinical practice.

Pamela Woodard, MD, presiding officer, Chest (pulmonary embolism: improving results).

FOCUS SESSION

Steven Don, MD, "Potential for reduced exposure to neonates through the use of chest computed radiography."

SCIENTIFIC EXHIBITS

Anil Khosla, MD; Franz Wippold, MD; Fred Hodges, MD, "Extramembranous cysts of spinal canal."

Jeff Michalski, MD; Sasa Mutic, MS; John Eichling, PhD; Nisar Ahmed, MD, "Measured patient and family radiation exposure from permanent prostate brachytherapy."

Mehdi Poustchi-Amin, MD; Pamela Woodard, MD; Fernando Gutierrez, MD; Jeffrey Brown, MD; Scott Mirowitz, MD; Vamsidhar Narra, MD, "Practical cardiac MRI: principles and applications, a review for the general radiologist."

REFRESHER COURSES

Dennis Balfe, MD, "Imaging the invisible: mesenteries and peritoneum of the upper abdomen."

Jeffrey Brown, MD, "MR of the genitourinary tract."

Joseph Deasy, PhD, "Update course in diagnostic radiology physics: radiation therapy optimization and intensity-modulated radiation therapy—radiobiological issues of optimization and intensity-modulated radiation therapy."

Louis Gilula, MD, "Vertebroplasty: indications, technique, problems, and complications;" "Imaging upper-extremity trauma with plain films, CT, and MR;" "Wrist and hand injuries."

Fernando Gutierrez, MD, "Update course in pediatric radiology: imaging advances in 2000—cardiovascular disease. Vascular anomalies: mediastinum and lung."

Jay Heiken, MD, "Acute abdomen: CT evaluation."

David Hovsepian, MD, "Hysterosalpingography and selective salpingography ('how-to' workshop)."

Elizabeth McFarland, MD, "CT of the small bowel and colon: principles, techniques, and applications."



Probstein Oncology Lecture

The Norman K. Probstein Oncology Lecture, in recognition of meritorious contributions to oncology, was presented on November 3 by Jonathan Epstein, MD, professor of pathology at Johns Hopkins University School of Medicine. He spoke on "Prognostic factors in prostate cancer."

Jeff Michalski, MD, "Radiation therapy for prostate cancer: dose escalation with 3D conformal radiation therapy."

William Middleton, MD, "Musculoskeletal US ('hands-on' workshop);" "Practical tips in ultrasound: hand and wrist."

James Purdy, PhD, "Update course in diagnostic radiology physics: radiation therapy optimization and intensity-modulated radiation therapy—optimized treatment planning."

David Rubin, MD, "Imaging upper-extremity trauma with plain films, CT, and MR: shoulder injuries."

Stuart Sagel, MD, "Digital chest radiography: techniques and clinical applications."

Barry Siegel, MD, "Optimizing PET interpretation."

Marilyn Siegel, MD, "Update course in pediatric radiology: imaging advances in 2000—pelvis: US, CT, or MR imaging? Uterine anomalies;" "Pediatric MR imaging: abdominal masses."

SYMPOSIA

Continued from page 27

SCIENTIFIC SESSIONS

Kyongtae Bae, MD, PhD; Alvaro Huete, MD; Farrok Dehdashti, MD; Jay Heiken, MD, "Characterization of adrenal adenoma with PET in oncology patients."

Kyongtae Bae, MD, PhD; Jeong Lee, MD; Bruce Whiting, PhD; Jay Heiken, MD, "Evaluation of multi-slice CT scan parameters for renal artery stenosis depiction: *in vitro* analysis."

Thomas Conturo, MD, PhD; Nicholas Lori; Erbil Akbudak, PhD; Abraham Snyder, MD, PhD; Robin Guillory; Joshua Shimony, MD, PhD, "MRI diffusion tensor tracking of neuronal pathways of the visual system in living humans."

Juliet Fallah, MD; Marilyn Siegel, MD, "Post-transplant lymphoproliferative disorder and non-Hodgkins lymphoma: comparison of CT findings in abdominal disease."

David Gierada, MD; Thomas Pilgram, PhD; Richard Slone, MD; Lora Crouch, BSRT, "Reliability of quantitative CT (QCT) in determining emphysema severity and distribution in lung volume reduction surgery candidates."

Louis Gilula, MD; Dallas Peck, MD, "Percutaneous vertebroplasty for severe osteoporotic vertebral compression (vertebra plana)."

Jay Heiken, MD; Cary Siegel, MD, "Attenuation of renal cysts with conventional and spiral CT: a phantom study."

Ronan McDermott, MD; Sharlene Tee Fey, MD; William Middleton, MD; Charles Hildebolt, DDS, PhD, "The resistive index in renal parenchymal disease: no correlation with histopathological findings."

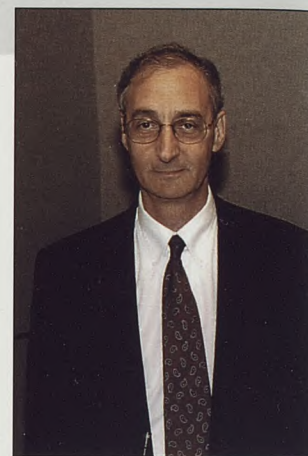
William Middleton, MD; Sharlene Tee Fey, MD, "Interobserver variability in sonographic detection of rotator cuff tears."

William Middleton, MD; Sharlene Tee Fey, MD; Cynthia Santillan, MD; Elizabeth McFarland, MD; Shadan Sadeghi, "Prospective evaluation of the incidence of testicular microlithiasis and its association with testicular tumors."

Scott Mirowitz, MD, "Health services, policy, and research;" "Radiology utilization patterns in an academic based managed care setting."

Tolmach Lecture

Norman Coleman, MD, chief of radiation oncology at the National Cancer Institute/National Institutes of Health in Bethesda, presented the Ninth Annual Leonard J. Tolmach Memorial Lecture on November 3. The lecture topic was "Radiation oncology: linking technology and biology in the treatment of cancer."



Pratik Mukherjee, MD, PhD; Robert McKinstry, MD, PhD, "Diffusion tensor MR imaging of the reversible posterior leukoencephalopathy syndrome."

Dallas Peck, MD; Louis Gilula, MD, "Technical problems and potential solutions in vertebroplasty."

Sharlene Tee Fey, MD; William Middleton, MD, "Detection of partial and full thickness rotator cuff tears in patients with a painful shoulder: a comparison of ultrasound, MRI, and arthroscopic surgery."

Bruce Whiting, PhD; Kyongtae Bae, MD, PhD, "Novel method of CT data reduction by compression of projection sinograms."

Dmitriy Yablonskiy, PhD, "Gradient echo plural contrast imaging (GEPCI)—new fast magnetic resonance imaging technique for simultaneous acquisition of T2, T1 (or spin density) and T2*-weighted images."



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