

Summer 1999

Focal Spot, Summer 1999

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SUMMER, 1999

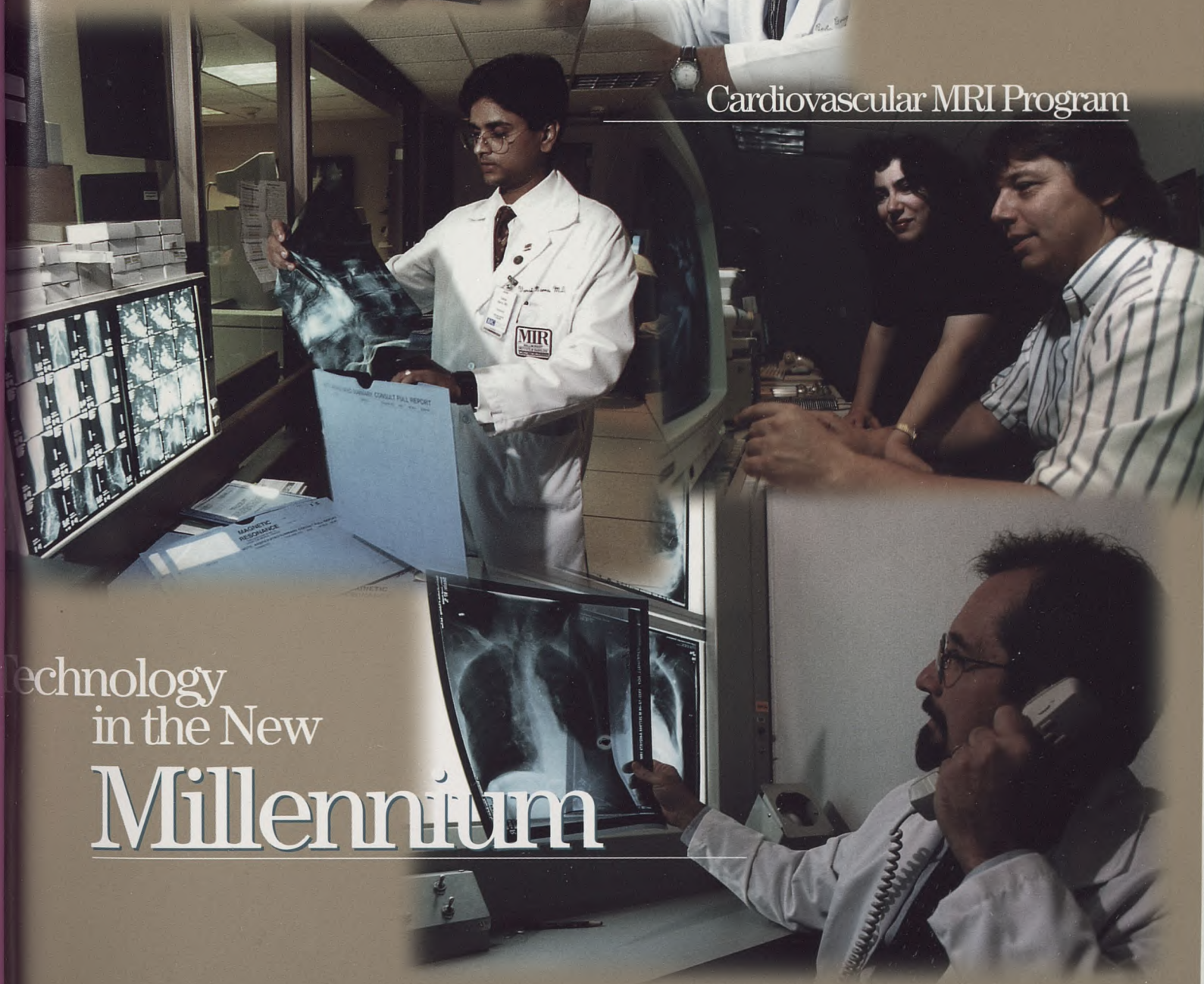
VOLUME 30, NUMBER 2

FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY



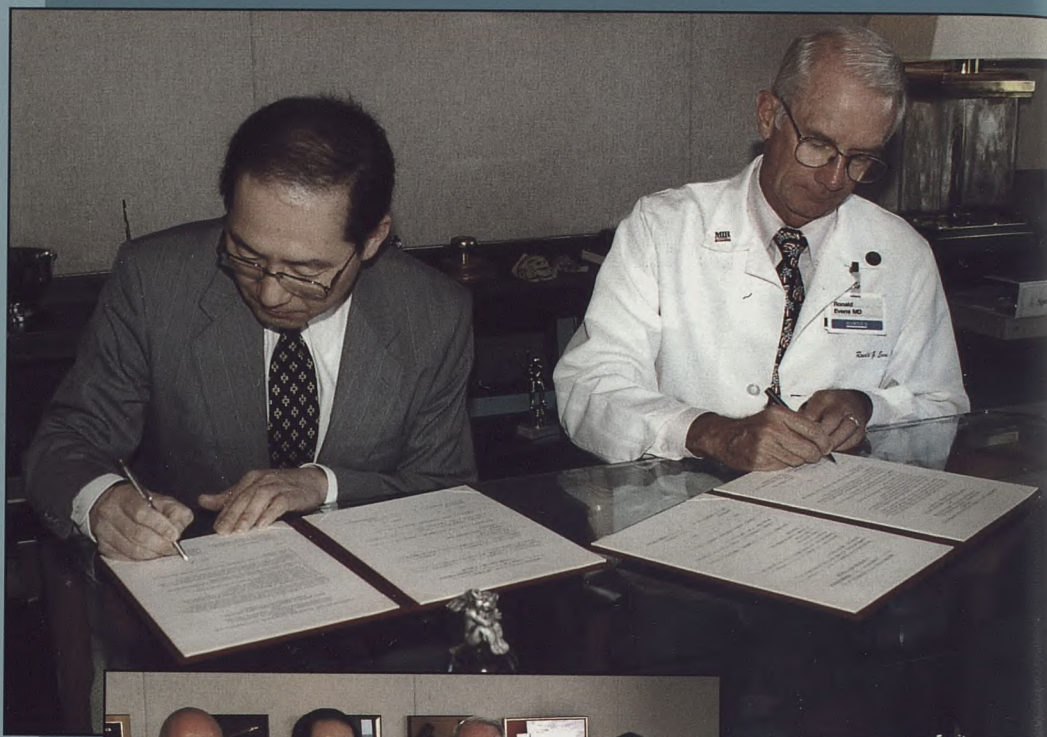
Cardiovascular MRI Program



Technology
in the New
Millennium

On June 29, 1999, Ronald Evens, MD, director of Mallinckrodt Institute of Radiology at Washington University, and Yoshiharu Yonekura, MD, director of the High Energy Medical Research Center at Fukui Medical University, signed an academic exchange and cooperation agreement between the two institutions.

Michael Welch, PhD, director of the Division of Radiological Sciences, has collaborated with the Japanese university on radiopharmaceutical research for many years, which has resulted in the development of an imaging agent for hypoxia that is currently used in four clinical studies at MIR. He was instrumental in coordinating the official exchange of professors, research scholars, and graduate students as well as scientific materials, publications, and information necessary to conduct joint research activities.



(Left to right) In Evens' office on the twelfth floor of the Institute, Welch, Yonekura, Evens, and Yasuhisa Fujibayashi, PhD, DMed.Sci., display the signed agreements: one in English, the other in Japanese.



Dear Friends and Colleagues,

On October 4 of this year, I will assume the position of president and CEO of Barnes-Jewish Hospital in St. Louis. It was a difficult decision for me to leave the Mallinckrodt Institute of Radiology—my professional home for 35 years. While I am enthusiastic about the opportunity to lead one of the nation's top hospitals, I will deeply miss MIR and my association with our exceptional faculty and staff.

The Institute has played an important role in the advancement of medical imaging, and my 28 years as head of Washington University School of Medicine's Department of Radiology and director of Mallinckrodt Institute have been exciting times, including the introduction of such groundbreaking technologies as positron emission tomography, computed tomography, and magnetic resonance. We have experienced a renewed commitment to our research and clinical programs, an increase in financial support through grants and contracts, enhanced patient services, an expanded physical plant, and a stronger relationship with our BJC hospitals.

I am proud to have been a part of this premier radiological facility and will continue as a member of the volunteer faculty as I move to full-time responsibilities at Barnes-Jewish Hospital. I value this new opportunity to guide a renowned hospital where private and academic physicians, including the MIR faculty, work together to deliver the highest quality medical care.

Best regards and continued success,

A handwritten signature in cursive script that reads "Ron Evens".

Ronald G. Evens, MD

FOCAL SPOT

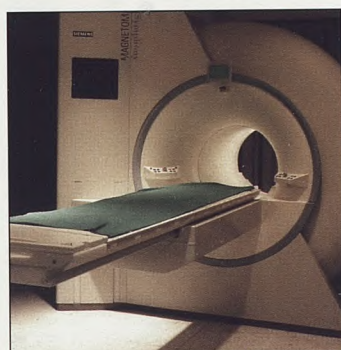
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MALLINCKRODT INSTITUTE OF RADIOLOGY



4 THE BIGGER PICTURE

Scientists in MIR's molecular pharmacology lab have uncovered the secrets of proteins in the human brain that are crucial to drug transport and regulation, a discovery that may provide breakthroughs in treating fatal diseases.

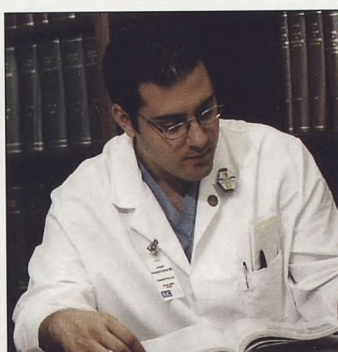


8 TECHNOLOGY IN THE NEW MILLENNIUM

Mallinckrodt Institute's Cardiovascular Magnetic Resonance Imaging Program, among the oldest and best known MR programs nationwide, provides an easy transition from cutting-edge research to high quality clinical care.

15 A LEARNING RESOURCE

After seven decades of renovations, relocations, and rejuvenations, the MIR Education Center continues to provide radiology residents, fellows, and staff with a comprehensive reference library and learning facility.



18 MEETINGS IN ST. LOUIS

Experts in the areas of radiopharmacology and radiopharmaceutical chemistry travelled to St. Louis to attend one of the largest international conferences ever held on the Washington University Medical Center campus.



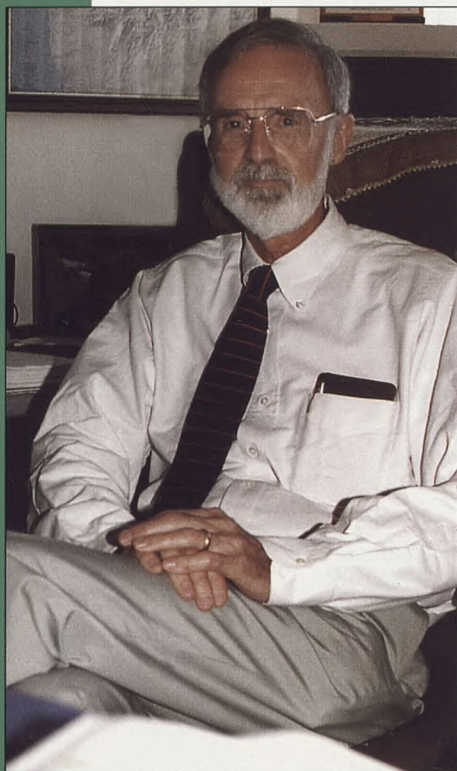
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ON THE COVER:

State-of-the art equipment, groundbreaking research, and a team approach to patient care are trademarks of Mallinckrodt Institute's highly regarded Cardiovascular Magnetic Resonance Imaging Program. Photography by Tim Parker.

SPOT NEWS



Honors for Raichle continue

Marcus Raichle, MD, a pioneer in medical imaging, is the recipient of the 1999 Bristol-Myers Squibb Award for Distinguished Achievement in Neurosciences Research. Chosen by an independent selection committee from an international roster of nominees, Raichle will receive the award in September in New York.

In the fall of this year, Raichle will receive the first Washington University Faculty Achievement Award. The announcement was made May 1 by Chancellor Mark Wrighton that Raichle

and Gerald Early, PhD, of the University's School of Arts and Sciences, were selected as the inaugural honorees for their outstanding achievement in research and scholarship, for their prominence within the community of scholars, for their service and dedication to the betterment of the University, and for their respected accomplishments in teaching.

Raichle's studies of the human brain using positron emission tomography and magnetic resonance imaging produced important discoveries relating to psychiatric disorders and the development of functional maps of the brain's sensory and language information-processing areas. He pioneered the use of radionuclides for the measurement of cerebral blood flow and metabolism.

A faculty member since 1971, Raichle is a professor of radiology and codirector of the Division of Radiological Sciences and holds joint appointments as a professor of neurology and neurobiology and is a senior fellow with the McDonnell Center for Studies of Higher Brain Function. He is a member of the National Academy of Sciences—one of the highest honors accorded a United States scientist or engineer—as well as a member of the Institute of Medicine and the American Academy of Arts and Sciences.

Totty named Teacher of the Year

Radiology senior residents annually honor the MIR faculty member who has made outstanding contributions to resident education. This radiologist teaches not only with the traditional course study and conferences but through example as the residents observe and participate in the interpretation of clinical studies.

At the residents' and fellows' farewell dinner on June 18, William Totty, MD, professor of radiology and of orthopaedic surgery, was named the 1998-1999 Teacher of the Year. He joins a prestigious list of honorees that began with the presentation of the first award in 1985 to Dr. David Ling.

According to Sanjeev Bhalla, MD, 1998-1999 cochief diagnostic radiology resident, "Doctor Totty was recognized because of his direct role in the education of all residents, from the very early (first month, first year) to the very senior (last month, last year). Although the musculoskeletal section's workload dramatically increased during the year, Doctor Totty made sure that the bone conferences—from basic bone to advanced MRI—were staffed and prepared. The residents never saw a decrease in the number of conferences or in the quality of teaching."

Totty received a medical degree from the University of Tennessee, where he was a member of the Alpha Omega Alpha honorary medical society. He joined the Institute staff in 1980 as an instructor in radiology and

was appointed professor of radiology in 1993 and professor of orthopaedic surgery in 1996. Totty is a past member of the MIR Resident Selection Committee and served for 10 years as the director of the Institute's medical staff library. In 1995, he was named a fellow of the American College of Radiology and currently serves on the editorial board of the journal *Topics in Magnetic Resonance Imaging*.

This year's farewell dinner marked the inauguration of two annual recognitions: Fellow of the Year, which was presented to Antoinette Cortese, MD, and Distinguished Teacher, which was awarded to doctors Harold Bennett, Dennis Balfe, David Rubin, and Vamsidhar Narra.

Zoberi named ASTRO fellow

Imran Zoberi, MD, radiation oncology assistant chief resident 1999-2000, was named the American Society for Therapeutic Radiology and Oncology (ASTRO) Clinical/Basic Research fellow for 1999-2000. The award was established by ASTRO in 1977 to recognize future leaders in the field of radiation oncology. To qualify for the award, a candidate must be a resident in training and must submit a manuscript detailing his or her research. Under the mentorship of David Gius, MD, PhD, instructor in radiology, Zoberi will study signal transduction pathways in cellular response to radiation.

Radiology chair endowed

The long-standing collaboration between Mallinckrodt Incorporated and the Edward Mallinckrodt Institute of Radiology (MIR) at Washington University School of Medicine has resulted in an endowed radiology chair—the Mallinckrodt Professorship in Informatics. The past two decades have seen a rapid development in radiologic technology and a steady progression toward a filmless radiology department that will be based on computer-generated information. According to Dr. Ronald Evens, head of the Institute, MIR must have exceptional leadership and knowledge in the information systems arena in order to position itself as the preeminent leader in patient care. He believes that this new professorship will provide the foundation for MIR to secure that role.

Gilbert Jost, MD, director of the Division of Diagnostic Radiology, and James Blaine, DSc, director of the Electronic Radiology Laboratory, are leading the international search for the professorial position, which also will lend collaborative support to the University's Department of Biomedical Engineering. MIR has one other endowed chair, the Elizabeth Mallinckrodt Professorship of Radiology that has been held by Ronald Evens since the chair was established in 1972.

RSNA funds research

Since its inception, the mission of the Radiological Society of North America (RSNA) has been to "promote and develop the highest standards of radiology and related sciences through education and research."

The RSNA Research and Education Foundation sponsors several programs to assist young investigators as they begin careers in radiology research, education, and related scientific disciplines:

Scholars program awards \$60,000 annually for two years to faculty members who are within five years of their initial faculty appointment.

- Pamela Woodard, MD, assistant professor of radiology at the Institute, received the 1999 RSNA/Eastman Kodak Scholar Award.

The Fellow award provides a stipend of \$35,000 annually, which may be renewed for a second year at \$40,000, for physicians nearing the completion of their radiologic training.

- Kevin Berger, MD, an MIR neuroradiology fellow, received a 1999 RSNA/Dichiro Fellow award of \$40,000.

Seed grants up to \$25,000 are awarded three times annually to young investigators to help them gain experience in testing hypotheses and defining objectives.

- MIR faculty members Kyongtae Bae, MD, PhD, and Cary Siegel, MD, received seed grants of \$25,000 and \$21,000, respectively.

Research Resident grants of \$30,000 provide second- and third-year radiology residents with an opportunity to explore careers in research.

- 1999 grant recipients are MIR's Jacob Locke, MD, radiation oncology fourth-year resident, and Pratik Mukherjee, MD, diagnostic radiology fourth-year resident.

Two receive Wilson Award

The Hugh M. Wilson Award for Meritorious Work in Radiology was established in 1968 as a tribute to Hugh Wilson, MD, the second director of Mallinckrodt Institute. Historically, the annual award is presented to one fourth-year medical student who has performed outstanding work in basic or clinical radiological sciences. This year, John Loh and Jeffrey Brent were dual recipients of the award, which was presented during Washington University's commencement exercises on May 14.

Loh participated in the MIR Summer Research Program under the mentorship

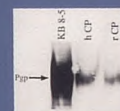
of Elizabeth McFarland, MD, associate professor of radiology, and Jay Heiken, MD, professor of radiology and chief of the abdominal imaging section. With a strong background in electrical engineering and computer graphics, Loh was instrumental in establishing hardware and software specifications required for virtual colonoscopy, a rapidly advancing imaging technique used to detect colorectal polyps. Loh was a coauthor of "Visualization of colorectal polyps with Spiral CT colography: evaluation of processing parameters with perspective volume rendering," which was published in the scientific journal *Radiology*.

Brent rotated through radiology early in his senior medical year and worked in the Division of Nuclear Medicine as a senior research elective, for which he received an Honors grade. Under the supervision of Tom Miller, MD, PhD, professor of radiology and of electrical engineering, Brent was responsible for developing and implementing computer software to spatially align cardiac images obtained with positron emission tomography and magnetic resonance imaging.

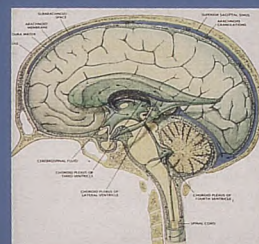
"Both Jeff and John fully met the high standards—academically, scientifically, and ethically—set by previous award recipients," says Lawrence Kotner, MD, chairman of the selection committee. "We are proud to add their names to the list of outstanding medical students who have received the Wilson Award."

Western Analysis of P-Glycoprotein Expression in Membranes of Rat and Human Choroid Plexus Tissues

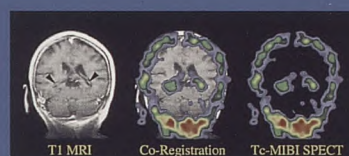
mAb C219



Choroid Plexus Within Ventricles of the Brain



Functional Demonstration of the Blood-Cerebrospinal Fluid Drug-Permeability Barrier in Human



Localization of P-glycoprotein to Epithelial Cells of Rat and Human Choroid Plexus

Frozen Rat Brain (mAb C219)

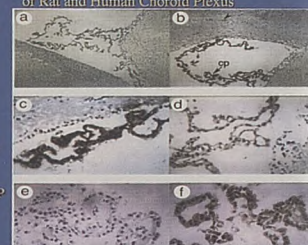
a: -; b: +

c: + C219

d: + C219 plus blocking peptide

Frozen Human CP (mAb MRK16)

e: -; f: +



the bigger picture

Mallinckrodt Institute researchers **unlock** molecular secrets in the brain.



David Piwnica-Worms, MD, PhD

by Kirstin Blase

What began as perfusion experiments in the heart using the radioactive imaging compound technetium-99 Sestamibi evolved into the discovery of proteins in the brain that are crucial to drug transport and regulation. This discovery of P-glycoprotein (PGP) and multidrug resistance-associated protein (MRP) in the choroid plexus—a highly convoluted tissue that lines cavities deep within the brain and is responsible for fluid and drug transport—has implications for treating cancer, depression and other diseases affecting the brain, as well as AIDS.

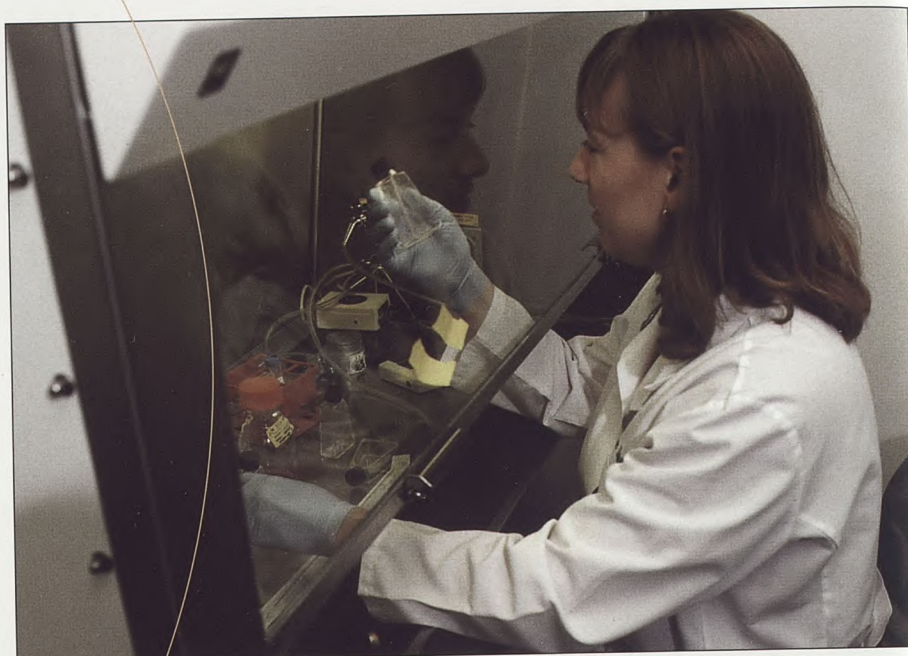
David Piwnica-Worms, MD, PhD, lead investigator of the study and director of Mallinckrodt Institute's molecular pharmacology laboratory, and a team of researchers used single photon emission computed tomography (SPECT) imaging and molecular biology to study the molecular events taking place in the brain. Like searching for hidden treasure, information from the SPECT image provided the researchers with a map for finding keys to the secrets of specific molecular events.

the bigger picture

Research history

Piwnica-Worms' research with technetium-99m-Sestamibi began more than 10 years ago at Harvard's Brigham and Women's Hospital, where he was investigating a group of technetium-99 compounds for use in heart perfusion imaging. ^{99m}Tc -Sestamibi is excellent for imaging the heart because the compound flows through the bloodstream and, upon reaching a tissue bed from the capillaries, its lipophilicity (or fat-loving nature) allows it to cross fatty bilayers or membranes into the cell. Once in the cell the compound's positive charge is attracted to the cell's negatively charged portions, such as the mitochondria, thereby retaining the agent. In his research, the compound was taken up rapidly in the heart, where Piwnica-Worms later confirmed an absence of PGP.

As the research moved from heart perfusion to a general investigation of the mitochondrial uptake, Piwnica-Worms and his colleagues began working with tumor uptake and encountered a turning point in their long journey of discovery: The ^{99m}Tc -Sestamibi was showing little uptake in various tumors, indicating that something was either preventing it from getting into the tumor cells or was rapidly pumping it out. PGP is found in the liver and kidneys, poised to pump out wastes. In tumors, PGP was acting similarly as a guard for the cells; ^{99m}Tc -Sestamibi was not allowed in and neither were chemotherapeutic agents.



In the tissue culture room, Julie Dahlheimer uses a hood that HEPA-filters all bacteria, virus, or yeast from the air so that she has a sterile environment in which to culture choroid plexus epithelial cells.

The story of PGP now turns to Mallinckrodt Institute of Radiology (MIR) and the choroid plexus. "Every investigation that finds something new, points to other queries," notes Piwnica-Worms, professor of radiology and of molecular biology and pharmacology. As the research continued into the nature of PGP, a SPECT image taken of a human brain showed the uptake of ^{99m}Tc -Sestamibi in the choroid plexus; however, uptake appeared nowhere else in the brain.

There are two ways to transport compounds into the brain: through the blood-brain barrier and through the choroid plexus. The latter is the "back door" that provides a barrier between the blood and the cerebrospinal fluid. But with ^{99m}Tc -Sestamibi's ability to pass through the choroid plexus' fatty epithelium, why wasn't the compound just spilling into the brain?

Questions lead to unexpected results

It's been proven that PGP's role in the blood-brain barrier is to prevent drugs from getting into the brain, but what about the cerebrospinal fluid? No one had ever looked for PGP in the choroid plexus before. Vallabhaneni Rao, PhD, a former instructor of radiology at the Institute, and Julie Dahlheimer, the lab's senior research technician, used choroid plexus tissue from 50 neonatal rats to develop a culture that simulated an epithelium, which allowed them to perform transport experiments. Rao and Dahlheimer hoped to show that PGP and MRP worked together, in a polar arrangement across the choroid plexus, regulating drug traffic. Using inhibitors for each PGP and MRP, the researchers demonstrated that by inhibiting one protein, a compound such as ^{99m}Tc -Sestamibi could favorably cross the epithelial layer to the other side, in one direction only. However, this alone could not tell them if the PGP was on the

apical (or luminal fluid) side of the choroid plexus or on the basolateral (or blood-facing) side, information that is important in understanding PGP's true function.

Further experiments with immunohistochemistry—staining slices of the choroid plexus with antibodies—provided a better clue to the geography of the choroid plexus. Confocal microscopy was also used in which cells were stained with fluorescent antibodies and then imaged.

"But there's a surprise for every investigation," says Piwnica-Worms. He had originally expected the PGP to be on the basolateral side but, as with the transport experiments, "unexpectedly discovered that MRP must be on the basolateral side and is the predominant mechanism preventing the technetium compound from traveling into the cerebrospinal fluid."

Analysis revealed that PGP, always on the apical side in various epithelial and tissues throughout the body (like the liver and kidneys), and usually thought to pump drugs and waste **out** of the body, is indeed apical but is poised to pump substances from the choroid plexus directly **into** the cerebrospinal fluid.

Future investigations

Because PGP is not as simple as originally thought, future research will study this important protein's natural function: Is PGP acting the same in all of the tissues in the body; if so, why and how; and does it act differently in the choroid plexus?

Pharmaceutical companies are already using the results of this research to develop PGP and MRP inhibitors. If PGP and MRP are blocking vital treatment drugs from reaching the brain, inhibiting these proteins will allow the drugs to pass through the blood-brain and cerebrospinal barriers and, hopefully, localize at the desired loca-

tions in the brain. Drugs such as chemotherapeutic agents for brain cancer, anti-depressants, and protease inhibitors for the AIDS virus would become effective in previously blocked areas of the body. Understandably, the MIR team is proud to be part of this important research.

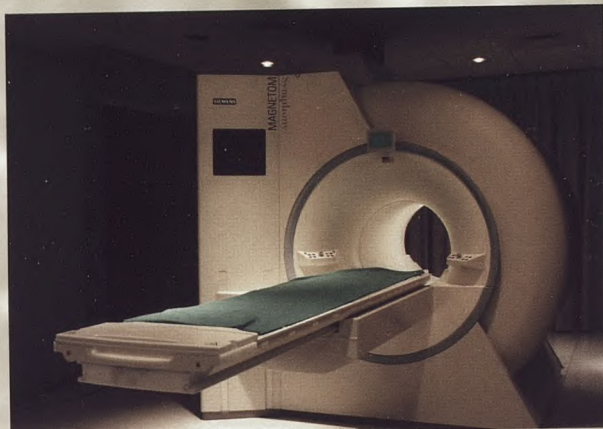
Piwnica-Worms is now beginning a National Institutes of Health-sponsored clinical trial to track PGP, using ^{99m}Tc -Sestamibi, in 100 patients with breast cancer tumors. Through continuing research, Piwnica-Worms also hopes to answer fundamental questions about the nature of PGP: What is its normal role? What are its normal substrates? What other biochemical events are impacted by the expression of PGP? How is PGP distributed across the membrane? Promising new position emission tomography agents targeting PGP also are under development.

Finding PGP and MRP in the choroid plexus has opened the door to possible breakthroughs in treating fatal diseases, and it will be accomplished by seeing the bigger picture—as the MIR team did with their research.

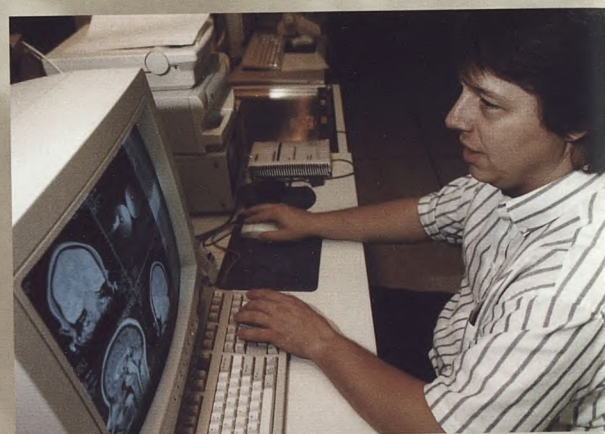
*Editor's note: Results of this study were published in the March 30, 1999, issue of Proceedings of the National Academy of Sciences. The paper, "Choroid plexus epithelial expression of MDR1 P glycoprotein and multidrug resistance-associated protein contribute to the blood-cerebrospinal-fluid drug-permeability barrier," was authored by Rao, Dahlheimer, Mark Bardgett and Abraham Snyder of Washington University School of Medicine, Rick Finch and Alan Sartorelli of Yale University, and Piwnica-Worms. **MIR***

Gary Luker, MD, shown with Piwnica-Worms in the molecular pharmacology lab, is representative of young investigators who are conducting science-driven research.





Siemens' Symphony scanner



Glenn Foster, research patient coordinator

Technology in the New Millennium

MIR's Cardiovascular Magnetic Resonance Imaging Program

moves easily

between research and clinical applications.



A 42-year-old man with exertional chest pain was referred to the Washington University Medical Center, after an X-ray coronary angiogram performed at another hospital showed that he had an anomalous right coronary artery. Mallinckrodt Institute of Radiology (MIR) clinicians then had to determine if the anomaly was a harmless variant or if the vessel passed between the aortic root and the pulmonary trunk—a vessel location that could result in a patient's sudden death. Using coronary magnetic resonance angiography (MRA), radiologists painstakingly traced the progress of the wayward artery and found that it ran between the aorta and the root of the pulmonary artery, a potentially lethal pathway if not correctly diagnosed.

MRA has proven to be a valuable tool in pinpointing these anomalous coronary arteries—even better than conventional X-ray angiography, which can locate the vessels but not assess their exact course. Magnetic resonance imaging (MRI) assessments often have life-or-death implications.

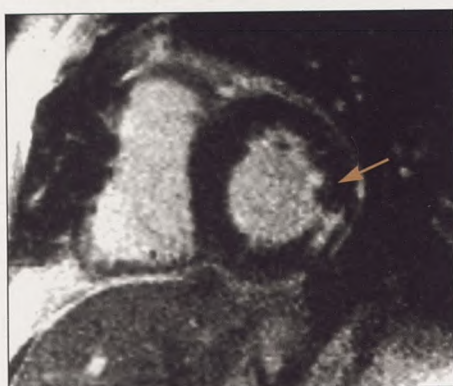
by Candace O'Connor



Pamela Woodard, MD



A multiplanar reconstruction of a left anterior descending coronary artery with a lesion corresponding to a 70 percent stenosis on the cardiac catheterization.



An MR myocardial viability study demonstrating an inferolateral infarct (arrow).

Along with evaluating anomalous arteries, MRA recently has been used in coronary artery bypass graft patency, which is used particularly beneficial for patients who are not eligible for cardiac catheterization. MRA is not only useful in heart procedures but is now routinely used to evaluate other parts of the vascular system, including the peripheral, pulmonary, and renal arteries.

Magnetic resonance angiography is just one segment of Mallinckrodt Institute's Cardiovascular Magnetic Resonance Imaging Program, among the oldest and best-known programs of its kind in the United States. Since the Institute acquired its first MRI scanner in 1983 (the first in Missouri and one of the first in the nation), the program has been expanding into critical areas such as assessment of congenital heart disease.

"Most institutions don't have cardiovascular MRI programs. They may perform an occasional cardiac or vascular study but not the combination of research and clinical cases that Mallinckrodt Institute does," says Pamela Woodard, MD, assistant professor of radiology and one of eight Institute staff members who are involved in groundbreaking magnetic resonance research and clinical studies. "Only about a dozen other sites nationwide produce research that subsequently moves into the clinical realm."

Cardiovascular MRI Growth

"The program is not just growing in the number of patients seen but in the types of problems that we are asked to diagnose," says Fernando Gutierrez, MD, an associate professor of radiology who has worked with MRI since its introduction at the Institute. "Referring physicians used to ask, 'Does this patient have congenital heart disease?' Now they say, 'Here's a patient with a complex problem; help me identify the level and magnitude of this particular lesion.' Doctors and patients want more answers, and our program can help to provide those answers."

From the beginning, the field of MRI has been fluid and rapidly changing. In 1983, recalls Gutierrez, radiologists were delighted to have this exciting new tool that allowed them to see vessels and heart chambers noninvasively. The technology was first applied to complex pediatric problems as a complement to cardiac catheterization and echocardiography. But no one had an inkling of how many applications would develop.

Initially magnetic resonance focused on imaging the abdomen and brain because imaging the heart has always proved technically difficult. The heart's pumping action and the motion caused by a patient's breathing complicate the acquisition of a good image. As researchers at

MRI Growth at the Institute

Mallinckrodt Institute used techniques such as retrospective respiratory gating and fast imaging technology to solve these problems, clinical cardiovascular MRI extended into other areas.

Clinicians now rely on MRI to provide extraordinary anatomical detail of the pulmonary and great vessels, which historically have been difficult to image using other techniques. Unlike computed tomography scans, MRI is increasingly accurate at depicting the direction and quality of blood flow, a critical factor in assessing cases of aortic narrowing or cardiac valvular diseases.

"We now have physiologic monitoring capability, which wasn't possible back in the early days of MRI. Patients with unstable conditions couldn't undergo MRI in the 1980s because the older scanners did not provide a way to monitor these patients," says Woodard. "Now we can check blood pressure and oxygenation and acquire better ECG tracings—important information,

Fernando Gutierrez, MD, and Cynthia Santillan, a fourth-year student at Washington University School of Medicine

especially for children with congenital heart problems or adults with ischemic disease."

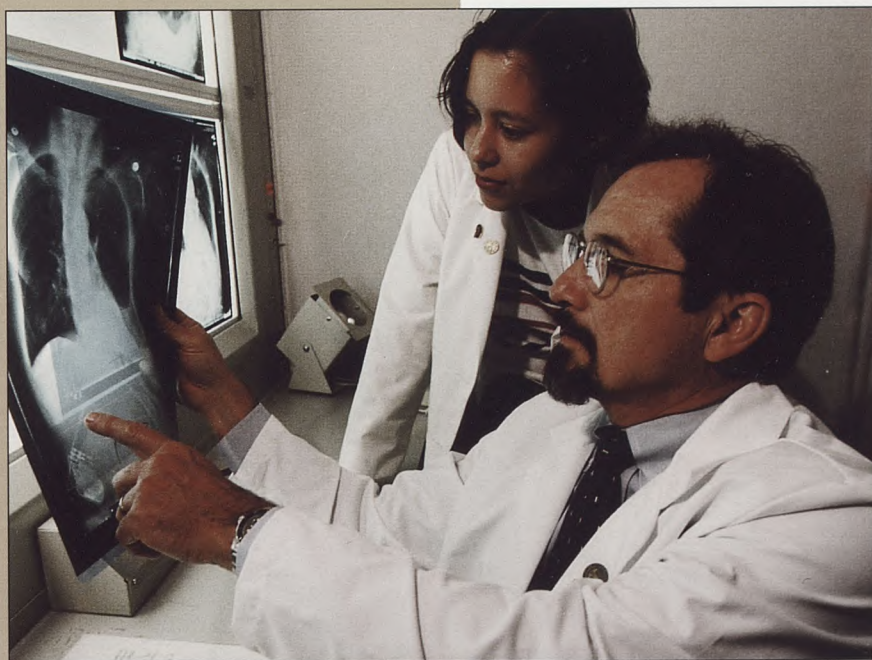
Thanks to the foresight of Ronald Evens, MD, director of Mallinckrodt Institute, state-of-the-art equipment has always been an integral part of the program. Three scanners are used for cardiovascular MR imaging research, including the newest piece of equipment called "The Symphony," a system specifically designed for cardiac imaging. Three additional scanners are on the clinical side, with a second Symphony expected near the end of 1999. All of the scanners were manufactured by one of Mallinckrodt Institute's long-standing research collaborators: Siemens Medical Systems of Iselin, New Jersey, and Erlangen, Germany.

The program is not just growing in

the number of patients seen but in

the types of problems that we are

asked to diagnose.



Fighting Congenital Heart Disease

In recent years at the Institute, cardiovascular MR of congenital heart disease has focused on an older population. These patients were all born with mild to severe heart abnormalities, and all are seen at Barnes-Jewish Hospital's Center for Adults with Congenital Heart Disease. The center is directed by Philip Ludbrook, MD, professor of medicine and of radiology.

These adults, mostly in their 20s and 30s, represent a brand-new patient base. Just a decade ago, most did not survive childhood. Now, these patients live longer but have complex, multi-systemic problems that require the detailed imaging provided by MRI.

"In many cases, MRI has allowed surgeons to identify pathologic lesions, which otherwise would not have been seen," says Gutierrez. "Showing surgeons the exact extent of the disease and the areas of abnormalities allows them to plan surgery accordingly."

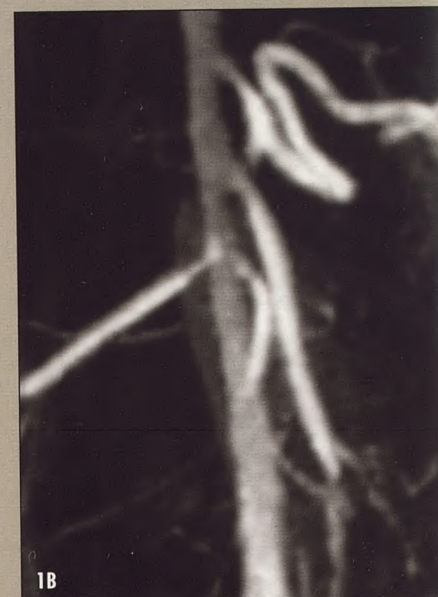
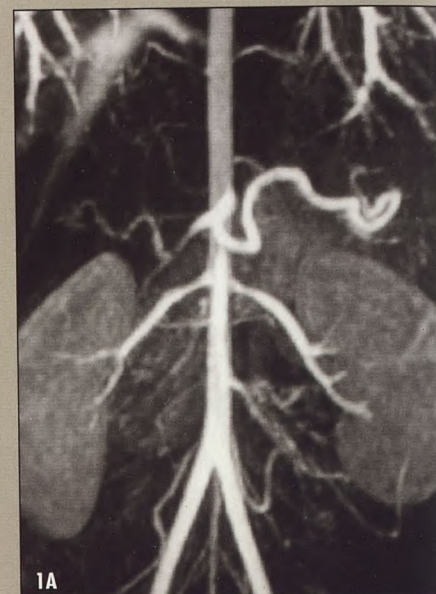
One strength of the Cardiovascular MRI Program is the interaction between radiologists and cardiologists, working together in a team approach to care. Multidisciplinary ventures, both ongoing and planned, exist in both clinical and research arenas and extend to equipment usage. It is anticipated that when cardiac MR reaches its full potential, a joint service of radiologists and cardiologists will be in place.

Expansion of MR Angiography

Vamsidhar Narra, MD, instructor in radiology, specializes in MRA of the pulmonary, renal, and peripheral arteries. Echoing his colleagues, he praises the Institute's team approach to care, particularly the partnership with interventional radiologists led by Daniel Picus, MD, chief of vascular and interventional radiology, who also read each aortic, peripheral, and renal MRA report.

"We are working in a very exciting field," says Narra. "Aortic, peripheral, and renal MRA, with a sensitivity and specificity varying from ninety-two to one hundred percent, compares favorably to conventional angiography—the gold standard."

During an MRA procedure, the patient is given a small test dose or "bolus" of contrast agent; Narra watches carefully to see how many seconds it takes for the bolus to affect the area of interest. Next the real bolus—a non-nephrotoxic agent called Gadolinium—is given while Narra waits for the precise moment for the MRI images to be taken. Each image slice is only one millimeter thick, with 60 to 90 slices in a single acquisition. Afterward, the images are assembled and run through a computer program to create a Maximum Intensity Projection (MIP).



This study is of a 14-year-old female, with a rare genetic condition called Williams Syndrome, who had chronic abdominal pain. The MR angiogram of the abdominal aorta and renal arteries (figures 1A, B, C) shows a small caliber abdominal aorta with narrowing of all of the major branches. A delayed image (figure 2) from the same study demonstrates venous anatomy with normal variation of the circumaortic left renal vein.



"The result is an image that looks like a conventional angiogram. The blood vessels, which were first viewed in pieces, are now together," Narra says. "You can see the entire vessel and its branches and the anatomy of the abnormality."

Unlike conventional angiography, MRA acquires data in a three-dimensional fashion. "We have the ability, which we call multiplanar reconstruction, to reconstruct acquired data in different planes, from different orientations—all from the same data, without repeating the procedure," he adds.

MRA is used in various types of renal cases: younger patients who have elevated blood pressure, patients who have poor renal function that may have a correctable cause, or patients with diabetes or poor renal function who need an angiogram but cannot tolerate the iodinated contrast agents used in computed tomography and conventional angiography.

Vamsidhar Narra, MD

MRA offers additional advantages over other imaging methods, Narra says. For example, in a case of central pulmonary embolus assessment, MRA has the advantage of determining other possible causes of symptomatology. MRA clearly shows the area outside the vessel, even the surrounding tissues, so that physicians can see not only the vessel but also the possible mass compressing the vessel.

New intravascular contrast agents—including two being tested by Narra, interventional radiologist Eric Malden, and Woodard—stay in the system longer than ever before, giving the radiologist a greater chance to acquire high-resolution, detailed images. But on the flip side of this advantage is a problem. Radiologists can now see the entire vascular tree, including large veins—which sometimes obscure the very arteries they need to study. Research is underway to devise subtraction techniques to eliminate the veins in favor of the arteries.

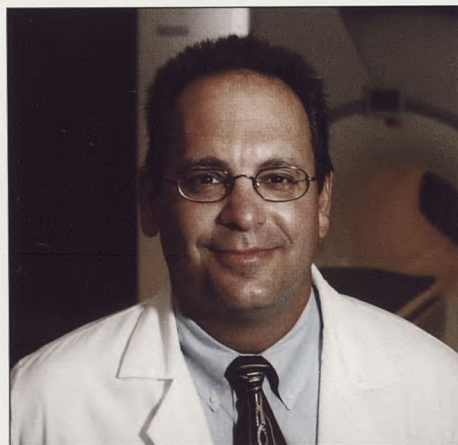


Technology in the New Millennium

Translating **Research Advances** into Clinical Care

The two-year-old Cardiovascular Imaging Laboratory, directed by Robert Gropler, MD, associate professor of radiology and of medicine, is dedicated to using various imaging technologies, such as echocardiography, MRI, and position emission tomography (PET), to solve specific biologic questions related to the cardiovascular system. The lab may be young, but the work is cutting-edge. Only two or three other research facilities worldwide have the capabilities for such complex imaging studies, in which aspects of cardiac function are accurately—and elegantly—measured. It is partly a tribute to their team but also a tribute to their facilities and colleagues who make this success possible, Gropler says.

Although the lab's work is primarily science-driven, one of the goals is the realization of having



Robert Gropler, MD

the researchers' work translated into new forms of clinical care. For example, Gropler and his team are negotiating a new research agreement with a past collaborator, Siemens Medical Systems, to use MRI to bring the imaging of myocardial perfusion and oxygen usage and function into the clinical arena.

"But the Holy Grail for cardiac MRI is the 'integrated examination' that would allow us to look for coronary artery stenoses, then assess the impact of these stenoses on coronary blood flow, and ultimately on the function of the heart," says Gropler, who heads a 15-member laboratory staff. "We currently conduct this assessment clinically with multiple noninvasive imaging approaches performed at different times, including coronary angiography, an invasive procedure. Our goal is to do it all noninvasively in a single sitting."

While this kind of examination may be seven to ten years away from routine clinical use, Mallinckrodt Institute researchers—primarily Woodard, an expert in coronary MRA—and scientists at other centers are making rapid technical advances in this area. Gropler's lab is developing protocols designed to assess cardiac MR's ability to detect changes in myocardial function in patients with coronary artery disease. Furthermore, in collaboration with cardiothoracic surgery, studies are underway to determine the accuracy of cardiac MR to differentiate myocardium that is damaged but still alive from myocardium that is dead.

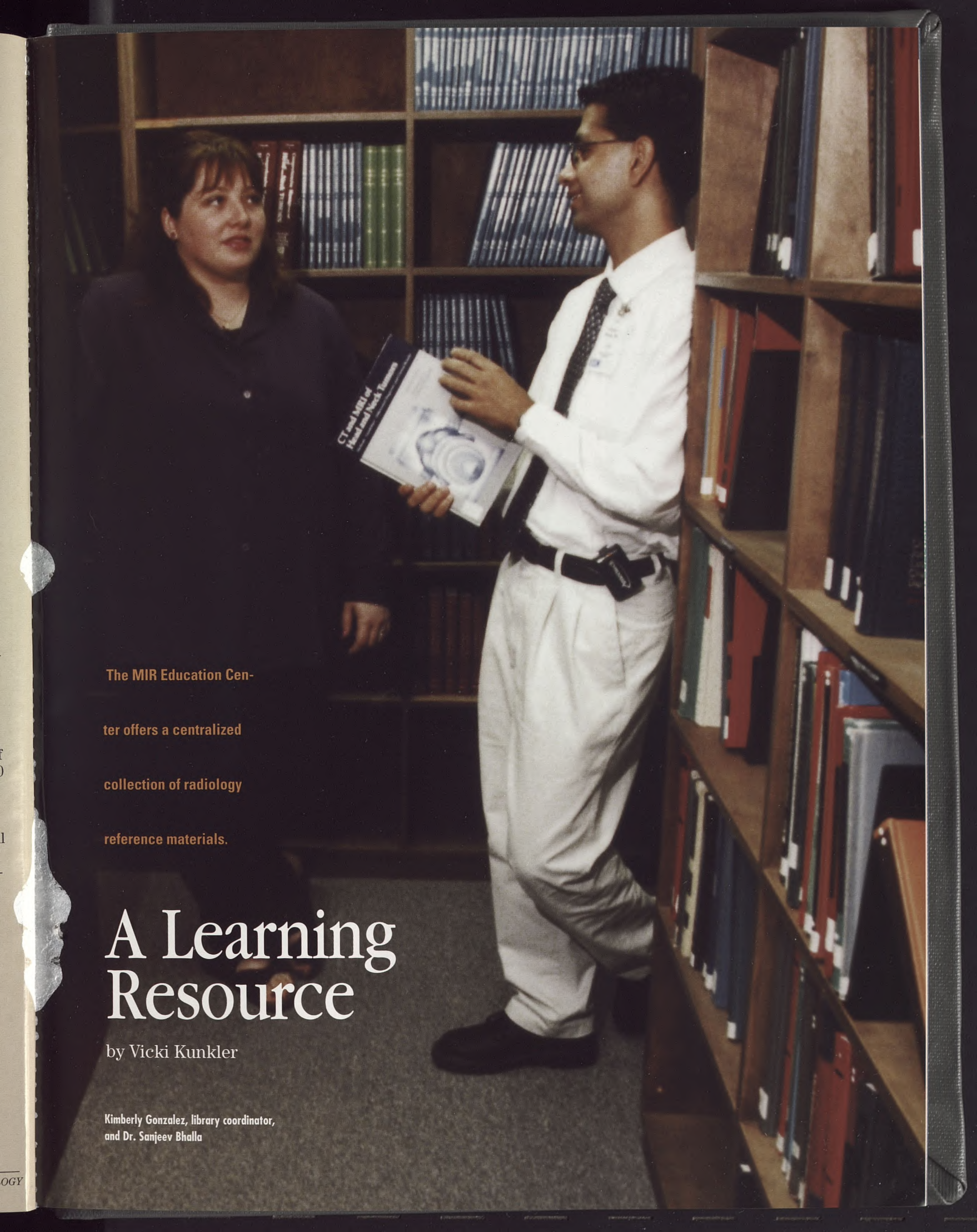
Looking toward the **future**

"Everyday there's something new," says Gutierrez. "It's a challenge to stay current with the technology while finding new ways to apply that technology to a particular problem."

One reason for this flood of technology is the strong interest of companies in developing cardiovascular MR units and software. All three major MR scanner manufacturers are developing dedicated cardiovascular MR units. Drug companies also are active in this market, looking at new contrast agents specifically designed for cardiovascular imaging.

In the future, predicts Narra, MRA will be changed by real time "fluoroscopic triggering," which will cut the time required for imaging and eliminate the need for a bolus test. Computers with larger memories, faster calculations, and newer algorithms will drastically reduce the time required for MR procedures; for example, an MR of the renal arteries will drop from 30 minutes to only 15.

"There is no question that MR is here to stay," says Gutierrez, "and there's no question that it will continue to improve with faster scans and better methods of freezing motion." **MIR**



The MIR Education Center offers a centralized collection of radiology reference materials.

A Learning Resource

by Vicki Kunkler

Kimberly Gonzalez, library coordinator,
and Dr. Sanjeev Bhalla



A Learning Resource



(Above) Arleta Douglas came out of retirement in 1993, after 24 years of service at the Institute, to work part-time in the staff library.

(Top photo) Donna Laine, Education Center secretary, checks the videotape inventory of lectures and conferences.

Tucked away in the corner of the Institute's tenth floor, the Education Center packs a ton of information—including 60 CD ROMs, 26 medical journals, 600 videotapes, and 2,000 textbooks—into a compact space of approximately 1500 square feet. The staff library, as it is commonly called, has undergone several, and often dramatic, facelifts since it was established nearly 70 years ago. The current facility continues to be a work-in-progress, with an ultimate goal of providing radiology staff and residents with a comprehensive reference library plus a full-service education center for handling residency and fellowship requirements as varied as permanent medical licensing, rotation schedules, and loan deferment and employment verification.

"The library staff is here to help the radiology residents," says Kimberly Gonzalez, administrative coordinator of the library. "It's an intense four years for the residents, and the library staff can act as a filter to make that time a little easier."

Directed by Gonzalez and fueled by MIR Director Ronald Evens' goal to "bring the library up to par," the Education Center has undergone a rejuvenation over the past 18 months. Under the supervision of Dennis Ammann, the Institute's chief administrative officer, and collaborating with Drs. Sanjeev Bhalla, a fellow in chest radiology who was 1998-1999 diagnostic radiology chief resident, Dennis Balfe, professor of radiology and diagnostic radiology residency program director, and Leo Lawler, 1999-2000 diagnostic radiology chief resident, Gonzalez has begun several initiatives, including

- hosting three book fairs annually where publishers offer radiology textbooks that can be previewed and purchased by faculty, fellows, and residents
- updating tape collections of noon conferences and special lectures
- reordering or discontinuing journals based on a usage tracking system
- clearing the shelves of outdated information and introducing hundreds of up-to-date textbooks
- following standard library routines in regard to reserving, returning, and checking out reference materials.

According to Gonzalez, a vast amount of information critical to resident education is now integral to the library, due in large part to the guidance of conscientious MIR faculty, who are committed to transforming the library into a good resource for residents.

"Radiology residents have traditionally learned by attending lectures, reading texts studying cases, and reading films in clinical areas," says Bhalla. "Recently, CD-ROMs and videos have made greater headway in radiologic education. But, with all of the subspecialties in radiology, it is impossible for the novice radiologist to purchase all of the materials necessary to learn the field. The MIR library is becoming more central to the residents' process of learning the field of radiology."

Statistics

Hours

- 7:00 a.m. to 5:00 p.m., Monday through Friday

Important numbers

- Library - 362-2978
- Education Center - 362-5117
- FAX - 362-4660

Usage

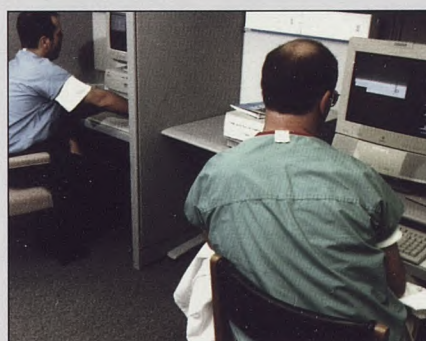
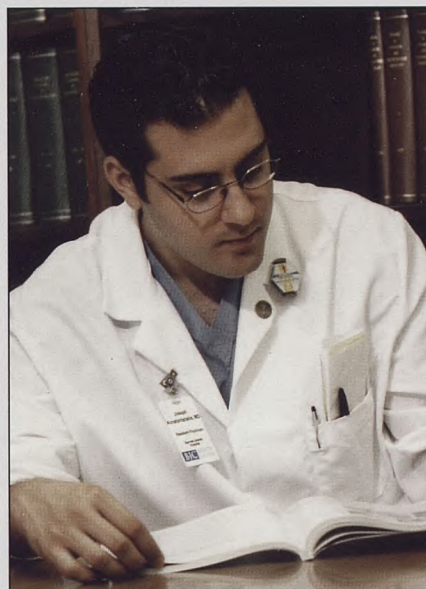
- Average of 80–100 residents and fellows per day

Library services

- Books and journals
- Rotational library
- New book orders
- Videotapes and players
- Videodisks and players
- CD-ROM for Macintosh and PC
- ACR-approved teaching files
- Viewboxes
- Laser scanner
- TV and VCR
- Conference room with dual slide projector
- Updated computers (5 PCs and Macintosh)
- Resident mailboxes

Education Center services

- Rotation schedules
- ACR in-training exams
- Notary public
- Permanent medical licensing
- Resident selection program (annually, more than 600 applications are received; 110 interviews are conducted; and 17 positions are filled, including 2 research residencies)
- Loan deferment and employment verification
- AFIP registration
- Senior medical student elective (coordinated with Dr. Lawrence Kotner for 7 students for each of 13 periods per year)
- Posting of noon conferences.
- Resident and fellow orientation coordination
- Resident and fellow evaluation processing
- Resident and fellow personnel file maintenance.



(Above) Residents use the library's computers for research, to check e-mail messages, and for composing papers.

(Top photo) Joseph Konstantarakis, MD, a first-year diagnostic radiology resident, peruses one of the many medical journals in the library's collection

Tucked away in the corner of the

Institute's tenth floor, the Education

Center packs a ton of information into

a compact space of approximately

1500 square feet.

Although there is no formal written history of the library, information gleaned from the Institute's archives shows that when the Institute officially opened in 1931, space on the first floor was designated as the Mills Room and contained a valuable collection of films and records amassed during the scientific career of Walter Mills, MD. Mills was director of the original X-ray Laboratory—which was under the auspices of Washington University School of Medicine's Department of Surgery—from 1913 until his death from unprotected radiation exposure in 1926. In those early years, radiology was a "fledgling specialty," but the important work performed in the X-Ray Laboratory provided the foundation for the establishment of Mallinckrodt Institute.

Conversations with MIR faculty and staff elicited recollections that in April of 1965 the first-floor library became the office of Dr. Juan Taveras, MIR's third director, and the library was moved into the film vault area on the eighth floor. For the first time, the library had a full-time staff: librarian Bettye Thomas and assistant librarian June Bodeman. During the 1987 renovation, the library was moved to the tenth floor, sharing space with the musculoskeletal radiology offices, and Harriet Fieweger was the librarian until her death in 1994. Kimberly Nickerson, Jama Rendell, and Arleta Douglas were staffing the library when, during yet another renovation in 1996, the library was moved to the Old Children's Hospital Annex—which was anticipated to be its final home. However, when the Annex was slated for demolition as part of the medical center's reconstruction program, the library was relocated in 1998 to its former site on tenth floor.

Special thanks to Dr. John Eichling and to Jama Rendell and Arleta Douglas for their assistance in compiling this historical information.



ISR and ISRC sessions were held in the Newman Center's technologically advanced auditorium.

One of the largest international conferences ever held on the Washington University Medical Center campus

brought more than 500 scientists from all points of the globe to attend three major meetings: the 8th Workshop on Targetry and Target Chemistry (WTTC), the 11th International Symposium on Radiopharmacology (ISR), and the 13th International Symposium on Radiopharmaceutical Chemistry (ISRC). Michael Welch, PhD, codirector of the Division of Radiological Sciences, chaired the Global Steering Committee in the yearlong planning and coordination of the meetings. Committee members were Carolyn Anderson, PhD; Deanna Kelley; Timothy McCarthy, PhD; and David Piwnica-Worms, MD, PhD.

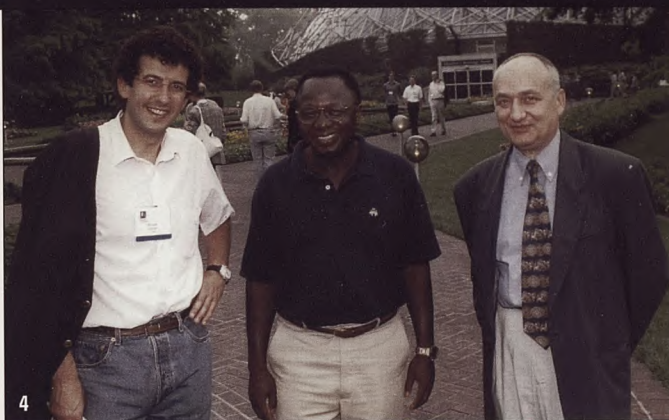
Representatives from the major positron emission tomography (PET) centers worldwide, as well as from the radiopharmaceutical companies operating cyclotrons, attended the June 24th through 27th WTTC meeting at the Regal Riverfront Hotel. Attendees participated in interactive discussions concerning problems associated with cyclotron targetry precursor synthesis and radiopharmaceutical automation.

Held at the medical center's Eric P. Newman Education Center, the ISR meeting ran concurrently

with the WTTC meeting and attracted a stellar assembly of investigators who use radiochemistry, pharmacology, biochemistry, and cell biology to study the mapping of molecular functions *in vivo* through imaging. The Newman Center's state-of-the-art amenities [see sidebar article for more information] provided the perfect environment for informal and open discussions among the scientists. Lectures from this meeting will be published in *The Quarterly Journal of Nuclear Medicine*.

Continuing the tradition of a series of meetings first held at Brookhaven National Laboratory in 1976, the 1999 ISRC symposium included more than 300 oral and poster presentations, covering topics ranging from potential methods for evaluating new radiopharmaceuticals to isotope availability, to regulatory issues and molecular modeling in radiopharmaceutical design. Abstracts from this meeting, which was held at the Newman Center June 27 through July 1, were published in a special volume of the *Journal of Labelled Compounds and Radiopharmaceuticals*.





1. Carolyn Anderson, PhD, assistant professor of radiology and of molecular biology and pharmacology, chaired the ISR session on antibodies.

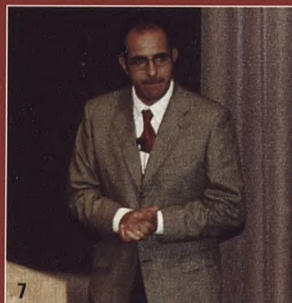
2. Timothy McCarthy, PhD, assistant professor of radiology, cochaired the WTTC session on nonstandard isotopes.

3. David Piwnica-Worms, MD, PhD, professor of radiology and of molecular biology and pharmacology, cochaired the molecular imaging session at the conjoint meeting on June 27.

4 and 5. A buffet reception at the Missouri Botanical Garden offered meeting attendees a chance to relax and enjoy the sights and scents of one of the United States' premiere gardens.

6. Deanna Kelley, an important member of the Global Steering Committee, handled the numerous and varied administrative responsibilities for the symposia.

7. Michael Welch, PhD, professor of radiology and of chemistry, used a ceremonial bell to kick off the ISRC banquet at the City Museum.



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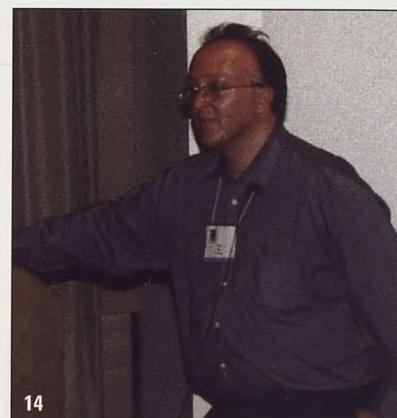
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7. Filippo Minutolo, University of Illinois, Urbana, presented "New route to substituted $\text{CpRe}(\text{CO})_3$ and $\text{CpTc}(\text{CO})_3$ complexes using diazocyclopentadiene: a mechanistic analysis."

8. Scott Wilbur, University of Washington, Seattle, spoke on "An initial investigation of B-213 labeled anti-CD45 antibody for ablation of hematopoietic cells in a canine model."

9. MIR's David Reichert, PhD, research instructor in radiology, spoke on "Comparison of molecular mechanics and density functional calculations for the prediction of technetium (V) complex structure."

10. MIR's Michael Lewis, PhD, NIH postdoctoral fellow, presented "A simple and rapid method for the comparison of copper-64 radiopharmaceuticals for conventional and pretargeted radioimmunotherapy."

11. Current and former postdoctoral fellows who trained under Dr. Welch (kneeling) reunited with their mentor at a celebration in Forest Park.

12. Director of the Institute Ronald Evens congratulated Michael Welch at a special dinner in Forest Park to honor Welch's 32 years at Mallinckrodt Institute.

13. ISRC guests followed the City Museum's colorful stairway into the banquet area.

14. Antony Gee, Addenbrookes Centre for Clinical Investigation, Cambridge, England, and Aarhus University Hospital, Aarhus, Denmark, spoke on "A simple and rapid method for the determination of ^{13}N ammonia and metabolites in blood."



EPNEC, a special commodity


Ann VanderLende, director of the Eric P. Newman Education Center (EPNEC), is understandably proud of this impressive conference center. From soundproof seminar rooms with a full complement of audio-visual equipment to the 450-seat auditorium with its state-of-the-art technology and "not a bad seat in the house" to the towering atrium lobby that's ideal for setting up registration or refreshment tables and exhibits, the Newman Center provides comfortable surroundings, privacy, and technical and professional support—all in one convenient location at Washington University Medical Center.

The three-floor EPNEC building is a joint venture of Washington University School of Medicine, BJC Health System, Barnes-Jewish Hospital, St. Louis Children's Hospital, and the Central Institute for the Deaf.

Dr. Michael Welch, who recently chaired a successful international meeting, echoes VanderLende's praise of EPNEC. "Our international participants, who have attended meetings in some of the most beautiful cities in the world, were very impressed with St. Louis and the Newman Center. More of our faculty need to know about and use this world-class meeting place right here on our campus" he says. "A big selling point for our attendees was the accessibility of the city's hotels and major attractions via MetroLink." *[MetroLink, St. Louis' light rail system, has a station adjacent to the Newman Center.]*

Impressive architecture and convenient transportation aside, events held at EPNEC can take advantage of the many options offered by the facility, including an on-site Business Center with capabilities for most office requirements, including faxing, duplicating, laser printing, and desktop publishing—at about half the cost of other facilities. Customized food service, including special dietary needs, can be served in the Great Rooms, the atrium lobby, the outside patio area, or the executive conference rooms. A security guard is posted in the lobby during all events, and the medical center is under 24-hour surveillance by WUSM protective services and the BJC Health System bike patrol. Technological services include satellite downlink and projection systems that can accept electronically-mailed slide presentations.

EPNEC is a member of the International Association of Conference Centers and "acts as a bridge between the education and medical world and the hospitality world," says VanderLende, who holds a degree in hospitality and tourism management. "We can make informed recommendations for many types of services that facilitate a productive meeting, including some not provided by EPNEC such as tours of St. Louis or travel and hotel accommodations."

For more information about the extensive amenities EPNEC has to offer, call 314-747-MEET (6338). 

FYI

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

PROMOTION

DeWitte Cross, MD, assistant professor of radiology, was promoted to associate professor of radiology, Division of Diagnostic Radiology.

NEW FACULTY

Daniel Brown, MD, assistant professor of radiology, Division of Diagnostic Radiology, vascular and interventional radiology, with a joint appointment as assistant professor of surgery.

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

Anil Khosla, MD, instructor in radiology, Division of Diagnostic Radiology, Barnes-Jewish West County Hospital.

APPOINTMENT

Mark Conradi, PhD, professor of physics, was appointed professor of radiology, Division of Diagnostic Radiology.

Robert McKinstry, MD, PhD, assistant professor of radiology, Division of Diagnostic Radiology, neuroradiology.

Katie Vo, MD, instructor in radiology, Division of Diagnostic Radiology, neuroradiology.

Robert Whitman, MS, instructor in radiology, Division of Radiological Sciences, electronic radiology laboratory.

William Wright, BS, instructor in radiology, Radiation Oncology Center, cancer biology.

FIRST-YEAR FELLOWS

Sanjeev Bhalla, MD, is a clinical fellow in radiology in the chest radiology section. He completed a four-year diagnostic radiology residency (chief resident, 1998-1999) at Mallinckrodt Institute of Radiology.

Michael Boerner, MD, PhD, is a clinical fellow in radiology in the neuroradiology section. He completed a four-year diagnostic radiology residency at Mallinckrodt Institute of Radiology.

George Brown, MD, is a clinical fellow in radiology in the neuroradiology section. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

Paul Connaughton, MD, is a clinical fellow in radiology in the vascular and interventional radiology section. He received an undergraduate degree from Johns Hopkins University and a medical degree from the Medical College of Wisconsin. Connaughton completed a four-year diagnostic radiology residency at Johns Hopkins University.

Mike DeGroot, MD, is a clinical fellow in radiology in the vascular and interventional radiology section. He received an undergraduate degree from the University of Pennsylvania and a medical degree from the University of California, Irvine. DeGroot completed a four-year diagnostic radiology residency at Stanford University.

Karen Gladden, MD, is a clinical fellow in radiology in the neuroradiology section. She received an undergraduate degree from Old Dominion University and a medical degree from Eastern Virginia Medical School. Gladden completed a four-year diagnostic radiology residency at Eastern Virginia Medical School.

Matthew Graham, MD, is a clinical fellow in radiology in vascular and interventional radiology. He received an undergraduate degree from Clemson University and a medical degree from the Medical University of South Carolina. Graham completed a four-year diagnostic radiology residency at the University of Tennessee, Memphis.

Kathleen Gundry, MD, is a clinical fellow in breast imaging. She received an undergraduate degree from Arizona State University and a medical degree from the University of Arizona College of Medicine. Gundry completed a three-year surgery/nuclear medicine internship at Emory University and a four-year diagnostic radiology residency at the University of Maryland.

Michael Hanelin, MD, is a clinical fellow in vascular and interventional radiology. He received an undergraduate degree from the University of California, Berkeley, and a medical degree from Columbia University. Hanelin completed a four-year diagnostic radiology residency at Emory University.

Kent Hootman, MD, is a clinical fellow in vascular and interventional radiology. He received an undergraduate degree from Colorado State University and a medical degree from the University of Colorado. Hootman completed a four-year diagnostic radiology residency at the University of Texas Medical Branch, Galveston.

Olga Kalinkin, MD, is a clinical fellow in magnetic resonance imaging. She received a medical degree from Moscow Medical School and completed a four-year diagnostic radiology residency at St. Joseph Hospital.

Kraig Kirkpatrick, MD, is a clinical fellow in musculoskeletal radiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

Ronan McDermott, MD, is a clinical fellow in abdominal imaging. He received an undergraduate and a medical degree from University College Galway. McDermott completed a two-year internal medicine internship at Trinity Medical School and a four-year diagnostic radiology residency at the Royal College of Surgeons.

Christine Menias, MD, is a clinical fellow in abdominal imaging. She completed four years of training in diagnostic radiology (chief resident, 1998-1999) at Mallinckrodt Institute of Radiology.

Dallas Peck, MD, is a clinical fellow in neuroradiology. He completed a four-year diagnostic radiology residency at Mallinckrodt Institute of Radiology.

Mehdi Poustchi-Amin, MD, is a clinical fellow in magnetic resonance imaging. He received an undergraduate and a medical degree from Ludwig-Maximilians University and completed a four-year diagnostic radiology residency at LLJ Medical Center.

Joel Schein, MD, is a clinical fellow in abdominal radiology. He received an undergraduate degree from the University of California, San Diego, and a medical degree from Washington University. Schein completed a four-year diagnostic radiology residency at the University of Minnesota.

Andrew Schneider, MD, is a clinical fellow in vascular and interventional radiology. He received an undergraduate degree and a medical degree from Duke University. Schneider completed a four-year diagnostic radiology residency at Duke University.

Joshua Shimony, MD, PhD, is a clinical fellow in neuroradiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

Laura Sievert, MD, is a clinical fellow in pediatric radiology. She received an undergraduate degree from Earlham College and a medical degree from the University of Missouri, Columbia. Sievert completed a four-year diagnostic radiology residency at the University of Missouri, Columbia.

Andrew Stockland, MD, is a clinical fellow in abdominal radiology. He received an undergraduate degree from the University of Wisconsin and a medical degree from the Medical College of Wisconsin. Stockland completed a four-year diagnostic radiology residency at the University of Pittsburgh.

Naoki Takahashi, MD, is a clinical fellow in abdominal radiology. He received an undergraduate degree and a medical degree from Kyushu University. Takahashi com-

pleted a four-year diagnostic radiology residency at the University of Texas, Houston.

Dean Thornton, MD, is a clinical fellow in musculoskeletal radiology. He received an undergraduate degree from the College of William and Mary and a medical degree from the University of Virginia. Thornton completed a four-year diagnostic radiology residency at UAB Hospital.

James Wu, MD, is a clinical fellow in neuroradiology. He received an undergraduate degree from the University of California, Santa Barbara, and a medical degree from the Medical College of Wisconsin. Wu completed a four-year diagnostic radiology residency at the State University of New York at Buffalo.

Bhalla Receives BJH Award

Sanjeev Bhalla, MD, a first-year fellow in chest radiology, was one of the June, 1999, recipients of the Barnes-Jewish Hospital Foundation's Caring Spirit Award. Bhalla, who was a cochief diagnostic radiology resident at the time of the award, was commended for "demonstrating acts of care, compassion, and service that go well beyond expectations." He was nominated as a "caring spirit" by a Washington University Medical Center faculty member who learned that Bhalla, upon encountering an elderly couple who had become lost in a parking garage while trying to locate the hospital entrance, drove the couple in his car to their destination.

FIRST-YEAR DIAGNOSTIC RADIOLOGY RESIDENTS

Scott Anderson, MD, assistant in radiology, received an undergraduate degree and a medical degree from Duke University. He completed a one-year internship at St. John's Hospital, St. Louis, Missouri.

Peter Chuang, MD, assistant in radiology, received an undergraduate degree from the University of California, Los Angeles, and a medical degree from the University of Minnesota. He completed a one-year internship in internal medicine at the University of California, San Diego.

Aamer Farooki, MD, assistant in radiology, received an undergraduate degree from Harvard University and a medical degree from Duke University. He completed a one-year internship at St. Barnabas Medical Center, Livingston, New Jersey.

Brett Gratz, MD, assistant in radiology, received an undergraduate degree and a medical degree from Duke University. He completed a one-year internship at Corilion Memorial Hospital, Roanoke, Virginia.

Amit Gupta, MD, assistant in radiology, received an undergraduate degree and a medical degree from Boston University. He completed a one-year internship at Metro West Medical Center, Farmington, Massachusetts.

Howard Harvin, MD, assistant in radiology, received an undergraduate degree from Stanford University and a medical degree from Washington University School of Medicine. He completed a one-year internship at Virginia Mason Medical Center, Seattle, Washington.

Robert Kadner, MD, assistant in radiology, received an undergraduate degree from the University of Virginia and a medical degree from Georgetown University. He completed a one-year internship at Georgetown University.

Joseph Konstantarakis, MD, assistant in radiology, received an undergraduate degree from the University of California, Irvine, and a medical degree from New York University School of Medicine. He completed a one-year internship at Lenox Hill Hospital, New York City.

Franklin Marden, MD, assistant in radiology, received an undergraduate degree from Dartmouth University and a medical degree from the University of Wisconsin, Madison. He completed a three-year neurology residency at Washington University School of Medicine.

Avi Mazumdar, MD, assistant in radiology, received an undergraduate degree from Johns Hopkins University and a medical degree from New York University. He completed a one-year internship at University of California, San Diego.

David Mueller, MD, received an undergraduate degree and a Masters of Science degree in chemical engineering from Washington University. He received a medical degree from the University of Missouri, Columbia, and completed a one-year internship at St. John's Mercy Medical Center, St. Louis, Missouri.

Jason Oliphant, MD, assistant in radiology, received an undergraduate degree and a medical degree from Yale University. He completed a one-year internship at Hospital of St. Raphael, New Haven, Connecticut.

Naveen Parti, MD, assistant in radiology, received an undergraduate degree from Vanderbilt University and a medical degree from Emory University School of Medicine. He completed a one-year internship at St. Vincent's Hospital, Indianapolis, Indiana.

Cary Shlimovitz, MD, assistant in radiology,

received an undergraduate degree from the University of Wisconsin and a medical degree from the Medical College of Wisconsin. She completed a one-year internship at St. Luke's Hospital, Milwaukee, Wisconsin.

Michael Todora, MD, assistant in radiology, received an undergraduate degree from the University of Texas, Austin, and a medical degree from Washington University School of Medicine. He completed a one-year internship at Barnes-Jewish Hospital, St. Louis, Missouri.

Feiyu Xue, MD, PhD, assistant in radiology, received an undergraduate degree from Beijing University, a Masters of Science degree in biochemistry from Tulane University, a doctoral degree in human genetics from Yale University, and a medical degree from Dartmouth University. He completed a one-year internship at May Imogene Bassett Hospital, Cooperstown, New York.

FIRST-YEAR RADIATION ONCOLOGY RESIDENTS

Fengming Kong, MD, PhD, assistant in radiology, received an undergraduate degree from Transitional Shanghai Medical University and a medical degree from Shanghai Medical University.

Robert Malyapa, MD, PhD, assistant in radiology, received an undergraduate degree from Loyola University, India, and a medical degree from the Jawaharal Institute for Postgraduate Medical Research.

FIRST-YEAR NUCLEAR MEDICINE TRAINEES

Daniel Appelbaum, MD, assistant in radiology, received an undergraduate degree from Cornell University and a medical degree from Mount Sinai Medical College. He completed a four-year diagnostic radiology residency at the University of Chicago.

Lester Johnson, MD, assistant in radiology, received an undergraduate degree from Washington and Lee University and a medical degree from Columbia University. He completed a four-year diagnostic radiology residency at Columbia University.

Lawrence Kaskowitz, MD, assistant in radiology, completed four years of training in

diagnostic radiology at Mallinckrodt Institute of Radiology.

Marc Montella, MD, assistant in radiology, received an undergraduate degree from the University of California, San Diego, and a medical degree from the University of Nevada School of Medicine. He completed a four-year diagnostic radiology residency at the University of New Mexico Health Science Center.

Jeffrey Yu, MD, assistant in radiology, completed two years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

GRANTS

Carolyn Anderson, PhD, assistant professor of radiology and of molecular biology and pharmacology, as principal investigator, received a four-year National Institutes of Health/National Cancer Institute grant for \$990,795 for research on "Labeling of octreotide with positron emitters" and a three-year grant for \$262,344 from Biotechnology Research Development Corporation to study "Radiolabeled peptides for diagnosis and therapy of cancer."

Jason Lewis, PhD, research associate, is an investigator for both grants. Anderson, as principal investigator, also received a one-year grant for \$25,000 from The Cancer Center (sponsored by the National Cancer Institute, Washington University School of Medicine, The

Barnard Free Skin and Cancer Hospital, and Barnes-Jewish and St. Louis Children's hospitals) for research on "Copper-64-labeled pretargeting agents for diagnosis and radiotherapy of cancer."

William McAlister, MD, professor of radiology and of pediatrics and chief of pediatric radiology, will direct the Bone Age Reading Center in conjunction with a National Heart, Lung, Blood Institute/National Institutes of Health grant received by Johns Hopkins University to fund the "Childhood Asthma Management Program (CAMP)." Along with McAlister, investigators for the \$58,531 Washington University subcontract are **Keith Kronemer, MD**, instructor in radiology, and **Patricia Suntrup**, research patient coordinator.

Oncology Award Goes to Curry

Heather Curry, MD, radiation oncology chief resident 1999-2000, received the American Radium Society's Young Oncologist Essay Award for her paper on "Heat shock inhibits NF-KB nuclear localization and DNA binding: possible role in hyperthermia." The award included a \$2,000 honorarium and travel allowance for the Society's meeting in Hawaii, where Curry presented her paper on April 21.

Jeff Michalski, MD, assistant professor of radiology, received a one-year grant from Nycomed-Amersham in the amount of \$10,850 to study "Radiation exposure to household members and household pets from patients receiving permanent interstitial brachytherapy for prostate cancer."

Scott Mirowitz, MD, associate professor of radiology, radiologist-in-chief at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, as principal investigator, received a \$450,000 three-year grant from General Electric Medical Systems to study "Development and application of rapid magnetic resonance imaging screening methods." As principal investigator, he received a one-year, \$50,000 grant from the Barnes-Jewish Hospital Auxiliary, Parkview Chapter, to investigate screening MRI for oncology patients.

Peter Shile, MD, assistant professor of radiology, received a \$208,000 grant from the U.S. Army's Breast Cancer Research Program to study "Impact of feature-based training and auditing on diagnostic accuracy and agreement in mammographic interpretations." He also received a research contract from Qualia Computing for a clinical trial of that company's computer-aided detection software in screening mammography.

Franz Wippold, MD, associate professor of radiology, received a one-year subcontract from Teva Pharmaceuticals for "A multi-national-multicenter, blind, placebo-controlled study to evaluate the efficacy, tolerability and safety of glativamer acetate for injection in primary progressive multiple sclerosis patients."

APPOINTMENTS/ELECTIONS

Jeffrey Bradley, MD, instructor in radiology, was named chief of the Radiation Oncology Center's Thoracic Service.

Steven Don, MD, assistant professor of radiology, was appointed to a three-year term on The Society for Pediatric Radiology's Physician Workforce Committee.

Daniel Low, PhD, assistant professor of radiology, was appointed associate editor of the journal *Medical Physics*.

William Mehard, MD, assistant professor of radiology, was elected secretary/treasurer of the Greater St. Louis Society of Radiologists.

Robert Myerson, PhD, MD, professor of radiology, was appointed the 1999-2001 councilor in medicine for the North American Hyperthermia Society.

Marcus Raichle, MD, professor of radiology and of neurology and neurobiology and codirector of the Division of Radiological Sciences, was appointed adjunct professor of psychology at the University of Missouri, Columbia.

Marilyn Siegel, MD, professor of radiology and of pediatrics, was appointed

president-elect of the Society of Computed Body Tomography and Magnetic Resonance Imaging. She was reappointed as a member of the Scientific Committee on Radiation Protection in Medicine (NCRPP Scientific Committee 91) of the National Council of Radiation Protection and Measurements.

Jerold Wallis, MD, in June, 1999, began a two-year term as president of the Computer and Instrumentation Council of the Society of Nuclear Medicine.

Franz Wippold, MD, associate professor of radiology, was reappointed to the Education Committee of the American Society of Neuroradiology.

HONORS/AWARDS

Samuel Au, MD, PhD, assistant in radiology, received the 1999 Best Resident Abstract Award at the 1999 American Brachytherapy Society Annual Meeting held in May. Under the mentorship of **Perry Grigsby, MD, MBA**, professor of radiology, Au has studied the results and derivation of the radiation tolerance dose of the proximal vagina. His abstract presented information based on clinical observations over an 11-year period of patients with cervical cancer who were treated with brachytherapy at the Institute.

Suresh Vedantham, MD, assistant professor of radiology, was selected to attend the Picker-Association of University Radiologists Faculty Development Program held in March in San Diego, California.

LECTURES/PRESENTATIONS

Clifford Chao, MD, assistant professor of radiology, presented "Role of radiation therapy in head and neck cancers" at Oncology in the New Millennium, Washington University Medical Center, St. Louis, Missouri, April 23 and 24. He spoke on "Head and neck IMRT: Washington University experience" at the 3D Conformal Radiation Therapy and Intensity Modulated Radiation Therapy in the New Millennium Conference, Houston, Texas, April 30 - May 2.

Duffy Cutler, PhD, assistant professor of radiology, as invited lecturer, spoke on "Whole-body PET in oncology—2D or 3D in the next decade" at the CTI/Siemens Technical Users Meeting, Amsterdam, The Netherlands, April 21.

Steven Don, MD, assistant professor of radiology, presented "Conversion to pediatric soft-copy sonography: effects on storage and imaging time" at The Society for Pediatric Radiology, Vancouver, British Columbia, May 14.

David Gierada, MD, assistant professor of radiology, presented "Dynamic ³He MRI using EPI: preliminary study of patients with emphysema" at the Workshop on Hyperpolarized Gases in Magnetic Resonance: Biomedical Investigations and Clinical Applications, The Centre de Physique, Les Houches, France, June 21 - 25.

Perry Grigsby, MD, MBA, professor of radiology, spoke on "External radiotherapy for benign brain tumors: current management of pituitary adenomas" at the 33rd San Francisco Cancer Symposium: Radiation Therapy of Benign Disease, San Francisco, California, April 3 and 4. As a panel member, he spoke on "We finally know how to treat the bulky barrel-shaped cervical cancer, or do we?" at the American Radium Society, Big Island, Hawaii, April 19. Grigsby presented "Carcinoma of the vulva and vagina," "Chemotherapy vs. radiotherapy for carcinoma of the cervix," "Radiotherapy for carcinoma of the cervix," and "Adjuvant radiation for endometrial carcinoma" to the Sociedade Paulista de Radiologia, Sao Paulo, Brazil, April 24 and 25. He spoke on "Non-sealed radioisotope therapy" at the American Brachytherapy Society's Annual Meeting, San Diego, California, May 23 - 25. Grigsby presented "Radiotherapy and adjuvant chemotherapy for carcinoma of the cervix" at the Review and Interpretation of the 1999 ASCO Meeting, Flint, Michigan, June 2.

Robert Gropler, MD, associate professor of radiology and director of the cardiovascular imaging laboratory, presented "Three-dimensional coronary MR angiography with AngioMARK," "Stenosis detection using Gadomer-17-enhanced coronary MR angiography," and "The effects of aging on myocardial efficiency" at the International Society for Magnetic Resonance in Medicine Meeting, Philadelphia, Pennsylvania, May 24 - 28.

Jay Heiken, MD, professor of radiology, chief of abdominal radiology, and codirector of body computed tomography, spoke on "CT of the aorta: approach to rupture and dissection" and "CT evaluation of nontraumatic emergencies of the GI tract" at Grand Rounds, Thomas Jefferson University Medical College, Philadelphia, Pennsylvania, April 6. He spoke on "Characterization of hepatic masses with CT and MRI" and, at a workshop, presented "CT of nontraumatic emergencies of the GI tract" at the Twenty-second Annual Course of the Society of Computed Tomography and Magnetic Resonance, New Orleans, Louisiana, April 12 - 16. Heiken presented "A practical approach to helical CT," "Spiral CT of the urinary tract," "CT of the aorta: approach to rupture and dissection," and "Evaluation of the patient with small bowel obstruction" at the Summer Abdominal Imaging Conference, sponsored by the University of Pennsylvania Medical Center, Jackson Hole, Wyoming, July 5 - 9.

Fiorenza Ianzini, PhD, assistant professor of radiology, presented "Delayed DNA damage-associated with mitotic catastrophe:

implications for genomic instability" at the 6th International Workshop—"Radiation Damage to DNA-Lesions, Mechanisms, and Consequences," Chapel Hill, North Carolina, April 17 - 22.

Eric Klein, MS, assistant professor of radiology, spoke on "Monitor unit calculations for multileaf collimation" and "Monitor unit calculations for dynamic and virtual wedges" at the SEAAPM Chapter meeting, Atlanta, Georgia, April 8. He presented the Refresher Course Lecture on "Radiation Oncology Physics" and a workshop discussion on "Implementation of multileaf collimation as a block replacement" at the American College of Medical Physics Annual Meeting, Aspen Colorado, May 18 - 21.

Daniel Low, PhD, assistant professor of radiology, as invited lecturer, spoke on "Commissions of IMRT treatment planning" at the ESTRO Workshop on Quality Assurance of Treatment Planning Systems, Göttingen, Germany, April 7.

Elizabeth McFarland, MD, assistant professor of radiology, spoke on "Spiral CT colonography: image acquisition and image display" at the American Society of Gastroenterology Meeting (Digestive Disease Week), Orlando, Florida, May 17.

Robert McKinstry, MD, PhD, assistant professor of radiology, as an invited speaker for a series of workshops sponsored by the American Medical Association, presented "Physicians accessing the Internet" to the Alameda Contra Costa Medical Association, Oakland, California, May 8; the

Brooklyn Veterans Administration Medical Center, Brooklyn, New York, May 17; the San Diego County Medical Society, San Diego, California, June 12; the Providence Hospital Family Practice Residency, Seattle, Washington, June 29; and the San Antonio Community Hospital, Upland, California, July 24.

Jeff Michalski, MD, assistant professor of radiology, presented "3D conformal RT for prostate cancer—an update of RTOG 9406," 4th International Symposium—3D Conformal Radiation Therapy and Intensity Modulated Radiation Therapy in the New Millennium, Houston, Texas, May 1. He spoke on "Clinician's perspective on virtual simulation" at the American College of Medical Physics Annual Meeting, Aspen, Colorado, May 18 - 21.

Eduardo Moros, PhD, assistant professor of radiology, presented "Time window for heat conduction free SAR: Is it possible?" and "A dual frequency ultrasound system for superficial hyperthermia with 3D power deposition control" at the 11th International Congress of Radiation Research, Dublin, Ireland, July 18 - 23.

Robert Myerson, PhD, MD, professor of radiology, presented "How conformal radiotherapy might help in the management of anorectal carcinoma" at the Lettura a Gruppo di Lavoro Multicentrico Interdisciplinare Su trattamento della Recidive Pelviche da Carcinoma del Retto, Rome, Italy, May 14.

James Purdy, PhD, professor of radiology, associate director of the Radiation Oncology Center, and chief of radiation oncology physics, spoke on "The CT-simulation/3-D treatment planning process" and "Quality assurance for 3-D CRT/IMRT multi-institutional clinical trials" at the 4th International Symposium—3D Conformal Radiation Therapy and Intensity Modulated Radiation Therapy in the New Millennium, Houston, Texas, April 30 - May 2. As invited speaker, he presented "3D radiation therapy from a physicist's point of view" at the University of Minnesota, Minneapolis, May 4. Purdy spoke on "New frontiers in radiation oncology: a physicist's perspective" and Dose-volume specifications and reporting: new challenges with IMRT" at the American College of Medical Physics Annual Meeting, Aspen, Colorado, May 18 - 21. He presented "Education and training requirements: radiation oncology physics;" "Prescribing, recording and reporting photon beam therapy: a review of ICRU Report 50;" "Acceptance testing, commissioning, and quality assurance of radiation treatment planning systems;" "Virtual simulation and 3-D conformal radiation therapy planning;" "Intensity modulated radiation therapy;" and "Recent advances in radiation therapy & radiotherapy in the next millennium" at the AAPN/IOMP International Scientific Exchange Program—International Teaching Course on Radiation Therapy Physics, Cluj, Romania, June 10 - 14.

LECTURES/PRESENTATIONS

Continued from page 27

Tracy Roberts, MD, assistant professor of radiology, as visiting professor, presented "Evaluation of the palpable breast mass" at Radiology Grand Rounds, Eastern Virginia Medical College, May 6 and 7.

Stuart Sagle, MD, professor of radiology, chief of chest radiology, and codirector of body computed tomography, as moderator, spoke on "Role of imaging in bronchogenic carcinoma" and "Instructive case discussions" at the Annual Conference on Chest Disease of the Fleischner Society, Tucson, Arizona, April 18 - 21. He presented "Chest radiography: Is it still useful?" at the Mount Carmel Medical Center, Columbus, Ohio, May 26.

Maria Schmidt, MD, assistant professor of radiology, spoke on "Breast health" at the Missouri Chamber of Commerce 1999 UMSL Economics Study Tour, St. Louis, Missouri, June 22.

Barry Siegel, MD, professor of radiology and of medicine and director of the Division of Nuclear Medicine, as invited lecturer, presented "The emerging role of PET in the management of patients with cancer" at the 18th Annual Philip M. Johnson Memorial Lecture, New York Presbyterian, New York City, May 6. As a panel member, he discussed "Pet imaging in cancer staging and therapy assessment" at the American Society of Clinical Oncology Thirty-fifth Annual Meeting, Atlanta, Georgia, May 15 -

18. Siegel spoke on "Applications of PET in oncology" at Evanston-Northwestern Hospital, Evanston, Illinois, July 15.

Marilyn Siegel, MD, professor of radiology and of pediatrics, presented "CT/MR of pediatric mediastinal disease" and "Use of spiral CT in children" at the 22nd Annual Course of the Society of Computed Tomography and Magnetic Resonance Imaging, New Orleans, Louisiana, April 12 - 16. As visiting guest lecturer, she spoke on "Current concepts in renal imaging of the pediatric patient" at the American Society of Pediatric Nephrology, San Francisco, California, April 29 - May 1. Siegel spoke on "MR of bone marrow: pediatric and adult," "Pediatric MRI: tips and techniques," "MR of the liver: pediatric indications," and "MR of adolescent gynecologic disorders" at the Magnetic Resonance Imaging National Symposium, New Orleans, Louisiana, May 3 - 7. As visiting professor, she presented "Ultrasonography/CT of the acute pediatric abdomen" at St. Mary's Hospital, Hong Kong, May 27. As invited lecturer, Siegel presented "Sonography of intracranial hemorrhage and ischemia," "Sonography of neonatal renal disease," "Pediatric chest sonography," and "Ultrasonography of the acute pediatric abdomen" at the Annual Ultrasound Seminar, Singapore General Hospital, Singapore, June 26, and at Chiang Mai University, Chiang Mai, Thailand, June 28.

Todd Wasserman, MD, professor of radiology, presented "Combined chemotherapy and radiotherapy for Hodgkin's disease" and "Combined chemotherapy and radiotherapy for non-Hodgkin's lymphoma" at the Texas Radiological Society meeting, Dallas, April 9. He spoke on "Ethylol" at the Alza Pharmaceuticals/Mercy Hospital Lecture Meeting, Des Moines, Iowa, May 10; at the Alza Pharmaceuticals/Capital Regional Medical Center Lecture Meeting, Jefferson City, Missouri, May 12; at the Alza Pharmaceuticals/Genesis Medical Center Lecture Meeting, Davenport, Iowa, June 22; and at the Alza Pharmaceuticals/North Iowa Mercy Health Center Lecture Meeting, Mason City, Iowa, June 28. Wasserman presented "Radio-surgery" at the American Society of Clinical Oncology Educational Session and "Radiosensitizers" at the Investigator's Meeting Panel Discussion, Atlanta, Georgia, May 16 and 18, respectively. He spoke on "The role of ethylol as a protector for xerostomia in head and neck cancer patients" at the U.S. Food and Drug Administration Meeting, Washington, DC, June 6 - 8.

Franz Wippold, MD, associate professor of radiology, as visiting professor, spoke on "Imaging the larynx," "Imaging the orbit," and "Head and neck radiology: 100 great cases" at Tripler Army Medical Center, Honolulu, Hawaii, April 5 - 9. As visiting professor, he spoke on "The cervical lymph nodes: the superhighway of the neck" and "Imaging of intraocular disease" at the Walter Reed Army Medical Center, Washington, DC, and

"Cystic lesions of the neck: a 'hole-istic' approach" and "Great cases in head and neck imaging" at the National Naval Medical Center, Bethesda, Maryland, May 3 - 14.

Pamela Woodard, MD, assistant professor of radiology, as invited lecturer, spoke on "AngioMARK: potential uses" at the session sponsored by EPIX Medical, Inc./Mallinckrodt, Inc., International Society of Magnetic Resonance in Medicine Seventh Scientific Meeting, Philadelphia, Pennsylvania, May 22 - 28.

Dmitriy Yablonskiy, PhD, assistant professor of radiology and adjunct professor of physics, as invited lecturer, spoke on "The MR signal decay structure reveals tissue vascularity" at the MRI Microcirculation International Symposium, Heidelberg, Germany, April 24 - 26. He chaired the session on "Novel contrast mechanisms" and presented "The structure of BOLD signal in functional MRI: linear and nonlinear contributions," "SrPRESSED technique for lactate editing in localized volume spectroscopy," "Rapid ³He MRI of lung ventilation using EPI: preliminary results from an emphysema patient," and "Measurements of ³He diffusivity in human lung: preliminary results from an emphysema patient" at the International Society of Magnetic Resonance in Medicine Seventh Scientific Meeting, Philadelphia, Pennsylvania, May 22 - 28.

SYMPOSIA

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

AMERICAN ROENTGEN RAY SOCIETY

*99th Annual Meeting
New Orleans, Louisiana
May 9 - 14, 1999*

INSTRUCTIONAL COURSE

Jay Heiken, MD, "Imaging of focal hepatic lesions."

REFRESHER COURSE

Elizabeth McFarland, MD, Advances in Body Computed Tomography, "Spiral CT colonography."

SCIENTIFIC SESSIONS

David Gierada, MD; Kyongtae Bae, MD, PhD, "Assessment of gadolinium as a CT contrast agent in a pig model."

Kevin Berger, MD, "FDG-PET evaluation of mucinous neoplasms: correlation of FDG uptake with histopathologic features."

POSTER EXHIBIT Certificate of Merit

David Gierada, MD, "CT patterns of thoracic lymph node disease."

AMERICAN SOCIETY OF NEURORADIOLOGY ANNUAL MEETING

*San Diego, California
May 22- 28, 1999*

INVITED LECTURE

Colin Derdeyn, MD, "Acute stroke intervention in the posterior circulation."

SCIENTIFIC SESSIONS

Colin Derdeyn, MD; Tom Videen, PhD; Robert Grubb, MD; William Powers, MD, "Deep white matter ischemia in carotid occlusion."

Anil Khosla, MD; Daniel Kido, MD; Colin Derdeyn, MD; Katie Vo, MD; Benjamin Lee, MD; Pratik Mukherjee, MD; Weili Lin, PhD; Mark Haacke, PhD, "Correlation of imaging findings with Misery perfusion in patients with carotid occlusion."

Anil Khosla, MD; Daniel Kido, MD; Colin Derdeyn, MD; Katie Vo, MD; Benjamin Lee, MD; Pratik Mukherjee, MD; Weili Lin, PhD; Mark Haacke, PhD, "High resolution BOLD venogram (HBRV) in the evaluation of stroke—a preliminary evaluation."

Franz Wippold, MD; Blease Graham, MD; Kyongtae Bae, MD, PhD; Thomas Pilgram, PhD; Ali Shaibani, MD; Daniel Kido, MD, "Comparison of CT myelography performed in the prone and supine positions for the detection of cervicospinal stenosis."

Katie Vo, MD; Benjamin Lee, MD; Pratik Mukherjee, MD; Weili Lin, PhD; Daniel Kido, MD; Mark Haacke, PhD, "High resolution BOLD venography (HBRV) of pediatric tumors."

SOCIETY OF NUCLEAR MEDICINE

*46th Annual Meeting
Los Angeles, California
June 6 - 10, 1999*

Carolyn Anderson, PhD, moderator, Session 46: Radiopharmaceutical Chemistry Track, New Chemistry: Oncology—Peptides.

Mickey Clarke, CNMT, moderator, Government and Healthcare: Update on Policy, Legislation, and Regulation.

Farrokh Dehdashti, MD, comoderator, Session 80: Oncology Track, Clinical Diagnosis—Breast II.

Jason Lewis, PhD, organizer/moderator, Continuing Education Session: Radiotherapeutic Pharmaceutical Pre-clinical Studies and Design Strategies.

Henry Royal, MD, organizer/moderator, Controversies in Radiation Biology: The Linear No Threshold Hypothesis—Prudent Regulation or Unscientific Extrapolation?

Barry Siegel, MD, comoderator, Session 35: Oncology Track, Clinical Diagnosis PET with Other Tracks.

Jerold Wallis, MD, moderator, Session 19: Instrumentation and Data Analysis Track, Computer and Instrumentation, Young Investigators Symposium; comoderator, PACS: Implementation in the Modern Nuclear Medicine Department.

Chief residents appointed

Doctors Jon Fromke and Leo Lawler were appointed cochief residents for the 1999-2000 diagnostic radiology program. Fromke came to MIR from the University of Minnesota, Minneapolis, where he was a member of Alpha Omega Alpha honorary medical society. Lawler received a medical degree from the University of Ireland, Dublin, and completed internships at St. Vincent's University Hospital, Dublin, and at Mayo Clinic, Rochester, Minnesota.

Heather Curry, MD, was appointed chief resident for the radiation oncology program. Prior to her residency at the Institute, Curry received a medical degree from Temple University, Philadelphia, Pennsylvania, and completed an internship at Abington Hospital, Abington, Pennsylvania. She was the 1998-1999 radiation oncology assistant chief resident. Imran Zoberi, MD, was appointed assistant chief resident for the 1999-2000 academic year. He received an undergraduate degree from the University of South Dakota, Vermillion, and a medical degree from Washington University School of Medicine.

SYMPOSIA

Continued from page 29

POSTER SESSIONS

Wendy Chen, technical assistant; **Julie Dahlheimer**, medical research technologist; **David Piwnica-Worms, MD, PhD**, "TC-99m-tetrofosmin is transported by the multidrug resistance (MDR1) P-glycoprotein and the multidrug resistance-associated protein (MRP), but not related gene family members."

Pilar Herrero, MS; Terry Sharp, technical supervisor; **Carmen Dence, MS; Nathaniel Potts**, data analyst; **Robert Gropler, MD**, "How constant is the lump constant in myocardial F18-FDG imaging during hyperinsulinemic-euglycemic clamp?"

Pilar Herrero, MS; Terry Sharp, technical supervisor; **Carmen Dence, MS; Nathaniel Potts**, data analyst; **Robert Gropler, MD**, "Comparison of 1-C11-glucose and F18-FDG for quantifying myocardial glucose utilization by PET."

Pilar Herrero, MS; Terry Sharp, technical supervisor; **Carmen Dence, MS; Nathaniel Potts**, data analyst; **Robert Gropler, MD**, "Accuracy of myocardial glucose utilization measurements obtained with 1-C11-glucose with and without correction of blood activity for metabolites."

Jason Lewis, PhD; Michael Lewis, PhD; Margaret Morris, lab technician; **Jian Wang, BS; Carolyn Anderson, PhD**, "Changes in target tissue uptake over a multiple dose radiotherapy regimen with copper-64-TETA-Y3-octreotate."

Tom Miller, MD, PhD; Perry Grigsby, MD, MBA, "Assessment of tumor volume in cervical cancer by F-18 FDG PET."

CATEGORICAL SESSIONS

David Piwnica-Worms, MD, PhD, "Noninvasive analysis of gene expression in cancer: functional imaging of the multidrug resistance (MDR1)."

Henry Royal, MD, "Childhood thyroid cancers: lessons from Chernobyl."

SCIENTIFIC SESSIONS

Carolyn Anderson, PhD, "Targeting strategies for radiotherapy: current trends and future directions."

Keith Fischer, MD; Marilyn Siegel, MD; Barry Siegel, MD, "Diagnostic accuracy of ventilation-perfusion scintigraphy for the detection of the bronchiolitis obliterans syndrome in lung transplant patients."

Pilar Herrero, MS; Deborah Delano, research patient coordinator; **Michael Pasque, MD; Robert Gropler, MD**, "Aging and myocardial efficiency in humans."

David Hillier, MD; Jerold Wallis, MD, "Myocardial SPECT motion artifact as a function of motion type and number of camera detectors."

Tom Miller, MD, "Iterative reconstruction algorithms: basic principles and role in clinical practice."

Valery Polyakov, PhD; Julie Dahlheimer, medical research technologist; **David Piwnica-Worms, MD, PhD**, "Membrane permeant peptide conjugates for imaging apoptosis in vivo."

Jeffrey Yu, MD; Keith Fischer, MD; Marilyn Siegel, MD; Michael Roarke, MD; Barry Siegel, MD, "Diagnostic accuracy of ventilation-perfusion scintigraphy for the detection of the bronchiolitis obliterans syndrome in lung transplant patients."

8TH WORKSHOP ON TARGETRY AND TARGET CHEMISTRY (WTTCC)

*St. Louis, Missouri
June 24 - 27, 1999*

Carmen Dence, MS, member, Scientific Organizing Committee.

Gregory Gaehle, research engineer, member, Scientific Organizing Committee.

Deborah McCarthy, PhD, member, Scientific Organizing Committee.

Timothy McCarthy, PhD, member, Scientific Organizing Committee; cochair, Non-standards Isotopes.

Sally Schwarz, RPh, MS, member, Scientific Organizing Committee.

Michael Welch, PhD, member, Scientific Organizing Committee.

INVITED TALK

Michael Welch, PhD, "Relationship of hot atom chemistry to PET radionuclide production."

11TH INTERNATIONAL SYMPOSIUM ON RADIO-PHARMACOLOGY (ISR)

*St. Louis, Missouri
June 24 - 27, 1999*

Carolyn Anderson, PhD, member, Scientific Organizing Committee; chair, Antibody Session.

David Piwnica-Worms, MD, PhD, member, Scientific Organizing Committee; cochair, Multidrug Resistance Session.

INVITED TALK

Joel Perlmutter, MD, "PET measurements of dopaminergic pathways in the brain."

SCIENTIFIC SESSIONS

Gary Luker, MD; David Piwnica-Worms, MD, PhD, "Inhibition of MDR1 Pgp-mediated transport of Tc-99m-Sestamibi by high-potency modulators is a marker of increased esterification of plasma cholesterol."

Terry Sharp, technical supervisor; **Pilar Herrero, MS; Jason Lewis, PhD; John Engelbach**, medical research technician; **Deborah McCarthy, PhD; Todd Perkins**, medical research technician; **Michael Welch, PhD**, "Delineation of ⁶⁰Cu-ATSM by positron emission tomography in canine models of extended myocardial infarction (> 24 hours)."

Michael Lewis, PhD; Robert Vanderwaal, PhD; Carolyn Anderson, PhD, "Tumor cell uptake and nuclear localization of radiometal-labeled somatostatin analogs."

POSTER SESSIONS

Pilar Herrero, MS; Terry Sharp, technical supervisor; **Carmen Dence, MS; Nathaniel Potts,** data analyst; **Robert Gropler, MD,** "Accuracy of myocardial glucose utilization measurements using 1-[¹¹C]-glucose and PET."

Julie Dahlheimer, medical research technologist; **Christina Pica,** senior medical/clinical research technician; **David Piwnica-Worms, MD, PhD,** "Modulation of the pharmacokinetics of P-glycoprotein-targeted Tc-99m-complexes by GF120918 in wild-type and MDR α (-/-) gene knockout mice."

Lynne Jones, BA; Timothy McCarthy, PhD; Michael Welch, PhD, "Biodistribution of ¹⁸F-fluoride in rats."

WTTC, ISR, ISRC CONJOINT MEETING

*St. Louis, Missouri
June 27, 1999:*

Michael Welch, PhD, cochair, Molecular Imaging Session.

David Piwnica-Worms, MD, PhD, cochair, Molecular Imaging Session.

SCIENTIFIC SESSIONS

Valery Polyakov, PhD; Vijay Sharma, PhD; Julie Dahlheimer, medical research technologist; **David Piwnica-Worms, MD, PhD,** "Synthesis and characteriza-

tion in vitro of membrane permeant peptide conjugates for imaging and therapy."

Pilar Herrero, MS; Terry Sharp, technical supervisor; **Carmen Dence, MS; Nathaniel Potts,** data analyst; **Robert Gropler, MD,** "Discrepancies between myocardial ¹⁸F-FDG and glucose uptake with changes in substrate environment and work load."

Stephanie Jonson, MS; Jian Wang, BS; Michael Welch, PhD, "Role of sex hormone-binding globulin in target uptake of radiolabeled steroids: investigations in transgenic models."

13TH INTERNATIONAL SYMPOSIUM ON RADIO-PHARMACEUTICAL CHEMISTRY (ISRC)

*St. Louis, Missouri
June 27 - July 1, 1999*

Carolyn Anderson, PhD, member, Scientific Organizing Committee; cochair, Oncologic Imaging & Therapy Session.

Timothy McCarthy, PhD, member, Scientific Organizing Committee; cochair, Fluorine-18 II) Session.

David Piwnica-Worms, MD, PhD, member, Scientific Organizing Committee.

Michael Welch, PhD, chairman, Scientific Organizing Committee.

SCIENTIFIC SESSIONS

David Reichert, PhD; Michael Welch, PhD, "Comparison of molecular mechanics and density functional calculations for the prediction of technetium (V) complex structure."

Michael Lewis, PhD; Mu Wang, senior medical research technician; **Lynne Jones, BA; Michael Welch, PhD; Carolyn Anderson, PhD,** "Comparison of copper-64 radiopharmaceuticals for conventional and pretargeted radioimmunotherapy."

WORKSHOPS

David Reichert, PhD, "Molecular modeling in radiopharmaceutical design."

Barry Siegel, MD; Sally Schwarz, RPh, MS, "Regulatory issues."

Deborah McCarthy, PhD, "Isotope availability."

POSTER SESSIONS

Stephanie Jonson, MS; Lynne Jones, BA; Michael Welch, PhD, "Tumor uptake of potential ligands for the peroxisome proliferator activated receptor."

Eric Hostetler, PhD; Barry Edwards, MS; Carolyn Anderson, PhD; Michael Welch, PhD, "Synthesis of 4-[¹⁸F]fluorobenzoyl octreotide and biodistribution in tumor-bearing Lewis rats."

Vijay Sharma, PhD; Valery Polyakov, PhD; Julie Dahlheimer, medical research technologist; **Michael Welch, PhD; David Piwnica-Worms, MD, PhD,** "Gallium(III) Schiff-base complexes as potential PET agents for evaluation of multidrug resistance (MDR1) P-glycoprotein transport activity."

Jason Lewis, PhD; Michael Lewis, PhD; Richard Laforest, PhD; Sally Schwarz, RPh, MS; Margaret Morris, lab technician; **Jian Wang, BS; Carolyn Anderson, PhD,**

"Human absorbed dose estimates of ⁹⁰Y-DOTA-Y₃-octreotate based on rat biodistribution data."

Lynne Jones, BA; John Engelbach, medical research technician; **Michael Welch, PhD,** "Animal models to evaluate radiolabeled androgens for imaging and therapy."

Jason Lewis, PhD; Jian Wang, BS; Carolyn Anderson, PhD; Deborah McCarthy, PhD; Michael Welch, PhD, "Comparison of cell killing ability of copper-64 and copper-61."

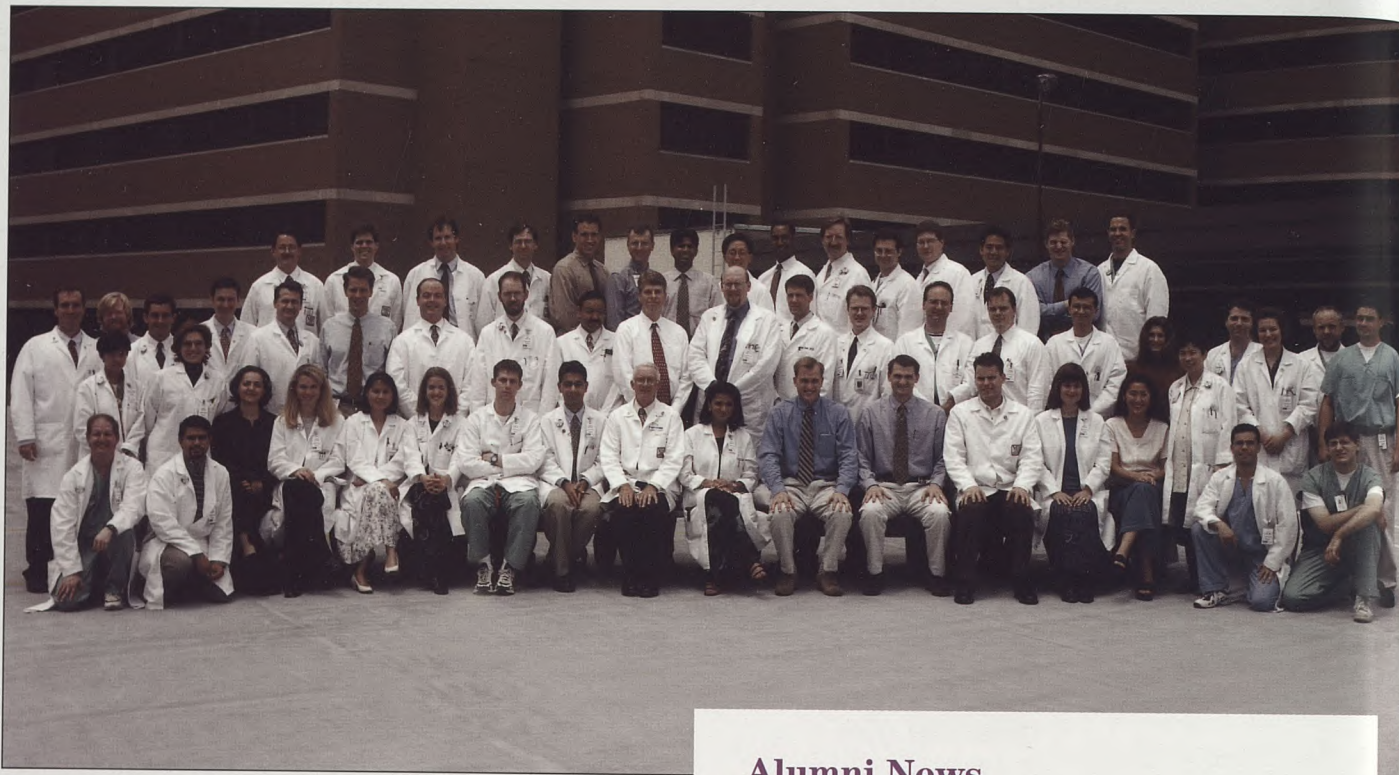
Carolyn Anderson, PhD; Michael Welch, PhD, "Labeling and in vivo evaluation of novel copper (II) dioxotetraazamacrocyclic complexes."

Jason Lewis, PhD; Michael Welch, PhD, "Dithiocarbamate copper complexes as blood flow tracers suitable for PET."

Barry Edwards, MS; David Reichert, PhD; Michael Welch, PhD, "Synthesis and evaluation of a β -cyclodextrin dimer and bis-t-butylbenzyl-cyclen as a new pretargeting strategy in radioimmuno-imaging/therapy."

William Margenau, cyclotron supervisor; **Michael Welch, PhD,** "Heated nitrogen to rapidly evaporate solutions."

Jason Lewis, PhD; Michael Welch, PhD, "Differential brain uptake of two hypoxia tracers dictated by lipophilicity."



Diagnostic radiology and nuclear medicine fellows, residents, and trainees for 1998-1999: (First row, left to right) Doctors Edward Wooten; Faraz Khan; Hero Hussain; Jennifer Gould; Katie Vo; Juliet Howard; Leo Lawler; Sanjeev Bhalla, cochief resident; Ronald Evens, director of the Institute; Christine Menias, cochief resident; Jon Fromke; Mark Fromke; John Neil; Sarah Reimer; Margaret Lee; Bonnie Joe; Paul Licata; George Brown. (Second row) Mark Culton, Mark Bakalars, Agnes Santosa, Tate Allen, Paul Broadbent, Robert Gelczer, Douglas Curry, Mark Oswood, Anil Khosla, John Leahy, Jeffrey Chesnut, Dallas Peck, Theodore Vander Velde, Bartosz Rydewski, Michael Boerner, Steve Schmitter, Mary Wyers, Noah Appel, Grace Phillips, Joshua Shimony, Matthew Vanasco. (Third row) Francisco Rodriguez, Christopher Gordon, Blease Graham, Gabriel DeSimon, Kevin Berger, Eric Schallen, Robert McKinstry, Joseph Philip, John Lim, Sean Pierce, Timothy Davis, Anthony Hein, Mark Fister, Craig Hamasaki, Jason Levy, Perry Pickhardt.

Alumni News

Garrett Ho, MD, who completed two years (1992-1994) of training in nuclear medicine at MIR, is director of the Department of Nuclear Medicine and Positron Emission Tomography at the Hong Kong Sanatorium and Hospital, the first PET facility in Hong Kong. Dr. Ho's facility recently sponsored the Clinical Positron Emission Tomography Conference in Hong Kong, where prominent academic professionals and experts provided their visions of the latest advancements using PET in the detection and treatment of cancer and of the utility of PET throughout the entire patient management process. Barry Siegel, MD, professor of radiology and of medicine and director of MIR's Division of Nuclear Medicine, as an invited speaker, presented "Practical oncological applications of PET" at the May 27th and May 28th conference. Michael Welch, PhD, professor of radiology and of chemistry and codirector of MIR's Division of Radiological Sciences, as invited speaker, presented "Development and application of new PET tracers for oncology."



In June, Mickey Clarke, CNMT, BA, was named a fellow of the Society of Nuclear Medicine Technologist Section (SNMTS) in honor of her educational and leadership activities on behalf of the Society and the field of nuclear medicine.

Clarke, administrator for the Institute's Division of Nuclear Medicine, has been an active member of SNMTS for more than 20 years. She has held numerous leadership roles, including treasurer, chair of the Government Relations Committee and scientific program chair for the annual meeting. She currently serves as vice chair of the Government Relations Committee of SNMTS' parent association, the Society of Nuclear Medicine, and as editor of the SNMT newsletter, *Uptake*.

She serves on the DuPont Pharma Technologist Advisory Board.

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