

Summer 1997

## Focal Spot, Summer 1997

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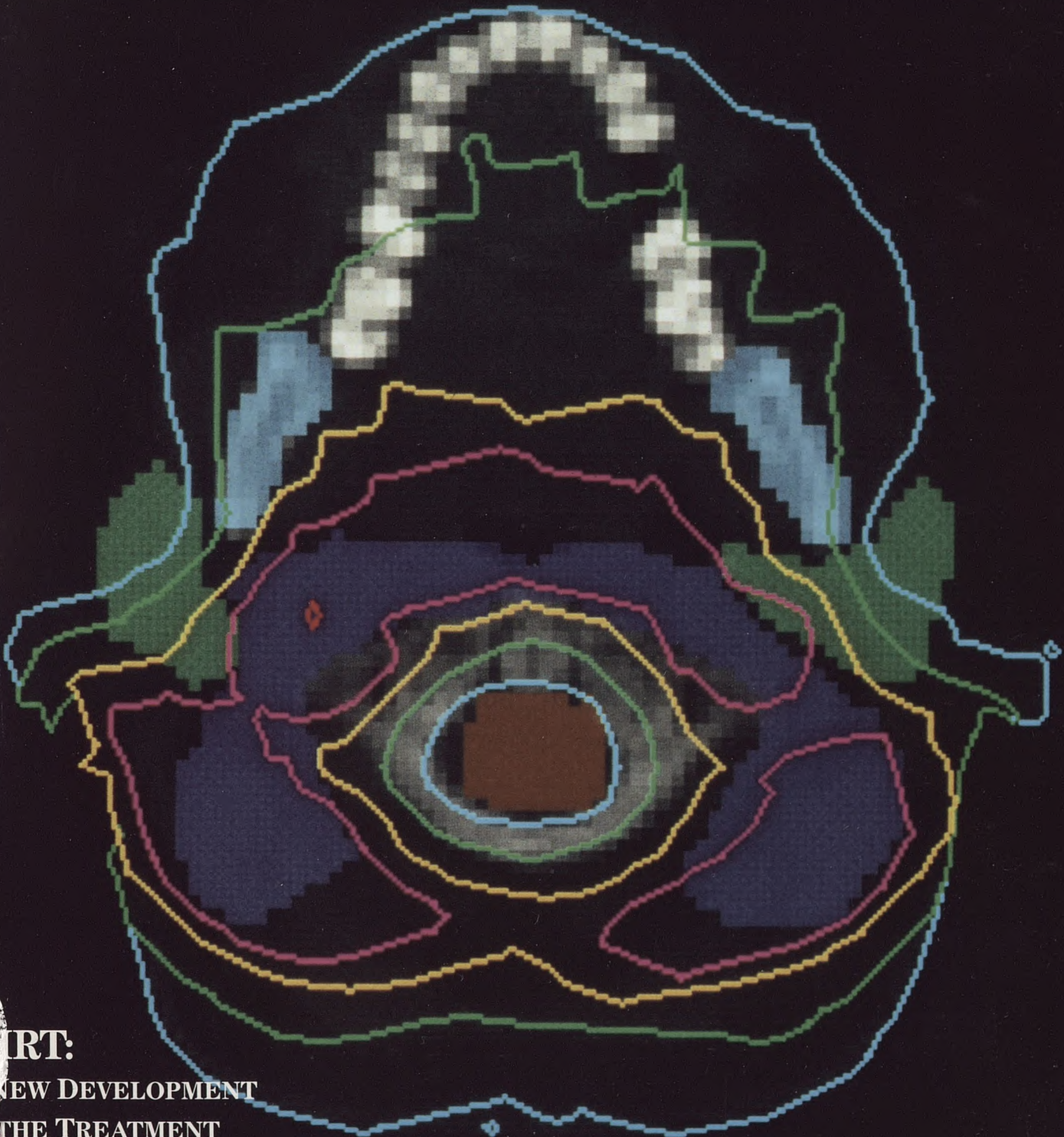
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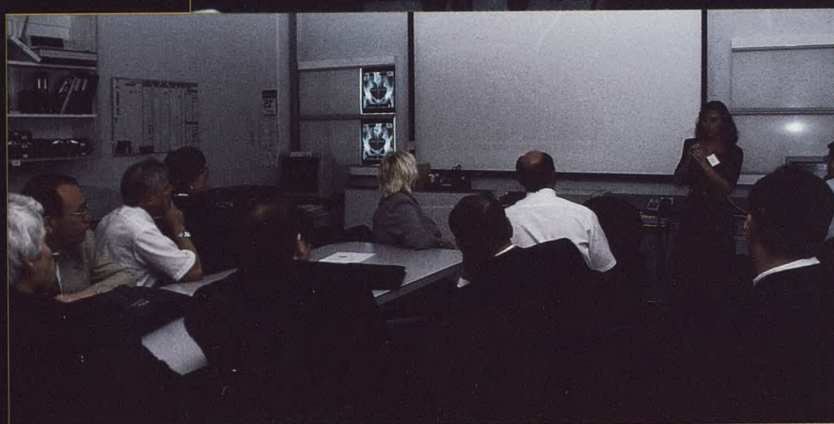
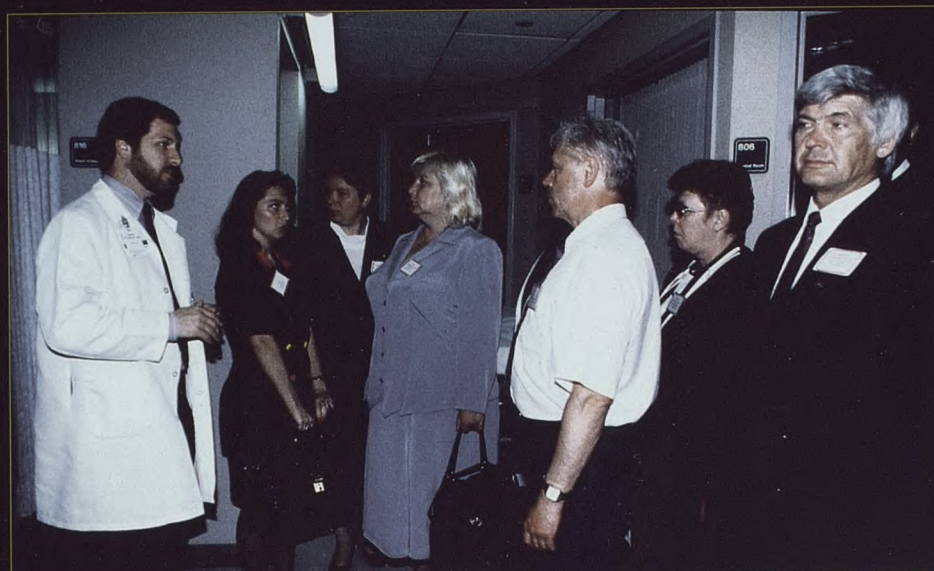
# FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY



**ART:**

NEW DEVELOPMENT  
THE TREATMENT  
CANCER



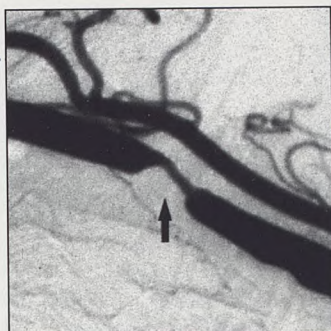
In June, during a three-week tour of healthcare facilities in the United States, physicians from Nizhni Novgorod, Russia, visited Mallinckrodt Institute of Radiology. The tour was part of the successful Business for Russia Program, an internship for Russian Federation business, government, and healthcare leaders that is sponsored by the United States Information Agency and the World Affairs Council.

**Top:** David Hovsepian, MD, described the types of procedures performed in the Institute's comprehensive vascular and interventional radiology suite.

**Bottom, left:** The Russian physicians also toured the Institute's three-dimensional radiation oncology treatment planning suite (above) as well as the computed tomography and positron emission tomography facilities.

**Bottom, right:** Dmitriy Yablonskiy, PhD, gave an overview of the research conducted in the magnetic resonance imaging laboratory.

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## RISK VS BENEFIT

Each year in the United States more than 160,000 people die from strokes caused by a blockage in the carotid artery. In a Mallinckrodt Institute study, researchers investigated whether screening of asymptomatic, at-risk patients would be beneficial and cost-effective. The surprising results will have a clinical impact on the diagnosis and treatment of carotid artery disease.

## 11 IMRT — A NEW DEVELOPMENT IN THE TREATMENT OF CANCER

Xerostomia can be a debilitating side effect of radiation therapy for patients with head and neck cancers. MIR clinicians and physicists are investigating the effectiveness of intensity modulated radiation therapy in sparing salivary glands during treatment. Based on results of this study, treatment plans can be devised for improving local tumor control while enhancing the quality of life for head and neck cancer survivors.



## 2 SPOT NEWS

## 16 FYI



### ON THE COVER:

A patient with nasopharyngeal cancer was treated with intensity modulated radiation therapy, in which individually controlled radiation doses were delivered precisely to the tumor sites (red and blue areas) while sparing the adjacent parotid glands (green area). Turn to page 11 for more information about this new development in conformal radiation therapy.

# SPOT NEWS



## Purdy honored for distinguished research career

James Purdy, PhD, associate director of MIR's Radiation Oncology Center and chief of the radiation oncology physics section, received The William D. Coolidge Award presented by the American Association of Physicists in Medicine

(AAPM). The Coolidge Award is the AAPM's highest honor, denoting distinguished contributions to the scientific practice of medical physics.

Recipients of the award are nominated by their AAPM peers, with the final selection made by the Honors and Awards Committee and approved by the AAPM Board of Directors. Nominees must have exerted a significant impact upon the scientific practice of medical physics, influenced the professional development of

other medical physicists, and been a leader in national or international organizations.

Purdy's research efforts in three-dimensional treatment planning for radiation therapy is having a profound effect on the practice of radiation therapy. An early advocate of quality assurance, he serves as director of the Mallinckrodt Institute-based, National Cancer Institute-designated 3-D Quality Assurance Center for a national dose escalation study.

Purdy joined the MIR faculty in 1973, was named chief of radiation physics in 1976, and was appointed professor of radiology in 1983. A prolific author, he has written more than 200 scientific journal and textbook articles and has given nearly 60 invited lectures worldwide. He is a member of the Board of Directors of the American Society of Therapeutic Radiology and Oncology, a past chairman of the Board of Chancellors of the American College of Medical Physics, a past president and member of the Board of Directors of AAPM, and a past member of the Governing Board of the American Institute of Physics. Purdy currently serves as the physics senior editor for the *International Journal of Radiation Oncology, Biology, and Physics*.

## Wilson Award presented

The 1997 Hugh M. Wilson Award was presented in May to Jennifer Thomure, a Washington University graduating medical student, for her meritorious contributions to the Department of Radiology. The award was initiated in 1968 in honor of Doctor Hugh Wilson, a strong advocate of the advancement of education and the second director of Mallinckrodt Institute of Radiology.

Thomure rotated through radiology early in her senior year and proved to be a valuable asset to a research project directed by Clark West, MD, assistant professor of radiology and director of emergency and trauma radiology. After abstracting over 500 trauma computed tomography (CT) reports, Thomure interpreted information from the reports, recorded that information into databases she designed specifically for the project, and ultimately analyzed the collected information. She also worked independently in reviewing charts on pertinent cases.

According to West, "Jennifer is an intelligent, extremely motivated, very organized, and highly dedicated individual who will be an asset to our field."

## MRI text rated one of the best

*Pitfalls, Variants, and Artifacts in Body MR Imaging*, authored by Scott Mirowitz, MD, was named one of the best health sciences books of 1996 by Doody's Rating Service.

The book, a reference of MRI artifacts and anatomic variants that can be mistaken for pathology, was one of a few radiology texts to receive Doody's highest possible rating of five stars and 100 points.

Doody's, an independent reviewer of healthcare books, utilizes a network of 3,000 reviewers who peruse and rate publications from 200 publishers. Results from the 1996 review were published in *Doody's Rating Service: A Buyer's Guide to the 250 Best Health Sciences Books*, 1997 edition.

Mirowitz is radiologist-in-chief at Barnes-Jewish Hospital north and codirector of Mallinckrodt Institute's body magnetic resonance imaging. He has an academic appointment as associate professor of radiology.

## Siegel appointed to board of directors

Marilyn Siegel, MD, professor of radiology and of pediatrics, was appointed to a two-year term on the Board of Directors of the Washington University School of Medicine (WUSM) Faculty Practice Plan. A recent initiative, the Practice Plan Board will manage the medical school's clinical operations, with responsibility in the areas of clinical oversight, administration, fiscal management, and clinical planning.

Along with William Peck, MD, executive vice chancellor for medical affairs and dean of the medical school; James Crane, MD, associate vice chancellor for clinical affairs and the Practice Plan's CEO; and Robert Waterston, PhD, head of the Department of Genetics, the 13-member board comprises three full-time faculty physicians; heads of the departments of Pediatrics, Neurology, Surgery, Internal Medicine, and Anesthesiology; and representatives from outside of the medical center.

Siegel and doctors Diana Gray of the Department of Obstetrics and Gynecology and Bruce Haughey of the Department of Otolaryngology-Head and Neck Surgery were selected from more than 1,200 faculty to serve as board representatives for WUSM's full-time faculty clinicians.



Dr. Albert Moss, president of ARRS, presented the Gold Medal Award to Ronald Evens, MD.

## Another gold medal for Evens

Throughout his 25-year career, Ronald Evens, MD, the Elizabeth E. Mallinckrodt Professor of Radiology, head of the Department of Radiology, and director of Mallinckrodt Institute, has earned a long list of honors. The most recent recognition came in May of this year when he was selected by the American Roentgen Ray Society's (ARRS) Executive Council as one of three recipients of the 1997 ARRS Gold Medal Award for Distinguished Service to Radiology.

Evens is highly regarded in business issues and the socioeconomic aspects of medicine as well as for his expertise in a variety of radiologic technologies. In 1996 he received the Association of University Radiologists' prestigious Gold Medal Award for his outstanding contributions to the specialty of radiology.

He has served on numerous boards and committees that greatly impact upon healthcare in the United States, including the U.S. Food and Drug Administration's Bureau of Radiological Health and the Office of Health Technology Assessment of the Federal Department of Health and Human Services. Evens is a past president of the ARRS, the Missouri Radiological Society, the Society of Chairmen of Academic Radiology Departments, and the Association of University Radiologists. He is currently serving as chairman of the Board of Chancellors of the American College of Radiology.

The ARRS was founded in St. Louis, Missouri, in 1900 and was the first scientific organization in the United States devoted to the advancement of medicine through the science of radiology.

# SPOT NEWS



## Barton voted teacher of the year

Established in 1983, the Annual Senior Residents' Distinguished Teaching Award is presented to the MIR faculty member who has made the greatest contribution to resident education during the academic year. The recipient is determined through a nomination and voting process by the radiology residents, with the award presentation made at the residents' and fellows' farewell dinner in June.

The 1997 Teacher of the Year is Prensri Barton, MD, assistant professor of radiology and a member of the breast imaging section. Barton has been active in the radiology resident training program since she joined the Institute's faculty in 1993. Prior to coming to MIR, she was in private practice in St. Louis for seven years and served as staff radiologist and director of the Division of Ultrasound at St. Louis City Hospitals for eight years.

### Past award winners:

- Dennis Balfe, MD  
1983 and 1987
- Marilyn Siegel, MD  
1984 and 1989
- David Ling, MD  
1985
- Fernando Gutierrez, MD  
1986
- Stuart Sagel, MD  
1988
- Barry Siegel, MD  
1990
- Franz Wippold, MD  
1991
- Anthony Wilson, MD  
1992
- William Middleton, MD  
1993
- Jay Heiken, MD  
1994
- Gary Shackelford, MD  
1995
- Mokhtar Gado, MD  
1996.

## RSNA funds MIR research

The Radiological Society of North America (RSNA), the largest of the scientific organizations, established the Research and Education Fund in 1984 to provide monetary support for diagnostic and oncologic radiology researchers. Nine grant programs under the umbrella of the R&E Fund are endowed by corporations such as Eastman Kodak Company; Siemens Medical Systems, Inc.; Mallinckrodt Medical, Inc.; Nycomed, Inc.; and Fuji Medical Systems USA, Inc.

Robert Feiwell, MD, instructor in radiology and a neuroradiology research fellow, received a one-year RSNA Siemens Medical Systems/RSNA Fellow grant to support his research project, "Functional imaging of the somatosensory processing in patients with dystonia." The grant carries a \$30,000 stipend so that young researchers who are nearing the completion of their training can gain experience in radiologic investigation or educational methods.

Joshua Shimony, MD, PhD, assistant in radiology and a third-year resident, received a one-year RSNA Research Resident grant for his investigation of "Anisotropic diffusion tensor imaging for evaluation of cerebral anatomy and fiber

tracking." The \$25,000 award provides second- or third-year radiology residents with an opportunity to explore careers in research before making definite career decisions.

These current and former MIR researchers have received R&E funding:

- Ty Bae, MD, PhD — 1996 RSNA Research Resident
- James Brink, MD — 1989 RSNA Fellow
- Jeffrey Brown, MD — 1989 RSNA Seed Grant
- Colin Derdeyn, MD — 1994 Siemens Medical Systems/RSNA Fellow
- James Duncan, MD, PhD — 1991 RSNA Research Resident
- David Gierada, MD — 1994 RSNA Seed Grant
- Marshall Hicks, MD — 1996 RSNA Seed Grant
- Gary Luker, MD — 1996 RSNA Fellow
- Mark Mintun, MD — 1988 RSNA Scholar
- David Piwnica-Worms, MD, PhD — 1989 Squibb/RSNA Scholar
- Vallabhaneni Rao, PhD — 1994 Fuji/RSNA Seed Grant
- Pamela Woodard, MD — 1996 Siemens Medical Systems/RSNA Fellow.

## Faculty granted professorships

William Middleton, MD, associate professor of radiology and head of ultrasonography; Barbara Monsees, MD, associate professor of radiology and chief of breast imaging; and Robert Myerson, PhD, MD, associate professor of radiology, were promoted to professor of radiology effective July 1, 1997.

Middleton joined the Institute in 1987 as assistant professor of radiology and was named head of ultrasonography in 1992. He completed a four-year diagnostic radiology residency at Mallinckrodt Institute (chief resident, 1984-1985). His clinical and research work focuses on sonographic evaluation of structural and vascular abnormalities with an emphasis on Doppler sonography and ultrasonographic evaluation of scrotal and musculoskeletal abnormalities.

Monsees joined MIR's musculoskeletal radiology faculty in 1980 after completing three years of residency in diagnostic radiology at the Institute and two years of training in pediatrics at St. Louis Children's Hospital.

She was named head of MIR's mammography service in 1992 and was appointed chief of the new breast imaging section in 1993. She is an advocate of the benefits of early detection of breast cancer through screening and promotes community education about breast cancer and mammography.

Myerson, in addition to a medical degree, has a doctorate in physics. He was assistant professor of physics at Pennsylvania State University and a member of the Institute for Advanced Study in Princeton, New Jersey. Prior to joining Mallinckrodt Institute's radiation oncology faculty in 1984, he completed three years of residency in radiation therapy at the University of Pennsylvania and a one-year internship at Graduate Hospital in Philadelphia. Myerson focuses his research efforts on the treatment of gastrointestinal malignancies and the clinical application of hyperthermia in the treatment of cancer.

## Alumni scholar-ship named after Siegel

The Washington University Medical Center Alumni Association has named a 1997 Distinguished Alumni Scholarship in honor of Barry Siegel, MD, director of the MIR Division of Nuclear Medicine. The association created the Distinguished Alumni Scholarship Program (DASP) in 1989 to annually provide four first-year students with full-tuition for four years of medical school. Scholarships are named after alumni who have distinguished themselves as Washington University faculty.

Siegel has been a member of the university community for the past three decades. He received an undergraduate and a medical degree from Washington University, completed a radiology residency at Mallinckrodt Institute, and joined the MIR faculty in 1973 as assistant professor of radiology and director of the Division of Nuclear Medicine. He was appointed professor of radiology in 1979 and professor of medicine in 1983.

He is widely recognized for his clinical and scientific expertise and is often called upon as a consultant to governmental organizations, industry, medical centers, and universities. In recognition of his dedication to education, Siegel was named the Institute's 1990 Teacher of the Year and was appointed in 1988 by the American College of Radiology as the editor-in-chief of the ACR's Radiology Professional Self-Evaluation and Continuing Education Program.

Two other MIR faculty have been honored by DASP: Barbara Monsees, MD, chief of the Institute's breast imaging section, and Ronald Evens, MD, director of the Institute — in 1995 and 1996, respectively.

## MIR team earns top AUR spot

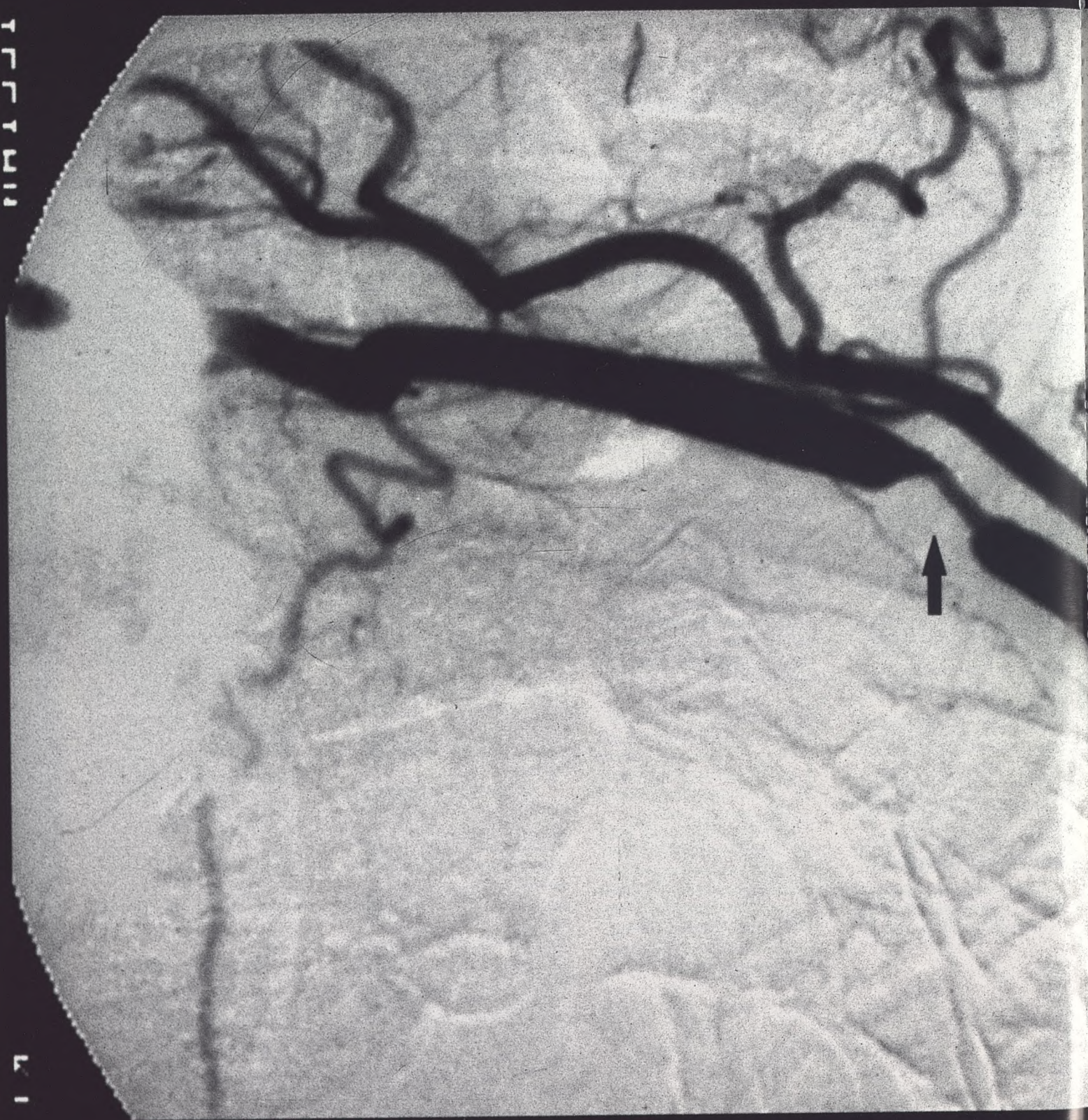
The competition was tough, but a team of MIR residents, faculty, and alumni beat a field of 48 teams to capture the number one spot in the 1997 Radiology Quiz Award. Sponsored by the Association of University Radiologists (AUR), the formal presentation of the "Film Interpretation of the Stars" award was made at the association's meeting in April in Dallas, Texas.

A core team of Doctors Thomas Vaughn and Donald Heck (the 1996-1997 cochief diagnostic radiology residents) and Mark Fromke and Sandy Ruhs (the 1997-1998 cochief diagnostic radiology residents) guided the group through the competition. Other team members were Doctors Dennis Balfe, director of the Diagnostic Radiology Residency Program; David Gierada, assistant professor of radiology; Kim Baker, former MIR neuroradiology fellow; and Mike Katz, former MIR resident.

In each round the team had to answer five general knowledge questions and interpret films from 11 cases. Judges scored the answers and diagnoses for each round and declared the team with the highest score as the winner.

Since, according to AUR rules, institutions cannot be consecutive winners of the award, the MIR team will be on hand at the next year's meeting to present the 1998 award — but watch out for 1999!

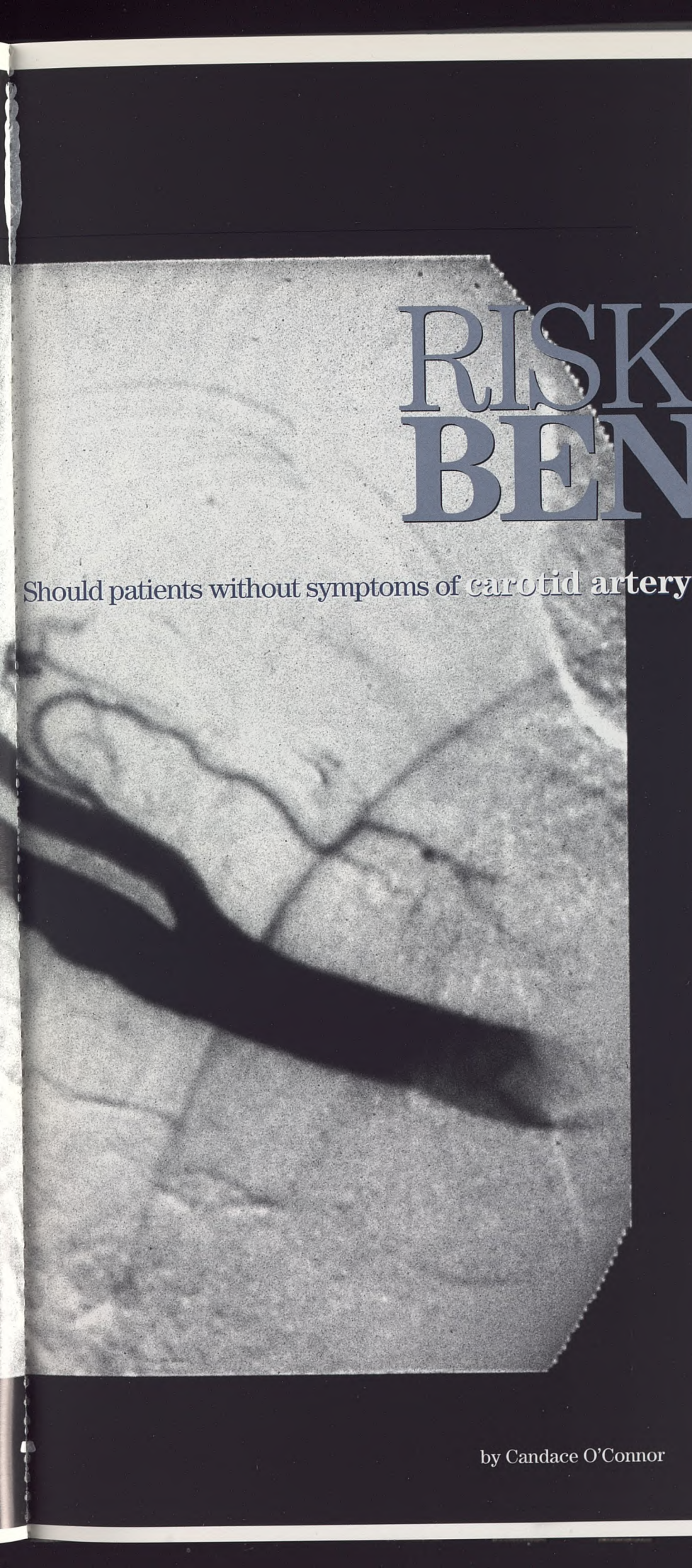
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An angiographic image  
of a partially blocked  
carotid artery (arrow).

Show



# RISK **vs** BENEFIT

Should patients without symptoms of carotid artery disease be screened?

**E**ach year more than half a million Americans die from strokes. About a third of the time, the strokes are caused by atherosclerosis in the carotid artery, the main artery that runs up through the neck and into the brain. As fatty deposits or plaque build up, they cause stenosis or a narrowing of the artery. A stroke occurs when a blood clot breaks off from the plaque and lodges in the brain, killing cells by depriving them of oxygen and nutrients.

When physicians discover this blockage early enough, they can remove it surgically and prevent the stroke from occurring. But many of these patients may die from other diseases such as cardiac disease or could suffer a stroke brought on by the diagnostic and surgical procedures. It is crucial to identify at-risk patients, but should physicians screen patients for carotid narrowing, even when they are not having any symptoms? And should the patients undergo this screening only once — or as often as every year over a 20-year period?

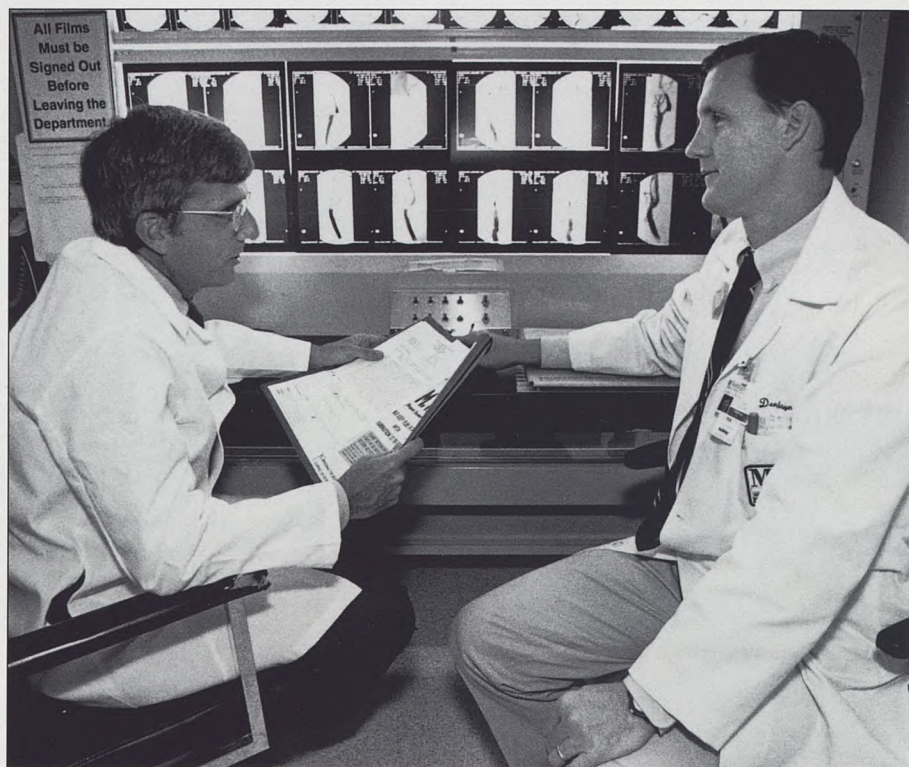
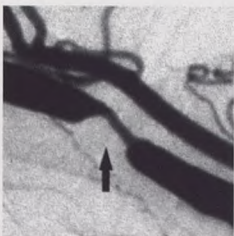
by Candace O'Connor

# RISK vs BENEFIT

Two Mallinckrodt Institute of Radiology researchers — Colin Derdeyn, MD, and William Powers, MD—tackled these questions last year with a sophisticated computer model that evaluated an array of data related to stroke frequency and risk, as well as the cost and benefits of surgical treatment. They looked at two hypothetical pools of patients: one, a normal population of healthy 50- to 60-year-old men; and the other, a high-prevalence group of men who had already had heart attacks, leg circulation problems, or a bruit (a murmur in the carotid artery).

The results of this study, published last year in the medical journal *Stroke*, surprised them. “We expected to find that screening in the asymptomatic population wouldn’t be effective, because it’s expensive and the benefits seemed to be slim,” says Derdeyn, assistant professor of radiology and principal researcher in this study. “But it turned out that a one-time screening of a high-prevalence population was reasonable and relatively cost-effective.”

Within the normal population, the conclusions were different. “All doctors want to do well for their patients, and you would think that the more you did, the better the outcome,” says Powers, associate professor of neurology and of radiology, who assisted Derdeyn with study planning and data gathering. “But we found it was actually detrimental to screen people on a yearly basis if they had a low risk of asymptomatic carotid stenosis.”



Doctors Colin Derdeyn (right) and William Powers

The Mallinckrodt Institute study had its roots in a 1995 national trial, the Asymptomatic Carotid Atherosclerosis Study (ACAS), which showed that surgery reduces the risk of stroke in asymptomatic men. In this trial, patients with carotid stenosis were split between two groups — one receiving medical treatment only and the other undergoing endarterectomy, a surgical procedure that clears plaque out of the artery. After nearly three years, 11 percent of the medically treated group had suffered strokes, as compared to only 5.1 percent of the surgically treated patients.

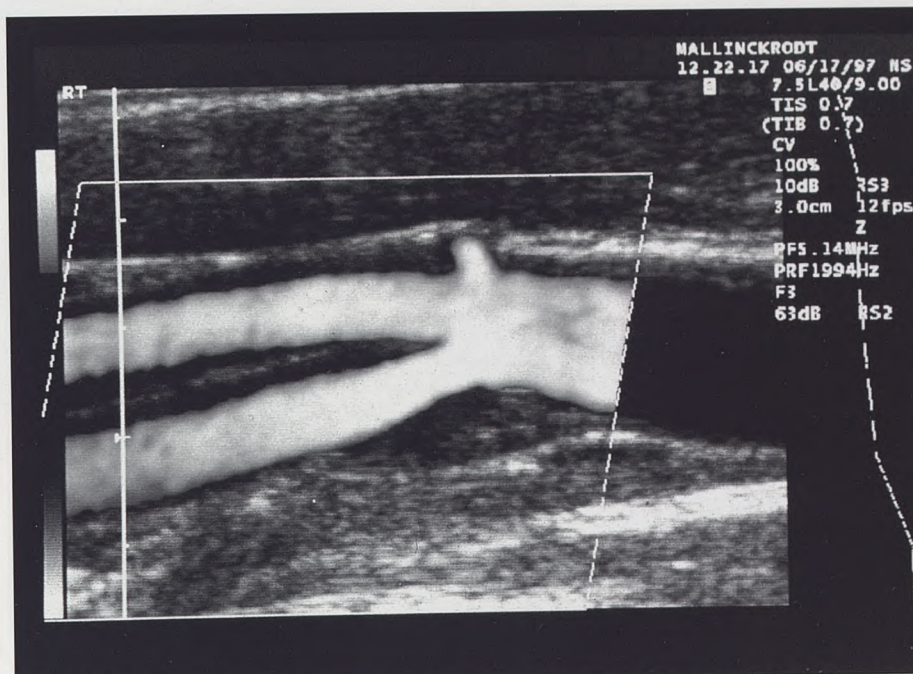
“So here was a trial that showed the value of operating on asymptomatic patients, but we still didn’t know whether it really made sense to go looking for those patients,” says Derdeyn. “What was the benefit? And would it cost an exorbitant amount?”

At about this same time, Derdeyn embarked on his own study of 200 Washington University Medical Center patients in which he compared the effectiveness of Doppler ultrasound and angiography in pinpointing patients with carotid artery stenosis. The results showed that ultrasonography is an excellent noninvasive, inexpensive tool for initial screening of patients. Once a stenosis has been identified, the patient can then have an angiogram, which yields a highly detailed image but costs more than ultrasound and entails a small risk of stroke from the procedure itself.

The ACAS study had provided outcome data on asymptomatic patients, and Derdeyn's own study supplied baseline data about the ultrasound method. Other data — such as estimates of disease prevalence and surgical complication rates — was in the literature that Derdeyn and Powers, both stroke specialists, had accumulated during other research. They began gathering the information they needed to construct a computer model that would weigh the value of looking for stenosis in asymptomatic patients.

*Ultrasonography  
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stenosis.*

"We discussed what we would need to know to do this study, including how often carotid stenosis occurs in asymptomatic people, how well you can find it, who has more of it and who has less, and information related to the cost effectiveness of treatment," says Powers.



Color Doppler image of the carotid bifurcation shows a plaque at the origin of the internal carotid artery.

With funding from the National Institute of Neurological Disorders and Stroke, Siemens Medical Systems, and the Charles A. Dana Foundation, Derdeyn took all this information and proceeded with the model. To construct its framework, he relied on help from Dennis Fryback, PhD, professor of preventive medicine and a technology assessment expert at the University of Wisconsin, where Derdeyn had spent his final clinical fellowship year.

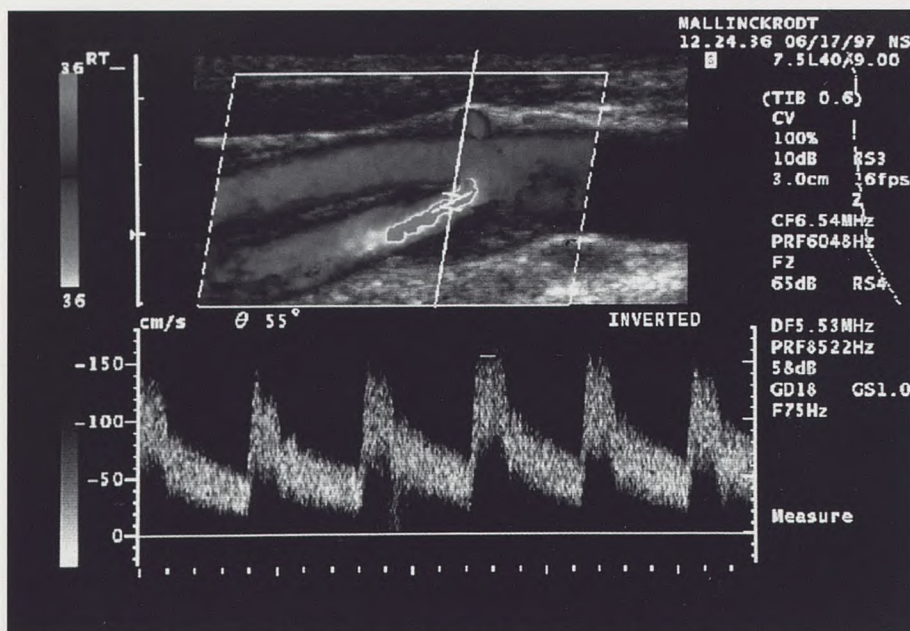
To verify his findings, Derdeyn did extensive "sensitivity testing" of his assumptions, taking each one and varying it widely to see how that change would affect the outcome of the model. "We asked, 'What if this assumption is wrong by a factor or two? How much difference will that make?' It turned out that for most of the assumption, it didn't have that much effect," says Powers.

But the model did prove particularly sensitive to two variables. The first was the long-term stroke-risk-reduction rate after surgery — a figure that could change the whole outcome of the study. "Decreasing the rate to fifty percent of what was reported in ACAS could actually harm people by looking for stroke risk and trying to treat it. And if you increase the rate by fifty percent, then it indicates that everyone should have treatment," says Derdeyn.

The other sensitive factor involved the years of life that could be saved if a patient underwent screening followed by successful surgery to prevent a stroke. Every stroke-free year counts as one quality-adjusted life year (QALY). For their model, Derdeyn and Powers counted every post-stroke year, in which the patient experiences reduced quality of life, as 0.8 QALY.

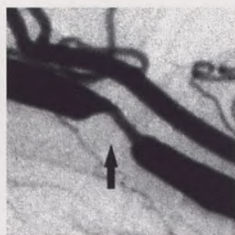
**Should patients** without symptoms of carotid artery disease be screened?

# RISK VS BENEFIT



Doppler waveform from the internal carotid artery shows mildly elevated velocities, indicating a greater than 50 percent diameter stenosis.

But for purposes of calculation, how much do you discount those potential good years gained by surgery? In other words, would a saved year of life ten years from now mean as much as a saved year only two years away? "If there's much of a discount, then the surgery isn't as useful," says Derdeyn. "The benefit from this operation is one that you have to wait for, and if you are discounting what you're waiting for, then it changes the outcome of the model."



Using 1995 figures, the model also included various costs — ultrasonography (\$109), angiography (\$2,000), and surgery (\$9,000) — and compared them to the costs saved over time by preventing strokes or death from stroke, and the need for long-term care. The model then calculated cost per QALY.

The outcome was dramatic: The high-risk men screened once for carotid stenosis gained 30 QALYs over men who were not screened at all, while the cost of each QALY was a relatively inexpensive \$35,130. On the other hand, annual screening of these same men would add only seven QALYs at a prohibitive cost of \$457,773 per QALY gained.

In the low-prevalence group, the researchers found that screening added only seven QALYs at a higher, one-time cost of \$52,588. Annual screening of this same group would actually be detrimental to patients because it would delete nine QALYs.

Overall, says Derdeyn, there were two messages from this study: First, one-time screening of high-risk men is beneficial and not inordinately expensive. Second, the benefits of screening are highly dependent on the ultrasonography quality and the complication rates from angiography, which can vary from one medical center to another. But they were particularly dependent on the risks of stroke or death from surgery, a rate estimated at a low 1.5 percent for the ACAS trial. In fact, the rate can range from 0.5 to 20 percent, depending on the expertise of the medical center.

Both Derdeyn and Powers believe that their findings will have a clinical impact. "It legitimizes what many surgeons are already doing," says Derdeyn, "and it may encourage primary care physicians to identify patients with asymptomatic carotid disease, particularly those who may have these risk factors."

"It provides some guidance to physicians on how to take the best care of their patients, and it says that more isn't necessarily better," says Powers. "It gives the physician a firm backing to say 'No, it's not really beneficial to the patient to use every option just because it's available.' I think that's important for physicians and for patients to know." **MIR**

Should patients without symptoms of carotid artery disease be **screened**?



Oncologist Henry Chao and physicist Daniel Low (seated).

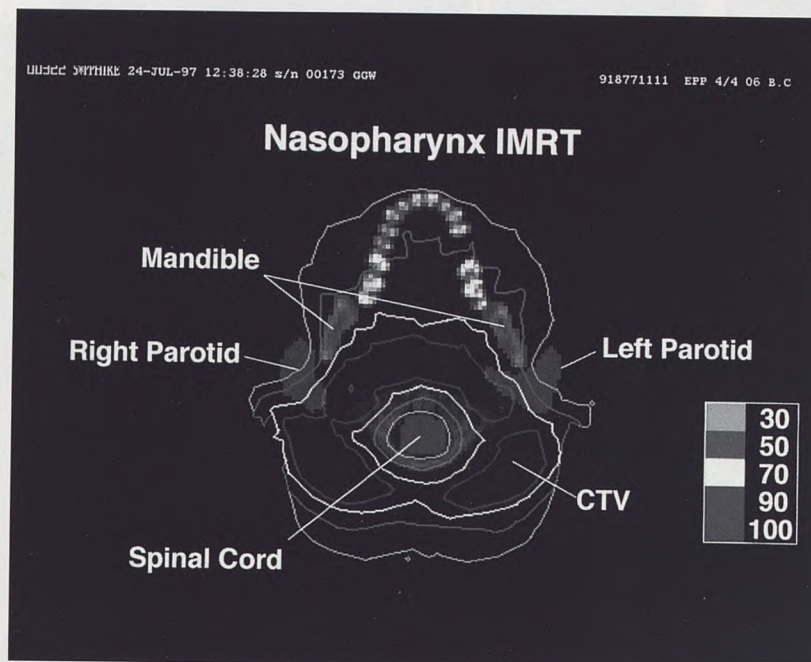
# IMRT

a new development in the treatment of cancer

**I**ntensity modulated radiation therapy (IMRT) is a recent technology that promises to provide the most effective method for delivering highly tailored, individually controlled radiation dose distributions precisely to the tumor. A new approach to external irradiation and a step forward in conformal therapy, IMRT could produce a positive effect on the quality of life and survival of patients with cancer while generating a tremendous impact on healthcare costs. As one of twelve medical facilities in the United States and the only one in the Midwest where IMRT is available, Mallinckrodt Institute of Radiology (MIR) researchers are assessing the technology's effectiveness in the treatment of head and neck cancer.

BY VICKI KUNKLER

## IMRT



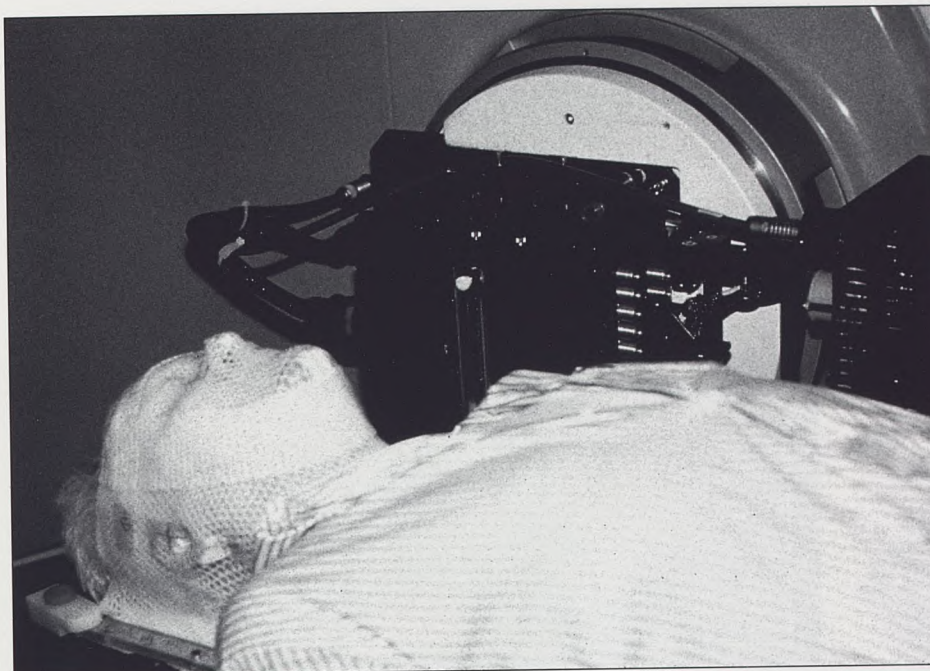
**H**istorically, the effectiveness of radiation therapy has been limited by the oncologist's ability to restrict the radiation beam to only the tumor site. In order to treat the tumor with levels of radiation high enough to destroy the cancerous cells, surrounding healthy tissue also receives significant doses of radiation. In the past, researchers hypothesized that if radiation could be delivered in such a way that only the tumor, regardless of its shape or size, received a lethal dose of radiation, then the patient's survival and subsequent quality of life would be significantly increased. In the late 1950s and early '60s this hypothesis evolved into the development of conformal therapy.

*Sensitive structures, such as the spinal cord and parotid glands, must be considered during treatment planning for nasopharyngeal cancer.*

Within the past two decades methods for treatment planning and radiation dose delivery systems have been significantly improved through the use of computed tomography (CT) and the subsequent generation of three-dimensional computer models of the patient. Simulators and treatment planning systems were developed to provide the capability of designing portals and subsequently verifying treated volumes. Initiated as a call to action by the National Cancer Institute, MIR, under the direction of James Purdy, PhD, associate director of the Radiation Oncology Center and chief of radiation physics, was one of six facilities awarded grants to develop the 3-D treatment planning system. The groundbreaking technology provided a method for effectively increasing doses of radiation.

"But there is no perfect plan, even with three-dimensional conformal therapy," says Clifford Chao, MD, assistant professor of radiology and principal investigator of Mallinckrodt Institute's IMRT study. "With conventional three-dimensional conformal therapy, there is a trial-and-error factor involved. We don't know the best treatment plan for a particular tumor unless we exercise all possible plans that can encompass the tumor target and spare normal tissue. Nevertheless, because the time and labor constraints will not allow us to test the infinite combinations of different radiation beam angles, different photon or electron beams, or constantly shaping radiation fields, we always question that there may be a better treatment."

## IMRT



The IMRT unit is affixed to the accelerator.

**R**adiation therapy is one of the crucial components of multidisciplinary treatments for head and neck cancers; however, the quality of life of these patients may be diminished due to the side effects of treatment. Using the NOMOS IMRT System, the only medical equipment manufacturer with FDA-cleared IMRT equipment, Chao is directing a 40-patient study to investigate the effectiveness of the NOMOS Peacock System in sparing adjacent salivary glands during treatment of head and neck cancer.

The study includes three groups of patients who are at low, intermediate, or high risk of developing xerostomia (dry mouth) based on the estimated proportion of salivary glands that may be irradiated during treatment. Xerostomia affects speaking, swallowing, chewing, and sleeping and contributes to dental disease and fre-

quent oral infections. Xerostomia must be considered in patient management as it can become a chronic disability for many patients. Tumor sites involved in the study are laryngeal cancer, cancer of the oral cavity and the hypopharynx, nasopharyngeal and oropharyngeal cancer, and cancer of the upper- and mid-cervical nodes.

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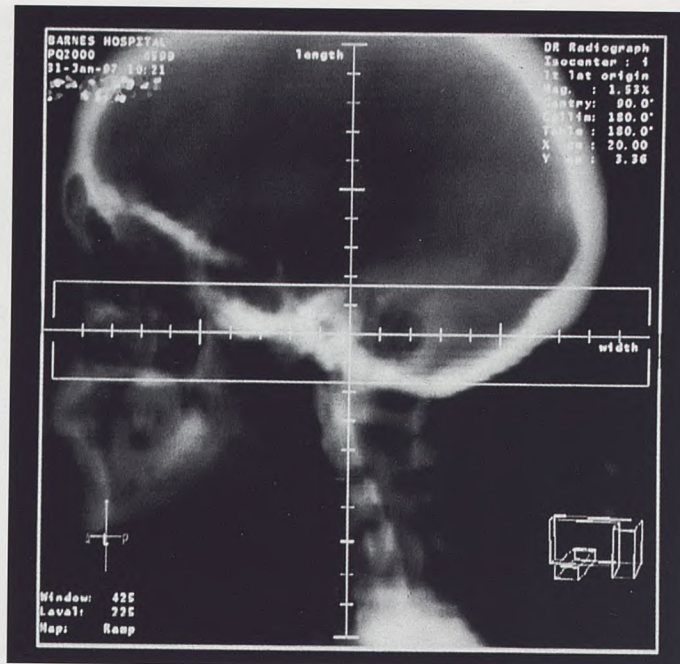
*Radiation therapy  
is one of the crucial  
components of  
multidisciplinary  
treatments for head  
and neck cancers.*

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"The result of our investigation will provide clinical guidance for selecting an effective radiation technique to spare salivary function and, most importantly, it will provide clinicians and patients with the pertinent information regarding the probability of treatment-related xerostomia and a tool to minimize complications," says Chao. "The results of this investigation will pave the way for developing intensity-modulated treatment plans in which dose to the tumor can be escalated with the same or lower probability of normal tissue damage, potentially improving local control and survival and quality of life."

IMRT is most effective when the tumor has a concave or complex three-dimensional shape, is adjacent to healthy surrounding tissue, or wraps around organs at risk. Tumor size is not a major criteria. In IMRT technology, a single accelerator beam has the capacity to function as several individually controlled, smaller beams that can accommodate the different planes

## IMRT



around and within the tumor. These intensity modulated beams can be produced directly through the use of an attached collimator that modulates the beam emitted by an accelerator.

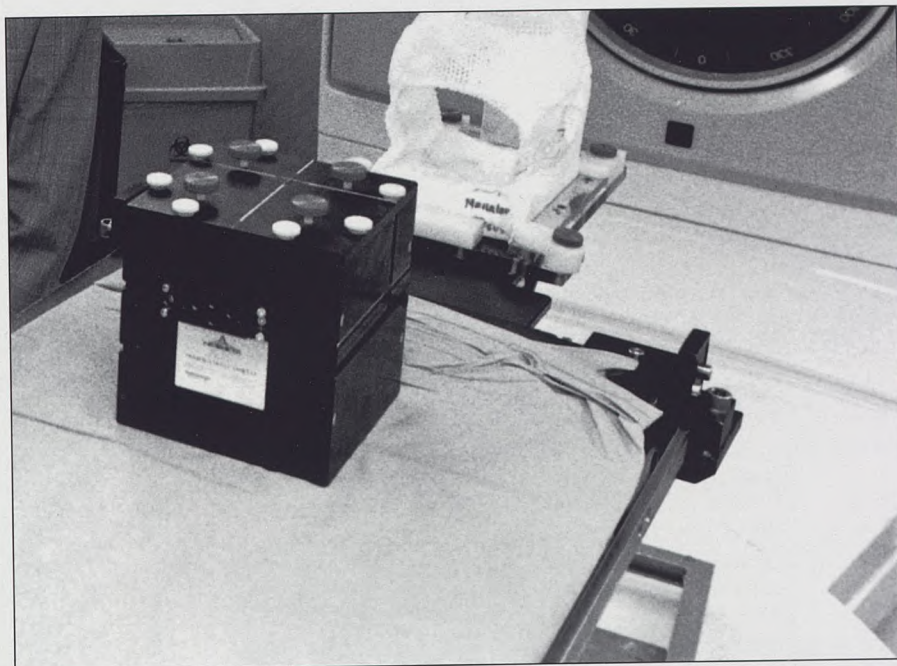
**A**t the Institute, the IMRT system is attached to a low-energy Varian Clinac 6MV analog accelerator. "Dose distribution confirmation is better achieved with low-energy beams, which are, therefore, more appropriate for IMRT," says Daniel Low, PhD, a radiation physicist and one of the study's coinvestigators. His role as physicist is to commission the IMRT treatment planning and delivery, to develop the process for dose distribution optimization and for patient positioning, and to insure dosimetric verification.

**During IMRT, radiation is delivered in minute segments that are continuously reconfigured to allow for tumor variances.**

IMRT uses a mathematical computer model to devise a treatment plan that tailors the dose distribution to the patient's tumor by optimizing the radiation beam intensities (known as inverse treatment planning). The gantry of the IMRT-driven accelerator rotates around the patient in a 360-degree arc, delivering a customized path of radiation all around the patient, as compared with fixed beams or simple rotational arcs used in conventional treatment. The system's computer determines the intensity distribution of the radiation beam during its rotation around the patient.

The IMRT system employs a series of tungsten multileaf collimators, called leaves — a total of 40, arranged in two rows of 20 each — to generate intensity modulated radiation beams. These collimators are pneumatically driven, taking less than one hundred milliseconds to fully open or close. The collimators narrow the beam coming from the accelerator into individually controlled "pencil" beams that create treatment strips of 3.36 centimeters, allowing for no overlap or underlap since even one millimeter variance can result in a 10 percent overdose or underdose. According to Low, at MIR the treatment strips are reduced further to increments of 1.68 centimeters. These beams are delivered slice by slice, similar to the fashion in which computed tomography scans are taken, and are continuously varied during the rotation of the accelerator's gantry.

## IMRT



"The IMRT system is constantly moving," says Chao. "It's very dynamic, allowing different doses from different angles. With IMRT, tumor contour irregularities and tissue inhomogeneities can be considered, and dose shaping within the patient allows for delivery of a curative radiation dose that closely conforms to the defined target volume."

**A**s with any new technology, there are some aspects that must be refined. According to Chao and Low, IMRT is time-consuming, requiring more verification and intense patient cooperation since treatment time currently can take up to twice as long as conventional therapy. "The time factor is

**IMRT tools:** This box-like apparatus is a cubic phantom used to verify dose distribution. Each patient treated for head and neck cancer is fitted with customized gear (white object at top) to insure immobilization during treatment.

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*MIR will provide the first quality assurance guidelines for IMRT head and neck cancer studies.*

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a two-edged sword; additional minutes are required to initiate quality assurance but the end result is a more precise, better controlled treatment," says Low. "In a year or so, treatment should require only fifty percent more time than conventional therapy."

Chao wrote the only protocol to date for IMRT treatment of head and neck cancer, and MIR will provide the first quality assurance guidelines for IMRT head and neck cancer studies. In addition to Chao and Low, coinvestigators for the two-year study are Carlos Perez, MD, director of the Institute's Radiation Oncology Center, who also will be assessing the technology on treatment of prostate cancer; Joseph Simpson, MD, PhD, a radiation oncologist; and radiation physicists James Purdy, PhD; Robert Dryzmala, PhD; and Russell Gerber, MS. **MIR**

## THE DIRECTOR'S OFFICE REPORT

*All Mallinckrodt Institute  
faculty and staff names in  
this section are highlighted  
in boldface type.*

### PROMOTIONS

**Clifford Chao, MD**, instructor in radiology, was promoted to assistant professor of radiology, Radiation Oncology Center.

**Constance Courtois, MD**, instructor in radiology, was promoted to assistant professor of radiology, Division of Diagnostic Radiology.

**Robert Gropler, MD**, assistant professor of radiology, was promoted to associate professor of radiology, Division of Nuclear Medicine.

**Vijay Sharma, PhD**, instructor in radiology, was promoted to research assistant professor, Division of Radiological Sciences.

### JOINT APPOINTMENTS

**Carolyn Anderson, PhD**, assistant professor of radiology, received a joint appointment as assistant professor of biomedical sciences.

**Assen Kirov, PhD**, instructor of radiology, received a joint appointment as adjunct instructor of physics.

### NEW FACULTY

**Andrew Fisher, MD**, instructor in radiology, musculoskeletal radiology, Division of Diagnostic Radiology.

**Fiorenza Ianzini, PhD**, research instructor in radiology, cancer biology, Radiation Oncology Center.

### FIRST-YEAR FELLOWS

**John Alfieri, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He received an undergraduate degree from the University of Pennsylvania, Philadelphia, and a medical degree from Hahnemann University, Philadelphia. Alfieri completed a diagnostic radiology residency at Allegheny General Hospital, Pittsburgh, Pennsylvania.

**Lefian Alotaibi, MD**, instructor in radiology, is a fellow in pediatric radiology. He received a premed and a medical degree from the University of Saudi Arabia, Riyadh. Alotaibi completed a diagnostic radiology residency at Massachusetts General Hospital, Boston.

**Dwayne Anderson, MD**, instructor in radiology, is a fellow in neuroradiology. He received an undergraduate degree from the University of Western Ontario, London, Ontario, Canada, and a medical degree from the Medical College of Pennsylvania, Philadelphia. Anderson completed an internship at Alton Ochsner Medical Foundation and a four-year diagnostic radiology residency at Tulane University, New Orleans, Louisiana.

**Ty Bae, MD, PhD**, instructor in radiology, is a fellow in chest radiology. He completed four years of training in diagnostic radiology and one year in radiology research at Mallinckrodt Institute of Radiology.

**Scott Beasley, MD**, instructor in radiology, is a fellow in abdominal radiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**James Blechman, MD**, instructor in radiology, is a fellow in abdominal radiology. He received an undergraduate degree from Rutgers University, New Brunswick, New Jersey, and a medical degree from New Jersey Medical School, Newark. He completed a radiology residency at Bridgeport Hospital, Bridgeport, Connecticut.

**Maria Chong, MD**, instructor in radiology, is a fellow in abdominal radiology. She received an undergraduate degree from Indiana University, Bloomington, and a medical degree from the University of Washington, Seattle. She completed an internship and a radiology residency at the University of Washington, Seattle.

**Laurie Cleland, MD**, instructor in radiology, is a fellow in breast imaging. She received an undergraduate degree from Stanford University, Stanford, California, and a medical degree from Oregon Health Sciences University, Portland. Cleland completed a general surgery internship and a diagnostic radiology residency at Oregon Health Sciences University.

**David Feinberg, MD, PhD**, instructor in radiology, is a fellow in neuroradiology. He received a Bachelor of Science, a Master of Science, and a doctorate degree from the University of California, Berkeley, and a medical degree from the University of Miami School of Medicine, Miami, Florida. Feinberg completed one year of training in diagnostic radiology at Brigham and Women's Hospital, Cambridge, Massachusetts, and a three-year diagnostic radiology residency at New York University Medical Center, New York City. He completed a one-year research fellowship in neurosurgery at Harvard Medical School, Cambridge, Massachusetts.

**Harold Goldberg, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He received an undergraduate degree from the University of Pennsylvania, Philadelphia, and a medical degree from the University of Maryland, College Park. Goldberg completed an internship at Mercy Medical Center, Baltimore, Maryland, and a diagnostic radiology residency at Duke University Medical Center, Durham, North Carolina.

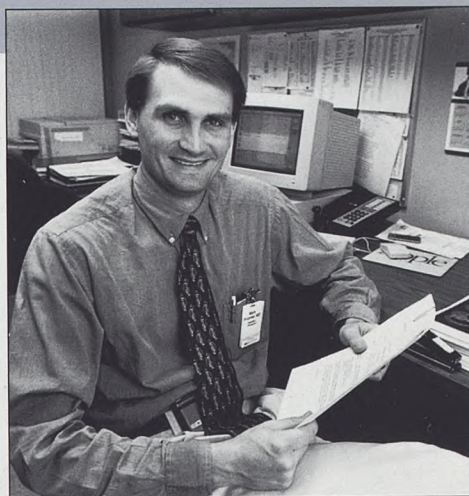
**Cole Graham, MD**, instructor in radiology, is a fellow in neuroradiology. He received an undergraduate degree from Duke University, Durham, North Carolina, and a medical degree from the University of North Carolina, Chapel Hill. Graham completed an internship at Medical College of Virginia Hospital, Richmond, and a radiology residency at Medical College of Virginia/Virginia Commonwealth University, Richmond.

**Daniel Hassell, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**Donald Heck, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He completed four years of training in diagnostic radiology (cochief resident, 1996-1997) at Mallinckrodt Institute of Radiology.

**Noah Jaffee, MD**, instructor in radiology, is a fellow in musculoskeletal radiology. He received an undergraduate degree from Tulane University, New Orleans, Louisiana, and a medical degree from Baylor College of Medicine, Waco, Texas. Jaffee completed an internship at Presbyterian/St. Luke's Medical Center, Boulder, Colorado, and a diagnostic radiology residency at the University of Oklahoma, Oklahoma City.

**George Kimbiris, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He received an undergraduate



## Diagnostic Radiology

Mark Fromke, MD, and Sandy Ruhs, MD, are the diagnostic radiology chief residents for 1997-1998. They joined the Institute's Diagnostic Radiology Residency Program as first-year postgraduates in 1994.

degree from Villanova University, Villanova, Pennsylvania, and a medical degree from Hahnemann University, Philadelphia, Pennsylvania. Kimbiris completed a diagnostic radiology residency at Hahnemann University.

**Debra Lau, MD**, instructor in radiology, is a fellow in pediatric radiology. She completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**Edmund Lee, MD**, instructor in radiology, is a fellow in musculoskeletal radiology. He received an undergraduate degree from the University of California, Berkeley, and a medical degree from the University of California, San Diego. Lee completed an internal medicine internship at Presbyterian/St. Luke's Medical Center, Boulder, Colorado, and a diagnostic radiology residency at the University of Colorado, Boulder.

**David Leifer, MD**, instructor in radiology, is a fellow in abdominal radiology. He received an undergraduate degree from the University of Chicago and a medical degree from Pritzker School of Medicine, Chicago, Illinois. Leifer completed a diagnostic radiology residency at the University of Texas Southwestern Medical Center, Dallas.

**Eugene Lin, MD**, instructor in radiology, is a fellow in abdominal radiology. He received an undergraduate degree and a medical degree from Northwestern University, Evanston, Illinois. Lin completed a diagnostic radiology residency at Saint Louis University, St. Louis, Missouri, and a one-year fellowship in nuclear medicine at the University of Pennsylvania, Philadelphia.

**Robert McKinstry, MD**, instructor in radiology, is a fellow in neuroradiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**Paul Malcolm, MD**, instructor in radiology, is a fellow in magnetic resonance imaging. He received an undergraduate degree and a medical degree from King's College, London, England.

**Santiago Miro, MD**, instructor in radiology, is a fellow in chest radiology. He received an undergraduate degree and a medical degree from the University of Montreal, Quebec, Canada. Miro completed a one-year internship and a four-year radiology residency at the University of Montreal Hospitals.

**Vamsidhar Narra, MD**, instructor in radiology, is a fellow in magnetic resonance imaging. He received an undergraduate degree from St. Joseph Junior College, Hyderabad City, India, and a medical degree from Osmania University, Hyderabad City, India. Narra completed an internship at Osmania General Hospital, Hyderabad City, India, and a diagnostic radiology residency at Michigan State University, East Lansing.

## THE DIRECTOR'S OFFICE REPORT

*Continued from page 17*

**Ali Shaibani, MD**, instructor in radiology, is a fellow in neuroradiology. He received an undergraduate degree from Youngstown State University, Youngstown, Ohio, and a medical degree from Northeastern Ohio University College of Medicine, Rootstown, Ohio. Shaibani completed an internship at Akron City Hospital, Akron, Ohio, and a radiology residency at University of Pittsburgh Medical Center, Pittsburgh, Ohio.

**Joseph Steele, MD**, instructor in radiology, is a fellow in vascular and interventional radiology. He received an undergraduate degree from Rice University, Houston, Texas, and a medical degree from the University of Texas Southwestern Medical School, Dallas. Steele completed a radiology residency at Parkland Hospital, Dallas, Texas.

**Felix Song, MD**, instructor in radiology, is a fellow in neuroradiology. He completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**Katy Vo, MD**, instructor in radiology is a fellow in neuroradiology. She received an undergraduate degree from Massachusetts Institute of Technology, Cambridge, and a medical degree from Cornell University Medical College, Ithaca, New York. Vo completed an internship at New York University Medical Center, New York City, and a radiology residency at Thomas Jefferson University

Hospital, Philadelphia, Pennsylvania.

### FIRST-YEAR DIAGNOSTIC RADIOLOGY RESIDENTS

**Lorin Broadbent, MD**, assistant in radiology, received an undergraduate degree from Weber State University, Ogden, Utah, and a medical degree from the University of Utah School of Medicine, Salt Lake City. He completed a general surgery internship at the Mayo Graduate School of Medicine, Rochester, Minnesota.

**Christine Etnyre, MD**, assistant in radiology, received an undergraduate degree from the University of Texas, Austin, and a medical degree from the University of Illinois, Urbana. She completed a one-year transitional internship at Oakwood Hospital Medical Center, Dearborn, Michigan.

**Daniel Fullmer, MD**, assistant in radiology, received an undergraduate degree from Brigham Young University, Provo, Utah, and a medical degree from the University of Utah, Salt Lake City. He completed a family practice residency at Baptist Medical Center, Kansas City, Missouri.

**Craig Hamasaki, MD**, assistant in radiology, received an undergraduate degree and a medical degree from the University of Hawaii, Manoa. He completed a University of Hawaii Integrated Transitional Internship at several hospitals in Honolulu, Hawaii.

**Donald Johann, MD**, assistant in radiology, received an undergraduate degree from Fordham University, Bronx, New York, and a medical degree from Case Western Reserve University, Cleveland, Ohio. He completed an internship at University Hospitals of Cleveland and a neurosurgery residency at New York University, New York City.

**Faraz Khan, MD**, assistant in radiology, received an undergraduate degree from Rensselaer Polytechnic Institute, Troy, New York, and a medical degree from the University of Texas, Houston. He completed a one-year transitional internship at the University of Texas, Houston.

**Lori Kunzelman, MD**, assistant in radiology, received an undergraduate degree from Southern Illinois University, Edwardsville, and a medical degree from Washington University, St. Louis, Missouri. She completed an internal medicine internship at Barnes-Jewish Hospital, St. Louis, Missouri.

**Brian Lawner, MD**, assistant in radiology, received an undergraduate degree from Duke University, Durham, North Carolina, and a medical degree from Washington University, St. Louis, Missouri. He completed an otolaryngology residency at Barnes-Jewish Hospital, St. Louis, Missouri.

**Scott Lee, MD**, assistant in radiology, received an undergraduate degree from Harvard University, Cambridge, Massachusetts, and a medical degree from Washington University, St. Louis, Missouri. He completed an internal medicine internship at the University of Michigan Medical Center, Ann Arbor.

**Paul Licata, MD**, assistant in radiology, received an undergraduate degree from Yale University, New Haven, Connecticut, and a medical degree from New York University, New York City. He completed an internal medicine internship at St. Vincent's Hospital, New York City.

**John Lim, MD**, assistant in radiology, received an undergraduate degree from Stanford University, Stanford, California, and a medical degree from Washington University, St. Louis, Missouri. He completed an internal medicine internship at Barnes-Jewish Hospital, St. Louis, Missouri.

**Reginald Pareja, MD**, assistant in radiology, received an undergraduate degree and a medical degree from the University of Michigan, Ann Arbor. He completed an ophthalmology residency at Wayne State University, Detroit, Michigan.

**Eliza Shin, MD**, assistant in radiology, received an undergraduate degree from Williams College, Williamstown, Massachusetts, and a medical degree from Northwestern University, Evanston, Illinois. She completed a urology residency at Northwestern University.

**Huy Tran, MD**, assistant in radiology, received an undergraduate degree and a medical degree from Tulane University, New Orleans, Louisiana. He completed an internal medicine internship at Alton Ochsner Medical Foundation, New Orleans, Louisiana.

**Theodore Vander Velde, MD**, assistant in radiology, received an undergraduate degree from Calvin College, Grand Rapids, Michigan, and a medical degree from Wayne State University, Detroit, Michigan. He completed a surgery internship and a surgery residency at Barnes-Jewish Hospital, St. Louis, Missouri.

### FIRST-YEAR NUCLEAR MEDICINE TRAINEES

**David Hillier, MD**, assistant in radiology, completed four years of training in diagnostic radiology at Mallinckrodt Institute of Radiology.

**Matthew Jakasha, MD**, assistant in radiology, received an undergraduate degree and a medical degree from Creighton University, Omaha, Nebraska. He completed a diagnostic radiology residency at the University of New Mexico, Albuquerque.

**Lisa Oakley, MD**, assistant in radiology, received an undergraduate degree from Stanford University, Stanford, California, and a medical degree from Duke University, Durham, North Carolina. She completed an internship at St. John's Mercy Medical Center, St. Louis, Missouri, and a diagnostic radiology residency at the University of California, San Diego.

**Michael Quinn, MD**, assistant in radiology, received an undergraduate degree from the College of the Holy Cross, Worcester, Massachusetts, and a medical degree from Albany Medical College, Albany, New York. He completed a diagnostic radiology residency at the University of New Mexico Health Sciences Center, Albuquerque.

**Stephanie Yen, MD**, assistant in radiology, received an undergraduate degree from Dartmouth College, Hanover, New Hampshire, and a medical degree from Duke University, Durham, North Carolina. She completed an internal medicine internship at Beth Israel Hospital, Boston, Massachusetts, and a diagnostic radiology residency at Duke University.

### FIRST-YEAR RADIATION ONCOLOGY RESIDENTS

**Joseph Aronovitz, MD, PhD**, assistant in radiology, received an undergraduate degree from Harvard University, Cambridge, Massachusetts, and a doctorate and a medical degree from Washington University, St. Louis, Missouri.

**Morris Chang, MD**, assistant in radiology, received an undergraduate degree and a medical degree from the University of Kansas, Lawrence. He completed an internal medicine internship at the University of Vermont, Burlington, and a neurology residency at Dartmouth University's Hitchcock Medical Center, Hanover, New Hampshire.

**Jason Cheng, MD**, assistant in radiology, received an undergraduate and a medical degree from the University of Taipei, Taiwan, Republic of China. He completed an internship and a three-year radiation oncology residency at Veteran's General Hospital, Kaohsiung, Taiwan, Republic of China.

**Todd Doyle, MD**, assistant in radiology, received an undergraduate degree from Union College, Schenectady, New York, and a medical degree from Albany Medical College, Albany, New York.

**Imran Zoberi, MD**, assistant in radiology, received an undergraduate degree from the University of South Dakota, Vermillion, and a medical degree from Washington University, St. Louis, Missouri.

### OFF STAFF

**Mary Alderman, MD**, instructor in radiology, completed four years of training in diagnostic radiology and a one-year fellowship in vascular and interventional radiology. She has accepted a position with Gainesville Radiology Group, Gainesville, Florida.

**Martin Anbari, MD**, assistant in radiology, completed four years of training in diagnostic radiology and has accepted a position with the Cleveland Clinic Foundation, Cleveland, Ohio.

**Robert Buse, MD**, instructor in radiology, completed a one-year fellowship in neuroradiology and has entered private practice in Louisville, Kentucky.

**John Butman, MD, PhD**, assistant in radiology, completed four years of training in diagnostic radiology and has received a fellowship in neuroradiology at the University of New Mexico School of Medicine, Albuquerque.

**Serge Djukic, MD**, instructor in radiology, completed a one-year fellowship in neuroradiology and has entered private practice in Tampa, Florida.

**James Duncan, MD, PhD**, assistant professor of radiology and of cell biology and physiology, Division of Diagnostic Radiology, has accepted a position with Radiology Associates of Pensacola, Florida.

**Richard Edelstein, MD**, instructor in radiology, completed a four-year diagnostic radiology residency and a one-year fellowship in vascular and interventional radiology. He has entered private practice in Boynton Beach, Florida.

**Matthew Fleishman, MD**, instructor in radiology, completed a four-year diagnostic radiology residency and a one-year fellowship in chest radiology. He has accepted a position with Radiology Imaging Associates, Englewood, Colorado.

**Jeffrey Friedland, MD**, instructor in radiology, completed a four-year diagnostic radiology residency and a one-year fellowship in pediatric radiology. He has accepted a position in pediatric radiology at Phoenix Children's Hospital, Phoenix, Arizona, and a position in adult radiology at Good Samaritan Regional Medical Center, Phoenix, Arizona.

**David Gius, MD, PhD**, assistant in radiology, completed three years of residency and a one-year fellowship in radiation oncology. He has accepted a position with Mallinckrodt Institute of Radiology.

**Brigid Gordon, MD**, assistant in radiology, completed one year of training in nuclear medicine and has accepted a position with Jersey Shore Medical Center, Neptune, New Jersey.

**Rachel Gordon, MD**, instructor in radiology, completed a two-year fellowship in neuroradiology and has accepted a position with Tower Imaging, Los Angeles, California.

## THE DIRECTOR'S OFFICE REPORT

*Continued from page 19*

**Edward Grishaw, MD**, assistant in radiology, completed one year of training in nuclear medicine and has accepted a position with Rutherford Radiological, Rutherfordton, North Carolina.

**Glenn Hammer, MD**, instructor in radiology, completed a two-year fellowship in neuroradiology and has accepted a position with Cedar Rapids Radiologists, PC, Cedar Rapids, Iowa.

**John Healey, MD**, assistant in radiology, completed four years of training in diagnostic radiology and has received a fellowship in magnetic resonance imaging at the Baylor University Medical Center, Dallas, Texas.

**Rexford Hill, MS**, associate professor of radiology, computer section, Division of Diagnostic Radiology.

**Paul Hsieh, MD**, assistant professor of radiology, Division of Diagnostic Radiology, has accepted a position with Kaiser Permanente, San Diego, California.

**William James, MD**, assistant in radiology, completed four years of training in diagnostic radiology and has accepted a position with Mallinckrodt Institute of Radiology.

**Anton Johnson, MD**, assistant in radiology, completed one year of training in nuclear medicine and has accepted a position with St. John's Hospital, Springfield, Illinois.

**David Linkous, MD**, instructor in radiology, completed a one-year fellowship in musculoskeletal radiology and has accepted a position with Caritas Medical Center, Louisville, Kentucky.

**Eric Malden, MD**, instructor in radiology, completed four years of training in diagnostic radiology and a one-year fellowship in vascular and interventional radiology. He has accepted a position with Mallinckrodt Institute of Radiology.

**James Milburn, MD**, instructor in radiology, completed a two-year fellowship in neuroradiology and has accepted a position with St. John's Mercy Medical Center, St. Louis, Missouri.

**Randolph Pawluk, MD**, instructor in radiology, completed a one-year fellowship in magnetic resonance imaging and has accepted a position with Texas Tech University Health Sciences Center, Lubbock.

**Steven Roth, MD**, assistant in radiology, completed a four-year diagnostic radiology residency.

**Rory Satterfield, MD**, instructor in radiology, completed a four-year diagnostic radiology residency and a one-year fellowship in abdominal radiology. He has accepted a position with Valley Memorial Hospital, Livermore, California.

**Michele Semin, MD**, instructor in radiology, completed four years of training in diagnostic radiology and a one-year fellowship in abdominal radiology. She has accepted a position with Radiology Associates of Nashville, PC, and with Baptist Hospital, Nashville, Tennessee.

**Farid Shafaie, MD**, instructor in radiology, completed a one-year fellowship in neuro-radiology and has accepted a position with Mallinckrodt Institute of Radiology.

**Mel Sharafuddin, MD**, instructor in radiology, completed a one-year fellowship in vascular and interventional radiology and has accepted a position with University of Iowa Hospital and Clinics, Iowa City.

**John Sunderland, MD**, assistant in radiology, completed four years of training in diagnostic radiology and has received a fellowship in vascular and interventional radiology, Alexandria Hospital, Alexandria, Virginia.

**Alfred Tinger, MD**, assistant in radiology and chief resident, Radiation Oncology Center, 1996-1997, completed three years of residency and a one-year fellowship in radiation oncology. He has accepted a position with Westchester Regional Radiation Therapy, Yonkers, New York.

**Leland Tsao, MD**, instructor in radiology, completed a one-year fellowship in magnetic resonance imaging and has accepted a position with Hill Radiology Associates, Nashville, Tennessee.

**Michael Vannier, MD**, professor of radiology, Division of Radiological Sciences, has accepted a position with the University of Iowa, Iowa City.

**Farrel VanWagenen, MD**, instructor in radiology, completed four years of training in diagnostic radiology (cochief resident, 1995-1996) and a one-year fellowship in vascular and interventional radiology. He has accepted a position with Colorado Springs Radiologists PC, Colorado Springs, Colorado.

**Thomas Vaughan, MD**, assistant in radiology and cochief resident, Division of Diagnostic Radiology, 1996-1997, completed a four-year diagnostic radiology residency. He has received a fellowship in neuroradiology, University of Washington School of Medicine, Seattle.

**Richard Wagman, MD**, assistant in radiology, completed three years of residency in radiation oncology.

**Samuel Wang, MD**, assistant in radiology, completed two years of training in nuclear medicine and has accepted a position with University Hospital and the New Jersey Medical School, Newark, New Jersey.

**Scott Werden, MD**, assistant in radiology, completed four years of training in diagnostic radiology.

**Clark West, MD**, assistant professor of radiology, Division of Diagnostic Radiology, has accepted a position with Hermann Hospital, University of Texas Medical Center, Houston.

**Steven Winn, MD**, instructor in radiology, completed three years of training in diagnostic radiology and a one-year fellowship in abdominal radiology. He has accepted a position with Association of Alexandria Radiologists, Alexandria, Virginia.

**Louis Winner, MD**, assistant in radiology, completed one year of training in nuclear medicine and has

accepted a position with Lima Memorial Hospital, Lima, Ohio.

**Robert Wissman, MD**, instructor in radiology, completed a one-year fellowship in musculoskeletal radiology and has accepted a position with Diagnostic Clinics, Largo, Florida.

**Darryl Zuckerman, MD**, assistant professor of radiology, Division of Diagnostic Radiology.

## APPOINTMENTS/ ELECTIONS

**Carolyn Anderson, PhD**, assistant professor of radiology, was elected to a two-year term on the Board of Directors of the Radiopharmaceutical Science Council of the Society of Nuclear Medicine.

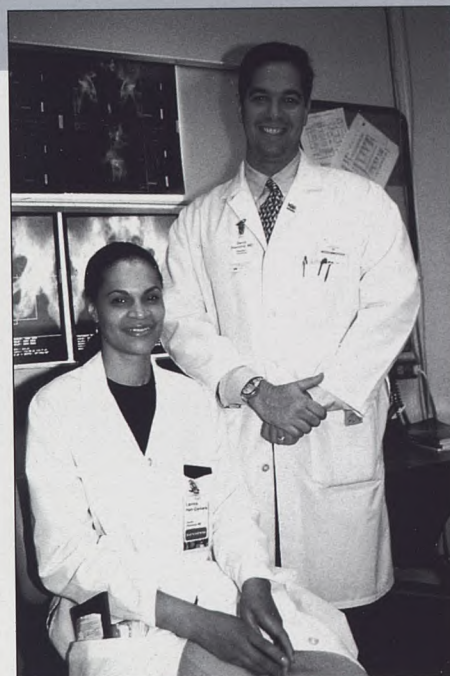
**Jeffrey Brown, MD**, associate professor of radiology, director of clinical research, and codirector of magnetic resonance imaging, was elected to the Board of Directors of the Missouri Radiological Society. He was appointed to a two-year term on the Board of Trustees of the International Society for Magnetic Resonance in Medicine and was appointed as a member of the Society's Publications Committee.

**Steven Don, MD**, assistant professor of radiology, was appointed to The Society for Pediatric Radiology Committee on Medical Informatics.

**Charles Hildebolt, DDS, PhD**, associate professor of radiology, was appointed as local arrangements chairman for the Sixty-sixth Annual Meeting of the American Association of Physical Anthropologists (AAPA). He was appointed to the Editorial Board of *Dentomaxillofacial Radiology*.

**Annette Johnson, MD**, instructor in radiology, was elected as a junior member of the American Society of Neuroradiology.

**William Mehard, MD**, assistant professor of radiology, was elected chairman of the Membership Committee of the Greater St. Louis Society of Radiologists.



## Radiation Oncology

Lannis Hall-Daniels, MD, and David Diamond, MD, are the 1997-1998 radiation oncology chief residents. Prior to their residencies at Mallinckrodt Institute, Hall-Daniels completed a surgical internship and a surgical residency at Howard University Medical Center and Diamond completed a one-year internship at Yale-New Haven Hospital.

**Jeff Michalski, MD**, assistant professor of radiology, was appointed to the Radiation Oncology and Radiobiology Subcommittee of the Program Committee for the Radiological Society of North America and was appointed as cochairman of the Radiation Therapy Oncology Group's 3-D Committee.

**Scott Mirowitz, MD**, associate professor of radiology, radiologist-in-chief at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, was appointed to a three-year term on the Finance Committee of the Association of University Radiologists and to a three-

year term on the Executive Committee of the Washington University Medical Center Alumni Association. He was appointed to the Missouri Regent's Advisory Council of the American College of Healthcare Executives and to the International Consultant Board for the *Argentine Journal of Radiology*.

**Joseph Roti Roti, PhD**, professor of radiology, associate director of the Radiation Oncology Center, and chief of cancer biology, was appointed as chairman and organizer of the Biology/Chemistry Symposium 1 for the 1997 North American Hyperthermia Society meeting held in May at Providence, Rhode Island.

## APPOINTMENTS/ ELECTIONS

*Continued from page 21*

**Henry Royal, MD**, professor of radiology and associate director of the Division of Nuclear Medicine, was appointed by the U.S. Department of Veterans' Affairs as a member of the Veterans' Advisory Committee on Environmental Hazards.

**Peter Shile, MD**, assistant professor of radiology and of medicine, was appointed to the Clinical Research Advisory Council of ECRI, the world's leading independent organization for the assessment, evaluation, and continued improvement of healthcare technology. He was appointed as an ad hoc reviewer for the Agency for Health Care Policy and Research, the Food and Drug Administration's Center for Devices and Radiological

Health, and the National Institutes of Health's Diagnostic Radiology Study Section.

**Jerold Wallis, MD**, associate professor of radiology, was elected to the Board of Governors of the Computer and Instrumentation Council of the Society of Nuclear Medicine. He was appointed to the Society of Nuclear Medicine's Committee on Computer Technology Assessment.

**Franz Wippold, MD**, associate professor of radiology, was elected as member-at-large of the Washington University Faculty Senate Council. He was appointed to the Washington University Advisory Committee on Tenure and Academic Freedom.

**David Gierada, MD**, assistant professor of radiology, as principal investigator, received the 1997 Clinical Research Grant from the American Lung Association of Eastern Missouri. The \$50,000 grant will support the research project "Standardized computed tomography quantitation of emphysema." Coinvestigators for the two-year grant are **Thomas Pilgram, PhD**, instructor in radiology; **Richard Slone, MD**, assistant professor of radiology; **Ty Bae, MD, PhD**, research fellow in radiology; **Stuart Sagel, MD**, professor of radiology; **Stephen Lefrak, MD**, Division of Pulmonary and Critical Care Medicine; **Roger Yusen, MD**, Division of Pulmonary and Critical Care Medicine; and **Joel Cooper, MD**, Division of Cardiothoracic Surgery.

**Assen Kirov, PhD**, instructor of radiology, received a \$9,998 departmental seed grant from the Radiation Oncology Center for "Development of three-dimensional scintillation dosimetry method using tomographic reconstruction."

**Michael Mackey, PhD**, assistant professor of radiology, as principal investigator, received a \$700,882 grant from the National Institutes of Health for research on "Mechanisms of radiosensitization by moderate hyperthermia." Coinvestigator is **Fiorenza Ianzini, PhD**, research instructor in radiology.

**David Piwnica-Worms, MD, PhD**, associate professor of radiology and of molecular biology and pharmacology, and chief of the molecular radiopharmacology

laboratory, as principal investigator, received a three-year grant in the amount of \$843,000 from the United States Department of Energy for research on "Targeting multidrug resistance with metal complexes." Coinvestigators are **Vijay Sharma, PhD**, research assistant professor; **Vallabhaneni Rao, PhD**, instructor in radiology; **Carolyn Crankshaw, MS**, research assistant in radiology; **Julie Dahlheimer**, medical research technician; **Gary Luker, MD**, instructor in radiology; **Kathryn Luker, PhD**, research associate in radiology; and **Valery Polyakov, PhD**, research associate in radiology.

**Joseph Roti Roti, PhD**, professor of radiology, associate director of the Radiation Oncology Center, and chief of cancer biology, as principal investigator, received a \$4.5 million program project grant from the National Institutes of Health for research on "Cellular stress response and radiosensitivity." Project leaders for the five-year grant are **Clayton Hunt, PhD**, assistant professor of radiology; **John-Stephen Taylor, PhD**, Department of Chemistry; **William Wright, BS**, research assistant in radiology; **Andrei Laszlo, PhD**, associate professor of radiology; **Ryuji Higashikubo, PhD**, assistant professor of radiology; **Michael Mackey, PhD**, assistant professor of radiology; **Douagls Spitz, PhD**, assistant professor of radiology; and **Peggy Lentz**, division administrator. Coinvestigators are **Ming-shun Chen, PhD**, instructor in radiology, and **Robert Malyapa, MD, PhD**, instructor in radiology.

## FELLOWSHIPS/ GRANTS

**Thomas Conturo, MD, PhD**, assistant professor of radiology and adjunct assistant professor of physics, received a one-year internal grant for \$17,500 from Mallinckrodt Institute for the research project "Development and evaluation of MR methodologies for imaging organ perfusion."

**David Diamond, MD**, assistant in radiology, received a \$9,778 resident research/institutional seed grant from the Radiation Oncology Center for "Endoluminal irradiation of newly-created PTFE hemodialysis grafts: effect on cellular proliferation and intermediate-team safety."

**Peter Shile, MD**, assistant professor of radiology and of medicine, as principal investigator, received a \$40,000 Mallinckrodt Institute Research Fund grant to study "Optimizing mass conspicuity in dense breast parenchyma in digitally acquired mammograms." As coinvestigator, he received a one-year grant in the amount of \$76,215 from the American Cancer Society for "Development, evaluation, and piloting a professional education program for radiologists and referring physicians on the ACR Breast Imaging and Reporting Data System (BI-RADS)."

**Sharlene Teefey, MD**, associate professor of radiology, received a one-year grant from the Society of Gastrointestinal Radiologists in the amount of \$15,000 for research on "Sonographic evaluation of non-occlusive ischemic colitis: an animal model."

**Michael Welch, PhD**, professor of radiology, of chemistry, and of molecular biology and pharmacology, and codirector of the Division of Radiological Sciences, as principal investigator, received a \$1,492,749 grant from the National Cancer Institute for research on "Targeted metal chelators for diagnostic imaging." Coinvestigators for the five-year grant are **Carolyn Anderson, PhD**, assistant professor of radiology; **Thomas Conturo, MD, PhD**, assistant professor of radiology; **David Reichert, PhD**, research instructor in radiology; and **Judith Connert, PhD**, Department of Surgery.

## HONORS/ AWARDS

**Duffy Cutler, PhD, DABR**, assistant professor of radiology, received Board Certification in Nuclear Medicine Physics from the American Board of Radiology.

**David Gierada, MD**, assistant professor of radiology; **Richard Slone, MD**, assistant professor of radiology; **Ty Bae, MD, PhD**, research fellow in radiology; **Roger Yusem, MD**, Division of Pulmonary and Critical Care Medicine; **Stephen Lefrak, MD**, Division of Pulmonary and Critical Care Medicine; and **Joel Cooper, MD**, Division of Cardiothoracic Surgery, received a 1997 Cum Laude Award from the Society of Computed Body Tomography and Magnetic Resonance Imaging. The award was presented in April for the research project "Quantitative assessment of emphysema to predict outcome following lung volume reduction surgery."

**Scott Mirowitz, MD**, associate professor of radiology, radiologist-in-chief at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, was a member of the first graduating class to receive a Masters Degree in Medical Management from the Department of Health Systems Management, Tulane University School of Public Health and Tropical Medicine. An additional honor: After he fulfilled the requirements for advanced education and professional experience and successfully completed the written and oral board examinations in healthcare management, Mirowitz was named a diplomate of the American College of Healthcare Executives.

## LECTURES/ PRESENTATIONS

**Carolyn Anderson, PhD**, assistant professor of radiology and of biomedical sciences, presented "Copper-64-labeled octreotide for imaging and therapy" at the University of Alabama, Birmingham, March 21, and at Hammersmith Hospital, London, England, June 24.

**Walter Bosch, DSc**, instructor in radiology, as invited lecturer, spoke on "A database for 3D radiation therapy" at the XXVth Proton Therapy Collaborative Oncology Group meeting, Boston, Massachusetts, May 1. He presented "An image/clinical database for multi-institutional clinical trials in 3D conformal radiation therapy" at the XIIth International Conference on the Use of Computers in Radiation Therapy, Salt Lake City, Utah, May 30.

**Jeffrey Brown, MD**, associate professor of radiology, director of clinical research, and codirector of magnetic resonance imaging, presented "MR contrast use in the liver and biliary system" and "MR contrast use in the abdomen and pelvis excluding the hepatobiliary system" at the Symposium on MR Contrast in Abdominal Imaging, Chicago, Illinois, May 3.

**Clifford Chao, MD**, assistant professor of radiology, as visiting professor, presented "Radiation therapy for cervical cancer — the MIR experience" and "IMRT for head & neck cancer" at the University of Iowa, Iowa City, April 24 and 25. He spoke on "Abdominal-pelvic

irradiation for epithelial ovarian cancer — the impact of treatment technique" at The American Radium Society Annual Meeting, New York City, New York, May 3.

**Carmen Dence, MS**, instructor in radiology, spoke on "Production and clinical use of radiopharmaceuticals labeled with Carbon-11: an overview of some problems and solutions" at the National Institute of Nuclear Physics, National Laboratory of Legnaro in cooperation with the University of Padova, Padova, Italy, June 25.

**Colin Derdeyn, MD**, assistant professor of radiology, presented "Temporal stability of hemodynamic stage in patients with carotid occlusion" at Brain '97, Baltimore, Maryland, June 16.

**Steven Don, MD**, assistant professor of radiology, presented "Computed chest radiographs: the effects of coning, positioning, and markers on image processing" and "Workstation design" at the Society for Pediatric Radiology, St. Louis, Missouri, May 15 - 18.

**Louis Gilula, MD**, professor of radiology and chief of musculoskeletal radiology, spoke on "Roentgenographic approach to wrist pain" at the Klinik für Diagnostische Radiologie und Neuroradiologie, Augsburg, Germany, May 20. He presented "Plain film evaluation of the wrist: Still the cornerstone?" and "Wrist arthrography: Do we still need it?"

## LECTURES/ PRESENTATIONS

*Continued from page 23*

at the Symposium on Trauma and Degeneration of Skeleton, Hamburg, Germany, May 24. Gilula spoke on "CT of the ankle and foot," "MRI of the ankle and foot," and "Less commonly known entities that imagers should know about the wrist and hand" at the Course on Musculoskeletal Radiology: Diagnostic Update, Brescia, Italy, May 26.

**Harvey Glazer, MD**, professor of radiology, presented "CT of pulmonary collapse" at the Society of Computed Body Tomography and Magnetic Resonance Annual Meeting, Washington, DC, April 14.

**Mary Graham, MD**, assistant professor of radiology, as invited professor, spoke on "3D therapy for lung cancer" and "Treatment options for non-small cell lung cancer" at the European Cancer Commission, Amsterdam, Holland, May 12 - 16.

**Perry Grigsby, MD, MBA**, professor of radiology, presented "Cervix: role of irradiation" at the Seminar on Common Cancers: Prevention, Detection and Therapy, St. Louis, Missouri, April 25.

**William Harms, BS**, instructor in radiology, spoke on "Evaluation of commercially available 3DRTP systems" and "Technical requirements for participating in 3DCRT multi-institutional clinical trials" at the American College of Medical Physics Annual Meeting, Lake Tahoe, Nevada, June 11.

**Jay Heiken, MD**, professor of radiology, chief of abdominal radiology, and codirector of body computed tomography, presented "Can we reduce contrast volume using helical CT?" and "Characterizing liver lesions: CT and MR" at the Twentieth Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Washington, DC, April 14 - 18. As visiting professor, he spoke on "CT of the aorta: rupture, dissection and the postoperative patient" and "Characterization of hepatic masses with CT and MRI" at Yale University School of Medicine, New Haven, Connecticut, May 22. Heiken presented "Spiral CT of the abdomen: practical considerations for contrast administration and scan timing," "Spiral CT of the kidneys," and "Spiral CT of hepatic neoplasms" at Advanced Topics in CT with Emphasis on Spiral CT, sponsored by the Department of Radiology, Johns Hopkins Medical Institutions, Santa Fe, New Mexico, July 24 - 27.

**Charles Hildebolt, DDS, PhD**, associate professor of radiology, presented "Alveolar bone loss: associations with clinical, demographic and dietary variables in postmenopausal women" at the Sixty-sixth Annual Meeting of the American Association of Physical Anthropologists, St. Louis, Missouri, April 1 - 5. He spoke on "Alveolar bone loss and bone dentistry in

postmenopausal women" at the 75th General Session of the International Association of Dental Research, Orlando, Florida, April 20. Hildebolt presented "Radiographic measurements from the cemento-enamel junction to the alveolar crest in postmenopausal women: relationships with clinical, dietary, and demographic variables" at the 11th Congress of the International Association of Dentomaxillofacial Radiology and the 3rd International Congress and Exposition on Computed Maxillofacial Imaging, Louisville, Kentucky, June 22.

**Fiorenza Ianzini, PhD**, research instructor in radiology, spoke on "Delayed induction of DNA strand breaks following mitotic catastrophe as a result of radiation G2 checkpoint abrogation" at the DNA Damage Workshop, Bowness-on-Windermere, England, April 23. She presented "Abrogation of G2/M cell-cycle checkpoint leads to delayed DNA damage" at the Radiation and Genomic Stability Unit, Medical Research Council, Harwell, Didcot, England, April 27.

**Annette Johnson, MD**, instructor in radiology, presented "Echoplanar diffusion-weighted imaging in infants" at the American Society of Neuroradiology Annual Meeting, Toronto, Ontario, Canada, May 21.

**Assen Kirov, PhD**, instructor in radiology and adjunct instructor of physics, as invited lecturer, presented "Brachytherapy dose measurements: 2D and 3D techniques" to the Medical Physics Department, University of Wisconsin, Madison,

March 10. He spoke on "Plastic scintillator — a promising tool for 2D radiation dosimetry" at the '97 MRV-AAPM meeting, Osage Beach, Missouri, May 17. Kirov presented "Studies in radiation physics at Washington University in St. Louis" to the Department of Physics, University of Sofia "St. Kliment Ohridsky," Sofia, Bulgaria, June 27.

**Eric Klein, MS**, assistant professor of radiology, spoke on "MLC and dynamic wedge dosimetry" at the University of Pennsylvania, Philadelphia, May 6. He presented "Clinical experience with enhanced dynamic wedge" at the Varian Applications Meeting, Seattle, Washington, June 9. Klein presented "Clinical implementation of MLC and dynamic wedge" at the American College of Medical Physics Annual Meeting, Lake Tahoe, Nevada, June 13.

**Andrei Laszlo, PhD**, associate professor of radiology, presented "Heat resistance in mammalian cells" and chaired a session on "Molecular chaperones in cell and medicine" at the First Annual Ponce School of Medicine/National Institutes of Health Program on Minority Biomedical Research, Ponce, Puerto Rico, March 10 - 12. He spoke on "Challenges in hyperthermic biology in vivo and in vitro" and "Is the heat shock response activated by exposures to RF fields?" at The Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 8 - 13.

**Daniel Low, PhD**, assistant professor of radiology, presented "Intensity modulated radiation therapy" at Royal Marsden Hospital, Sutton, England, June 30; at Christie

Hospital, Manchester, England, July 4; and at Western Infirmary, Glasgow, Scotland, July 8. He presented "3-dimensional conformal radiation therapy" at Princess Royal Hospital, Kingston upon Hull, England, July 2.

**William McAlister, MD**, professor of radiology and chief of pediatric radiology, copresented a hands-on refresher course on "Hip sonography for DDH" at the Society for Pediatric Radiology Annual Meeting, St. Louis, Missouri, May 16.

**Michael Mackey, PhD**, assistant professor of radiology, spoke on "Delayed induction of DNA strand breaks following mitotic catastrophe as a result of radiation G2 checkpoint abrogation" at the DNA Damage Workshop, Brownness-on-Windermere, England, April 23. He presented "Abrogation of G2/M cell-cycle checkpoint leads to delayed DNA damage" at Radiation and Genomic Stability Unit, Medical Research Council, Harwell, Didcot, England, April 27.

**Robert Malyapa, MD, PhD**, instructor in radiology, presented "Measurement of DNA damage by the alkaline comet assay in rat brain cells following *in vivo* exposure to 2450 MHz electromagnetic radiation" at The Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 8 - 13.

**Jeff Michalski, MD**, assistant professor of radiology, presented "Prostate cancer: Role of irradiation" at the Seminar on Common Cancers: Prevention, Detection and Therapy, St. Louis, Missouri, April 25.

**Scott Mirowitz, MD**, associate professor of radiology, radiologist-in-chief at Barnes-Jewish Hospital north, and codirector of body magnetic resonance imaging, as a faculty member, spoke on "Pitfalls in abdominal MRI" at the 20th Annual Course Meeting of the Society of Computed Body Tomography and Magnetic Resonance, Washington, DC, April 14 - 18. As guest speaker, he presented "Fast MR imaging techniques" at the Society for Pediatric Radiology Annual Meeting, St. Louis, Missouri, May 16. Mirowitz, as visiting professor, presented "Optimizing MR images," "MR artifacts: challenges and solutions," "Fast MR imaging techniques," and "Cardiovascular MR" at the University of Heidelberg School of Medicine/German Cancer Center, Heidelberg, Germany, June 23 - 27.

**Stephen Moerlein, PhD**, associate professor of radiology, chaired a session on "Radiochemistry" at the Third International Conference on Quantification of Brain Function with PET (Brain PET '97), National Institutes of Health, Bethesda, Maryland, June 20 - 22.

**Stephen Moore, MS**, research assistant professor of radiology, presented "Overview of the DICOM Standard" at the Society for Pediatric Radiologists Annual Meeting, St. Louis, Missouri, May 18.

**Eduardo Moros, PhD**, assistant professor of radiology, as invited lecturer, spoke on "Present and future devices for simultaneous thermoradiotherapy of superficial tumors," presented "Estimation of SAR in cells exposed to microwaves in a radial transmission line irradiator," and coauthored "Determination of brain SAR in rats exposed to microwaves in the chamberette irradiator" and "Management of DNA damage by the alkaline comet assay in rat brain cells after *in vivo* exposure to 2450 MHz electromagnetic radiation" at The Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 8 - 13.

**Carlos Perez, MD**, professor of radiology and director of the Radiation Oncology Center, as visiting professor, presented "Update of cervical cancer" at the New York Methodist Hospital, New York City, April 16. He spoke on "Low dose rate brachytherapy for gynecologic tumors" at the International Seminar on Brachytherapy in the Next Millennium — A Global Conference on Brachytherapy, New York City, New York, April 17 - 19. As visiting professor, Perez spoke on "Cost benefit in carcinoma of the prostate" at Emory University, Atlanta, Georgia, April 25 and 26. He presented "Evolving trends in the management of localized carcinoma of the prostate and cost benefit considerations" and "Irradiation alone or combined with surgery in the treatment of carcinoma of the uterine cervix" at the University of Minnesota, Minneapolis, May 20 - 23.

**James Purdy, PhD**, professor of radiology, associate director of the Radiation Oncology Center, and chief of radiation oncology physics, as visiting professor, presented "Overview of 3D conformal planning and delivery techniques" at the University of Western Ontario, London, Ontario, Canada, April 15. He spoke on "Multi-institutional clinical trials: 3-D CRT quality assurance" and "3-D conformal radiation therapy quality assurance" at the 2nd International Symposium in Special Aspects of Radiotherapy Quality Assurance in Radiation Oncology, Berlin, Germany, May 1 - 3. Purdy presented "A practical guide to ICRU 50 volume and dose specification for three-dimensional conformal radiation therapy" and "Future directions in 3-D treatment planning and delivery" at the American College of Medical Physics Annual Meeting, Lake Tahoe, Nevada, June 9 - 12. He spoke on "Overview of intensity modulated radiation therapy" at the International Congress of Radiation Oncology, Beijing, People's Republic of China, June 4 - 7. Purdy presented "Education and training of medical physicists," "Medical imaging in radiation therapy," "Prescribing, recording and reporting photon beam therapy: a review of ICRU 50," "Acceptance, testing and quality assurance of treatment planning systems," "3-D conformal radiation therapy planning," and "Recent advances in radiation therapy" at the American Association of Physicists in Medicine International Scientific Exchange Course, Moscow, Russia, June 16 - 20.

## LECTURES/ PRESENTATIONS

*Continued from page 25*

**Marcus Raichle, MD**, professor of radiology and of neurology, and codirector of the Division of Radiological Sciences, presented "Seeing memories: a functional imaging update" at the Washington University Psychology Symposium, St. Louis, Missouri, April 12. He spoke on "Functional brain imaging: status and future" at the Brain '97 Symposium, Baltimore, Maryland, June 16. Raichle presented "In search of an image of mind: an historical perspective" and "What words tell about the brain" at the XXXIIIrd International Congress on Physiological Sciences, St. Petersburg, Russia, June 30 - July 5. Raichle presented "Where have we come from, and where are we going?" at the James S. McDonnell Summer Institute in Cognitive Neuroscience, sponsored by Dartmouth College, Hanover, New Hampshire, July 11.

**Joseph Roti Roti, PhD**, professor of radiology, associate director of the Radiation Oncology Center, and chief of cancer biology, as guest speaker, presented "Nuclear matrix mediated DNA organization and radiosensitivity" at the "From DNA Damage to Cell Death: The Role of Nuclear Structure in the Response to Cancer Therapy" meeting, Montreal, Quebec, Canada, June 5 - 7. As principal speaker, he lectured on "The nuclear matrix and radiosens-

itivity" at the Gordon Conference on Molecular Concepts in Radiation Oncology, Boston, Massachusetts, June 29 - July 4.

**Henry Royal, MD**, professor of radiology and associate director of the Division of Nuclear Medicine, presented "Chernobyl: facts and fantasies" and "Effects of radiation on the thyroid" at the Sierra Valley Nuclear Medicine Association meeting, Santa Rosa, California, May 17.

**Stuart Sagel, MD**, professor of radiology, chief of chest radiology and codirector of body computed tomography, spoke on "CT of the thorax: anatomic variants and pitfalls" and "Problematic CT cases" at the 20th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Washington, DC, April 14 - 18. He presented "Conventional and digital radiography of the chest," "CT of the thorax: anatomic variants and pitfalls," "CT of mediastinal masses," "CT of the pleura," "CT of the thymus," and "Problematic chest radiologic cases" at the 6th NICER Course on Chest and Cardiac Radiology, Beijing, People's Republic of China, May 29 - June 1. Sagel spoke on "Conventional and digital radiography of the chest" and "CT of mediastinal masses" at the Radiological Symposium, Mangunkusomo University Teaching Hospital, Jakarta,

Indonesia, June 3. He presented "CT of the thorax: anatomic variants and pitfalls," "CT of mediastinal masses," and "Problematic chest radiologic cases" at the Radiological Symposium, Dr. Soetomo University Teaching Hospital, Suabaya, Indonesia, June 4. Sagel presented "CT of the mediastinum" at the Annual Conference on Chest Disease of the Fleischner Society, London, England, June 27.

**Farid Shafaie, MD**, instructor in radiology, presented "Comparison of computed tomography myelography and magnetic resonance imaging in the evaluation of cervical spondylotic myelopathy and radiculopathy" at the 35th Annual Meeting of the American Society of Neuroradiology, Toronto, Ontario, Canada, May 21.

**Peter Shile, MD**, assistant professor of radiology, spoke on "Observer variability in use of terminology of the American College of Radiology (ACR) Breast Imaging and Reporting Data System (BI-RADS)" at the 45th Annual Meeting of the Association of University Radiologists, Dallas, Texas, April 7. He presented "Patterns of variability in the use of ACR BI-RADS terminology" to the American College of Radiology BI-RADS Committee, San Diego, California, April 18. Shile spoke on "X-ray detectors and displays for digital mammography" at the Federal Multi-Agency Consortium on Imaging Technologies to Improve Women's Health Technology Transfer Workshop on Breast Cancer Detection, Diagnosis and Treatment, Washington, DC, May 1.

**Barry Siegel, MD**, professor of radiology and director of the Division of Nuclear Medicine, as visiting professor, spoke on "Oncological applications of PET" at the Department of Radiology Grand Rounds, Columbia-Presbyterian Medical Center, New York City, New York, April 2.

**Marilyn Siegel, MD**, professor of radiology and of pediatrics, as visiting professor, presented "Sonography of the acute pediatric abdomen," "Pediatric pelvic imaging," and "Pediatric thymus" at the Children's Hospital of Philadelphia, Pennsylvania, April 1 - 3. As invited guest speaker, she presented "Ultrasonography of neonatal intracranial hemorrhage and ischemia," "Ultrasonography of the acute pediatric abdomen," "Ultrasonography of pediatric renal diseases," and "CT/MR of the pediatric pelvis" at the New Orleans Radiologic Society Spring Roentgen Conference, New Orleans, Louisiana, April 30 - May 2. As visiting professor, Siegel presented "Techniques and applications of pediatric spiral CT" at the Tulane University School of Medicine, New Orleans, Louisiana, May 1. She spoke on "MR imaging of the pediatric musculoskeletal system" and "Pediatric spiral chest CT" at the 20th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Washington, DC, April 14 - 18. Siegel presented "MR imaging of congenital gynecologic anomalies in adolescents" at the Society of Pediatric Radiology Annual Meeting, St. Louis, Missouri, May 13.



**Diagnostic radiology and nuclear medicine fellows, residents, and trainees for 1996 - 1997:** (first row, left to right) Doctors Perry Pickhardt; Mark Fister; David Youmans; Denise Iuliano; Robert Buse; David Kim; Gavin Slethaug; Serge Djukic; (second row) Felix Song; Pratik Mukherjee; Sanjeev Bhalla; Christine Menias; Mark Fromke; Dennis Balfe, director, Diagnostic Radiology Residency Program; Donald Heck, cochief resident; Ronald Evens, director, Mallinckrodt Institute; Thomas Vaughan, cochief resident; Lawrence Kotner, associate director, Diagnostic Radiology Residency Program; Sandy Ruhs; Mary Board; Agnes Santosa; Myeong Yoon; Peter Salazar; Robert Vogler; (third row) Gilbert Jost, director, Division of Diagnostic Radiology; Harold Prow; David Hillier; Rachel Gordon; Anthony Hein; Hank Chen; Jon Fromke; Lloyd Stam- baugh; Lawrence Kaskowitz; Jeffrey Friedland; Matthew Fleishman; David Linkhous; Randolph Pawluk; Leland Tsao; Farid Shafaie; Jonathan Gurney; Glenn Hammer; (fourth row) Jason Levy; David Jeck; Scott Beasley; Sean Pierce; Robert Boerner; Joshua Shimony; Robert McKinstry; Kevin Berger; Robert Feiwell; Daniel Hassell; Alan McDaniel; Steven Roth; Annette Johnson; (fifth row) Timothy Davis; Leo Lawler; Farrel VanWagenen; Stephen Schmitter; Bartosz Rydzewski; Donald Blair; Dallas Peck; John Leahy; Rory Satterfield; Stephanie Hiskes; John Butman; John Sunderland; John Healey; Martin Anbari; Paul Guillerman; Christopher Thornton; Mark Oswood; John Neil.

**Joseph Simpson, MD, PhD**, associate professor of radiology, as invited speaker, presented "Cancer pain management" at the Kansas Medical Education Foundation, Topeka, May 31.

**Todd Wasserman, MD**, professor of radiology and chairman of radiation oncology at Barnes-Jewish Hospital north, spoke on "Radioprotective effects of Ethylol®" at the Ethylol® Advisory Board Meeting, ALZA Pharmaceuticals/U.S. Bioscience, Beverly Hills, California, May 10, and Tucson, Arizona, May 31, and at the Ethylol® Investigator's Meeting: Improving the Therapeutic Index in Cancer Therapy, Denver, Colorado, May 16.

**Franz Wippold, MD**, associate professor of radiology, as visiting professor, presented "Normal laryngeal anatomy," "Laryngeal cancer," and "Top 50 cases of head and neck imaging" at the National Naval Hospital, Bethesda, Maryland, April 28 - May 9.

**Pamela Woodard, MD**, instructor in radiology, presented "Maximum intensity projection images for the detection of acute pulmonary emboli with helical CT: assessment of utility in a porcine model" at the 20th Annual Course of the Society of Computed Body Tomography and Magnetic

Resonance, Washington, DC, April 14 - 18. She presented "Blinded assessment of 3D MRA with retrospective respiratory gating for detection of coronary artery stenoses: a pilot study" at the Second International Magnetom Vision Conference, Rotterdam, The Netherlands, June 13.

## SYMPOSIA

### INTERNATIONAL SOCIETY FOR MAGNETIC RESONANCE IN MEDICINE

*Vancouver, British Columbia, Canada  
April 12 - 18, 1997*

**Thomas Conturo, MD, PhD**, cochair, "Animal brain MR imaging: vascular."

### POSTER SESSIONS

**Erbil Akbudak, PhD;**  
**Thomas Conturo, MD, PhD**, "Arterial input functions from echoplanar phase imaging."

## SYMPOSIA

*Continued from page 27*

John Neil, MD\*; Shelly Sirhan, research assistant\*\*;  
**Robert McKinstry, MD;**  
 Avi Snyder, PhD, MD\*\*;  
**Benjamin Lee, MD;**  
**Thomas Conturo, MD,**  
 PhD, "Brain anisotropy-weighted images of normal term and preterm neonates."  
 \*Barnes-Jewish Hospital, St. Louis, Missouri. \*\*Washington University, St. Louis, Missouri.

**Pamela Woodard, MD,**  
 "Detection of coronary artery stenoses with 3D MR angiography with retrospective respiratory gating: blinded assessment of individual partitions and projection images."

## SCIENTIFIC SESSIONS

**Jeffrey Brown, MD,** "The role and efficacy of MnDPDP injection for detection and characterization of focal hepatic disease."

John Neil, MD\*; Shelly Sirhan, research assistant\*\*;  
**Robert McKinstry, MD;**  
 Avi Snyder, PhD, MD\*\*;  
**Benjamin Lee, MD;**  
**Thomas Conturo, MD,**  
 PhD, "Quantitative measurements of brain water apparent diffusion coefficient in normal pre-term neonates."  
 \*Barnes-Jewish Hospital, St. Louis, Missouri. \*\*Washington University, St. Louis, Missouri.

**Marcus Raichle, MD,**  
 "Surgery and radiotherapy: a functional imaging road map."

Joshua Shimony, MD\*;  
**Robert McKinstry, MD;**  
**Erbil Akdubak, PhD;** Avi Snyder, PhD, MD\*\*;  
 Joseph

Aronovitz, MD\*; **Thomas Conturo, MD, PhD,** "Cerebral diffusion sensor imaging: normative data, signal to noise measurements, and anatomical findings."  
 \*Barnes-Jewish Hospital, St. Louis, Missouri. \*\*Washington University, St. Louis, Missouri.

## RADIATION RESEARCH SOCIETY

*The 45th Annual Meeting and*

## NORTH AMERICAN HYPERTHERMIA SOCIETY

*The 16th Annual Meeting  
 Providence, Rhode Island  
 May 3 - 7, 1997*

**Lisa Ridnour, PhD,** student travel award.

MINI-PRESENTATIONS/  
POSTER SESSIONS

**David Gius, MD;** Adita Vocero-Akbani\*; **Michael Wei\***; Steven Dowdy, PhD\*, "TAT mediated protein transduction into cells examination of the phosphorylation status of the retinoblastoma protein in vivo." \*Washington University, St. Louis, Missouri.

**Prabhat Goswami, PhD;**  
**Robert VanderWaal, PhD;**  
**Ryuji Higashikubo, PhD,**  
 "G1-acceleration following delayed transit through S and G<sub>2</sub> phases in the preceding generation."

**Fiorenza Ianzini, PhD;**  
**Michael Mackey, PhD,**  
 "Accumulation of cyclin B1 and enhanced loss of G2 checkpoint function in hela S3 cells treated with a combination of moderate hyperthermia and ionizing radiation."

**Andrei Laszlo, PhD;** Kenzo Ohtsuka, PhD\*; **Teri Davidson,** senior medical research technician; An Hu, PhD\*\*;  
 "Localization of HSC 70 and heat resistance." \*Aichi Cancer Center, Nagoya, Japan. \*\*Stanford University, Stanford, California.

**Michael Mackey, PhD;**  
**Fiorenza Ianzini, PhD,**  
 "Cell-cycle delays in late S and G<sub>2</sub> phases with overaccumulation of cyclin B1 and loss of G2 checkpoint in irradiated hela S3 cells."

**Robert Malyapa, MD, PhD;**  
**Eric Ahern,** medical research technician; **William Straube, MS;** **Eduardo Moros, PhD;** William Pickard, PhD\*; **Joseph Roti Roti, PhD,** "Measurement of DNA damage by the alkaline comet assay after in vitro exposure to 835 MHz or 2450 MHz electromagnetic radiation." \*Washington University, St. Louis, Missouri.

**Eduardo Moros, PhD;**  
**Xiaobing Fan, PhD;**  
**William Straube, MS;**  
**Robert Myerson, PhD, MD,**  
 "A dual-array dual-frequency superficial applicator with depth of heating control."

**Azemat Parsian, BS;** **Prabhat Goswami, PhD;** **Clayton Hunt, PhD,** "Cell cycle coupled expression of the heat shock cognate (HSC70) member of the HSP70 gene family."

**Lisa Ridnour, PhD;** **Julia Sim,** medical research technician; **Douglas Spitz, PhD,** "Nitric oxide-induced resistance to oxidative stress is mediated by glutathione-dependent process."

**Julia Sim,** medical research technician; **Mai Xu, PhD;**  
**Joseph Roti Roti, PhD;**  
**Douglas Spitz, PhD,** "Alterations in cellular antioxi-

dants in 41.1°C-resistant human colon adenocarcinoma cells."

**William Straube, MS;**  
**Eduardo Moros, PhD;** **Eric Klein, MS;** **Daniel Low, PhD;** **Robert Myerson, PhD, MD,** "Clinical implementation of simultaneous microwave and ultrasound hyperthermia on a 6MV linear accelerator."

**Robert VanderWaal, PhD;**  
**Ryuji Higashikubo, PhD;**  
**Joseph Roti Roti, PhD,**  
 "Effects of hyperthermia on the nuclear pattern of DNA replication."

**William Wright, BS;** Ruby Hanna, undergraduate student\*; **Joseph Roti Roti, PhD,** "Residual DNA damage in mammalian cells following low doses of ionizing radiation." \*Washington University, St. Louis, Missouri.

**Mai Xu, PhD;** **William Wright, BS;** **Ryuji Higashikubo, PhD;** **Joseph Roti Roti, PhD,** "Intracellular distribution of HSP70 is a potential marker for cell proliferation during chronic heat treatment."

## REFRESHER COURSES

**Eduardo Moros, PhD,** introduction, "Simultaneous heating and radiation."

**Michael Welch, PhD,** "Current status of availability of radionuclides for diagnosis and therapy."

## SYMPOSIA

**Eduardo Moros, PhD,** chairman, "Thermometry, thermal modeling, and quality assurance."

**Joseph Roti Roti, PhD,** chairman, "Modes and mechanisms of cell death after hyperthermia."

**Michael Welch, PhD**, cochairman, "Targeted radionuclides for the measurement of radiobiological parameters."

**Andrei Laszlo, PhD**; Kenzo Ohtsuka, PhD\*; **Ming-shun Chen, PhD**; **Teri Davidson**, senior medical research technician; Aaron Ciechanover, PhD\*\*, "Functions of the high molecular weight heat shock proteins." \*Aichi Cancer Center, Nagoya, Japan. \*\*Weizman Institute, Haifa, Israel.

**Andrei Laszlo, PhD**; Kenzo Ohtsuka, PhD\*; **Teri Davidson**, senior medical research technician; An Hu, PhD\*\*, "Localization of HSC 70 and heat resistance." \*Aichi Cancer Center, Nagoya, Japan. \*\*Stanford University, Stanford, California.

**Azemat Parsian, BS**; **Prabhat Goswami, PhD**; **Clayton Hunt, PhD**, "Cell cycle coupled expression of the heat shock cognate (HSC70) member of the HSP70 gene family."

**Lisa Ridnour, PhD**; **Julia Sim**, medical research technician; **Douglas Spitz, PhD**, "Nitric oxide-induced resistance to oxidative stress is mediated by a glutathione-dependent process."

**Joseph Roti Roti, PhD**; **Robert VanderWaal, PhD**; **Robert Malyapa, MD, PhD**; **Ryuji Higashikubo, PhD**, "Modes and mechanisms of cell death after hyperthermia."

**Joseph Roti Roti, PhD**; **Mai Xu, PhD**; **Julia Sim**, medical research technician; **Lili Wang**, research fellow; **William Wright, BS**; **Ryuji Higashikubo, PhD**; **Douglas Spitz, PhD**, "Characterization of human tumor cell lines that proliferate at 41.1°C."

**Mai Xu, PhD**; **William Wright, BS**; **Ryuji Higashikubo, PhD**; **Joseph Roti Roti, PhD**, "Intracellular distribution of HSP70 is a potential marker for cell proliferation during chronic heat treatment."

#### WORKSHOPS

**Clayton Hunt, PhD**, chairman, "Potential role of hyperthermia in gene therapy strategies."

**Douglas Spitz, PhD**, chairman, "Oxidative stress and the cellular response to cancer therapy."

#### AMERICAN ROENTGEN RAY SOCIETY

*The 97th Annual Meeting  
Boston, Massachusetts  
May 4 - 9, 1997*

**Peter Shile, MD**, scientific program committee — breast.

**Richard Slone, MD**, 1997 ARRS scholar.

#### PARTNERS PROGRAM

**Ronald Evens, MD**, "Update on ACR activities."

#### SCIENTIFIC SESSIONS

**Steven Don, MD**; **Michael Albertina, BS, RT\***; **Dennis Ammann, MBA**, "Soft copy pediatric ultrasound: cost savings sensitivity analysis." \*St. Louis Children's Hospital, St. Louis, Missouri.

**Matthew Fleishman, MD**; **Richard Slone, MD**; **Fernando Gutierrez, MD**, "Comparison of pulmonary artery size measured by computed tomography with direct pressure measurements in patients with severe pulmonary emphysema."

**Brigid Gordon, MD**; **Farrukh Dehdashti, MD**; **Barry Siegel, MD**, "Role of FDG-PET in localizing occult primary tumors."

**Thelma Lopes, MD\***; **Richard Slone, MD**; **David Gierada, MD**, "Prevalence of diaphragm defects in patients with severe pulmonary emphysema." \*Hospital Real Beneficencia Portuguesa, Sao Paulo, Brazil.

**Melhem Sharafuddin, MD**; **Luigi Garibaldi, MD\***; **Atchawee Luisiri, MD\*\***; **Julian Omid, MD\*\***; **Richard Graviss, MD\*\***, "Prospective assessment of pituitary size and shape on MR imaging after hormonal therapy in central precocious puberty." \*Robert Wood College of Medicine, Newark, New Jersey. \*\*Cardinal Glennon Children's Hospital, St. Louis, Missouri.

**Richard Slone, MD**; **Glenn Fletcher, PhD**; **Edward Muka, MS**; **Gregory Reiker, MS**; **Pamela Woodard, MD**; **Stuart Sagel, MD**; **Gilbert Jost, MD**, "Image quality, tone characteristics and patient dose of selenium-based digital chest images compared with screen-film radiographs."

**Richard Slone, MD**; **David Gierada, MD**; **Thelma Lopes, MD\***, "Unsuspected bronchogenic carcinoma in patients with severe pulmonary emphysema being evaluated for lung volume reduction surgery." \*Hospital Real Beneficencia Portuguesa, Sao Paulo, Brazil.

**Pamela Woodard, MD**; **James Brink, MD**; **Francis Schlueter, MD\***; **Janice Semenkovich, MD**; **Jay Heiken, MD**, "Usefulness of minimum intensity projection images (MINIPS) in the assessment of tracheobronchial stenoses." \*Good Samaritan Hospital, Cincinnati, Ohio.

**Yuming Yin, MD**; **Viktor Metz, MD\***; **Louis Gilula, MD**; **Anthony Wilson, MB, ChB\*\***, "A broken proximal carpal ARC (ARC I) under finger traction does not indicate intrinsic ligament disruption." \*Allegemeines Krankenhaus der Stadt Wien, Universitaeskllinik fuer Radiodiagnostik, Vienna, Austria. \*\*Harborview Hospital, University of Washington Medical Center, Seattle.

**David Youmans, MD\***; **Steven Don, MD**; **Charles Hildebolt, DDS, PhD**; **Gary Luker, MD**; **Gary Shackelford, MD**; **William McAlister, MD**, "Fractures in child abuse: comparison between screen-film radiographs and digitized radiographs." \*Barnes-Jewish Hospital, St. Louis, Missouri.

#### SCIENTIFIC EXHIBITS

**Matthew Fleishman, MD**; **David Gierada, MD**; **Richard Slone, MD**, "Normal anatomy, variants and pathological conditions of the diaphragm: appearance by computed tomography with magnetic resonance imaging correlation."

## SYMPOSIA

*Continued from page 29*

**David Gierada, MD;**  
**Richard Slone, MD,** "Normal radiographic findings and complications after lung volume reduction surgery in the early postoperative period."

**Gary Reiker, MS; Richard Slone, MD; Pamela Woodard, MD; Glenn Fletcher, PhD; Stuart Sagel, MD; Gilbert Jost, MD,** "Comparison of standard screen-film radiographs and digital images obtained with commercial selenium-based chest imaging system."

## SOCIETY OF NUCLEAR MEDICINE

*The 44th Annual Meeting  
San Antonio, Texas  
June 1 - 5, 1997*

**Mickey Clarke, CNMT,** scientific and teaching sessions committee member — technologist section; technical exhibits committee member.

**Tom Miller, MD, PhD,** technical exhibits committee member.

**Sally Schwarz, RPh, MS,** scientific committee sub-chair.

## SPECIAL LECTURE

**Marcus Raichle, MD,** Kuhls and Lesser Lecture.

## CATEGORICAL SEMINARS

**David Piwnica-Worms, MD, PhD,** "Physiological basis and detection of multi-drug resistance."

**Henry Royal, MD,** "Imaging pulmonary embolism: lung scan versus spiral CT."

## PLENARY SESSION

**Michael Welch, PhD,** presenter of the Georg de Hevesy Award.

## POSTER SESSIONS

**Duffy Cutler, PhD,** "Improved dosimetry with point kernel convolution applied to whole-body PET images."

**Carmine Fannelli, MD\*;**  
**Philip Cryer, MD\*;**  
**Carmen Dence, MS;**  
**Joanne Markham, MS\*;**  
**Tom Videen, PhD\*;**  
**Deanna Paramore, PhD\*;**  
**William Powers, MD\*;**  
'Cerebral glucose transport and metabolism in diabetes mellitus.' \*Washington University, St. Louis, Missouri.

**Tom Miller, MD, PhD;**  
**Jerold Wallis, MD;**  
**Guangming Dai, PhD;**  
Michelle Miller, summer student, "Iterative reconstruction algorithms: their clinical value."

**Xan Phung,** medical student\*;  
**Jerold Wallis, MD,** "An internet-based interactive nuclear medicine image display system implemented in the Java programming language." \*Washington University, St. Louis, Missouri.

**Xan Phung,** medical student\*;  
**Nancy Bartlett, MD\*;**  
**Paula Fracasso, MD, PhD\*;**  
**David Piwnica-Worms, MD, PhD;**  
**Henry Royal, MD,** "In vivo quantification of the effect of P-glycoprotein inhibitor PSC833 on the biokinetics of Tc-99m SESTAMIBI." \*Washington University, St. Louis, Missouri.

## SCIENTIFIC PAPERS

**Carolyn Anderson, PhD,** comoderator, "Radiopharmaceutical chemistry: therapy I."

**Duffy Cutler, PhD,** comoderator, "Instrumentation and data analysis: PET IV - data correction."

**Farrokh Dehdashti, MD,** comoderator, "Oncology diagnosis: FDG - breast."

**Tom Miller, MD, PhD,** moderator, "Instrumentation and data analysis: SPECT I - cardiac imaging."

**Stephen Moerlein, PhD,** comoderator, "Radiopharmaceutical chemistry: neuroimaging tracers - serotonin."

**Henry Royal, MD,** comoderator, "Pulmonary."

**Farrokh Dehdashti, MD;**  
**Carolyn Anderson, PhD;**  
**Diana Trask, RN;**  
**Laura Bass, PhD;**  
**Sally Schwarz, RPh, MS;**  
**Duffy Cutler, PhD;**  
**Deborah McCarthy, PhD;**  
**Margaret Lanahan, MS,** "Initial results with PET imaging using Cu-64-labeled Teta-octreotide in patients with carcinoid tumor."

**Duffy Cutler, PhD,** "Improved dosimetry with point kernel convolution applied to whole-body PET images."

**Julie Dahlheimer,** medical research technologist;  
**Carolyn Crankshaw, MS;**  
**Mary Marmion, PhD\*;**  
**David Piwnica-Worms, MD, PhD,** "Modulation of the pharmacokinetics of Tc-99m-Q-58 and Tc-99m-SESTAMIBI in MDRLA P-glycoprotein knockout mice." \*Mallinckrodt Medical, Inc., St. Louis, Missouri.

**Carmine Fannelli, MD\*;**  
**Philip Cryer, MD\*;**  
**Carmen Dence, MS;**  
**Joanne Markham, MS\*;**  
**Tom Videen, PhD\*;**  
**Deanna Paramore, PhD\*;**  
**William Powers, MD\*;**  
'Cerebral glucose transport and metabolism in diabetes mellitus.' \*Washington University, St. Louis, Missouri.

**Yasuhisa Fujibayashi, PhD,**  
**DMSc\*;**  
**Cathy Cutler, PhD;**  
**Carolyn Anderson, PhD;**  
**Deborah McCarthy, PhD;**  
**Lynne Jones, BA;**  
**Yoshiharu Yonekura, MD, PhD\*;**  
**Michael Welch, PhD,** "Comparative imaging studies of Cu-11-ATSM hypoxia imaging agent and C-11-acetate in acute myocardial infarction model: ex vivo imaging in rats." \*Fukui Medical School, Matsuoka, Japan.

**Brigid Gordon, MD;**  
**Fidelma Flanagan, MD;**  
**Farrokh Dehdashti, MD,** "Comparison of FDG-PET and intraoperative ultrasound in detection of hepatic metastases."

**David Hillier, MD;**  
**Jerold Wallis, MD;**  
**Tom Miller, MD, PhD,** "Cardiac artifacts due to hepatobiliary uptake in Tc-99m myocardial SPECT."

**Gary Luker, MD;**  
**Carolyn Crankshaw, MS;**  
**David Piwnica-Worms, MD, PhD,** "Tc-99m-Q-58 and Tc-99m-Q-63 show transport selectivity for MDR1 over MDR3 P-glycoprotein."

**Timothy McCarthy, PhD;** Neil Worrall, MD\*; **Jian Zhang, MS;** Jia Hui, research associate\*; **Michael Welch, PhD,** "Detection and comparison of inducible nitric oxide synthase (iNOS) upregulation in a heterotropic cardiac transplant model using sulfur-2-[fluorine-18]fluoroethylisothiourea." \*Washington University, St. Louis, Missouri.

**Tom Miller, MD, PhD;** **Jerold Wallis, MD;** **Guangming Dai, PhD;** Michelle Miller, summer student, "Iterative reconstruction algorithms: their clinical value."

Xan Phung, medical student\*; **Nancy Bartlett, MD\*;** **Paula Fracasso, MD, PhD\*;** **David Piwnica-Worms, MD, PhD;** **Henry Royal, MD,** "In vivo quantification of the effect of P-glycoprotein inhibitor PSC833 on the biokinetics of Tc-99m SES-TAMIBI." \*Washington University, St. Louis, Missouri.

Xan Phung, medical student\*; **Jerold Wallis, MD,** "An internet-based interactive nuclear medicine image display system implemented in the Java programming language." \*Washington University, St. Louis, Missouri.

**Vallabhaneni Rao, PhD;** **Lee Herman, PhD\*;** **James Kronauge, PhD\*;** **David Piwnica-Worms, MD, PhD,** "Hexakis (3,4,5-trimethoxyphenyl isonitrile) technetium(I), a novel areneisonitrile Tc-complex inhibits transport activity of the multidrug resistance P-glycoprotein." \*Brigham and Women's Hospital, Boston, Massachusetts.

**Jian Zhang, MS;** **Timothy McCarthy, PhD;** **Anne Cross, MD\*;** **Michael Welch, PhD,** "Measurement of upregulation of inducible nitric oxide synthase (iNOS) in the experimental autoimmune encephalomyelitis (EAE) model using S-2[F-18]fluoroethylisothiourea." \*Washington University, St. Louis, Missouri.

## INTERNATIONAL WORKSHOP ON TARGETRY AND TARGET CHEMISTRY

*7th Annual Meeting  
Heidelberg, Germany  
June 8 - 11, 1997*

### SCIENTIFIC SESSIONS

**Carmen Dence, MS;** **Michael Welch, PhD,** "High specific activity 1-[<sup>11</sup>C]ethyl iodide — preliminary results."

**Gregory Gaehle, BS;** **Michael Welch, PhD,** "New approaches to the control of accelerators and production systems."

**Stephen Fallis,** research associate; **Timothy McCarthy, PhD;** **Michael Welch, PhD,** "Synthesis of [<sup>11</sup>C]acetone: considerations regarding stoichiometry."

**Stephen Fallis,** research associate; **Timothy McCarthy, PhD;** **Michael Welch, PhD,** "Production of high specific activity, [<sup>11</sup>C]methyl iodide using the GE microlab evaluation and testing at Washington University."

**Deborah McCarthy, PhD;** **William Margenau,** cyclotron supervisor; **Todd Perkins,** medical research technician; **Laura Bass, PhD;** **Michael Welch, PhD;** **Ruth Shefer, PhD\*;** **Robert Klinkowstein, PhD\*;** "The

efficient production of various positron copper radionuclides using a biomedical cyclotron." \*Newton Scientific, Inc., Cambridge, Massachusetts.

**Timothy McCarthy, PhD;** **Gregory Gaehle, BS;** **William Margenau,** cyclotron supervisor; **Kilichan Gurleyik,** engineering student\*, "Evaluation of a commercially available inductive heater for the rapid combustion of graphite disks used in the production of [<sup>13</sup>N]NO and [<sup>13</sup>N]NO<sub>2</sub>." \*Washington University, St. Louis, Missouri.

**Sally Schwarz, RPh, MS;** **Timothy McCarthy, PhD;** **Naomi King,** senior research medical technician; **Keith Lechner, BS;** **William Margenau,** cyclotron supervisor; **David Ficke,** senior cyclotron operator; **William Courtney,** medical research technician; **Michael Welch, PhD,** "FDG PET trace microlab: average [<sup>18</sup>F]FDG EOS activity compared to the source of the [<sup>18</sup>O] water used."

## INTERNATIONAL SYMPOSIUM ON RADIOPHARMACEUTICAL CHEMISTRY

*12th Annual Meeting  
Uppsala, Sweden  
June 15 - 19, 1997*

### SESSION IV: RADIONUCLIDE PRODUCTION AND AUTOMATION

**Laura Bass, PhD;** **Deborah McCarthy, PhD;** **Lynne Jones, BA;** **Duffy Cutler, PhD;** **Ruth Shefer, PhD\*;** **Robert Klinkowstein, PhD\*;** **Sally Schwarz, RPh, MS;** **Cathy Cutler, PhD;** **Jason Lewis,** research associate; **Carolyn Anderson, PhD;** **Michael Welch, PhD,** "High purity production and potential application of copper-60

and copper-61." \*Newton Scientific, Inc., Cambridge, Massachusetts.

### SESSION V: RADIOPHARMACEUTICALS FOR TUMOR DIAGNOSIS AND THERAPY

**Michael Welch, PhD,** chairman

### SESSION VI: COORDINATION CHEMISTRY (1)

**Todd Spradau,** graduate student\*; **Barry Edwards, MS;** **Carolyn Anderson, PhD;** **Michael Welch, PhD;** **John Katzenellenbogen, PhD\*;** "Preparation and biodistribution of octreotide labeled with cyclopentadienyl tricarbonyl technetium Tc-99m." \*University of Illinois, Urbana.

### SESSION VII: COORDINATION CHEMISTRY (2)

**Cathy Cutler, PhD;** **David Reichert, PhD;** **Carolyn Anderson, PhD;** **Cecilia Giron, PhD\*;** **Ramunas Motekaitis, PhD\*;** **Duncan Quarless, PhD\*;** **Lynne Jones, BA;** **Jason Lewis,** research associate; **Steven Koch, PhD\*;** **Arthur Martell, PhD\*;** **Michael Welch, PhD,** "Factors influencing the *in vivo* behavior of In(III)S<sub>3</sub>N and Ga(III)S<sub>3</sub>N." \*University of Padua, Padua, Italy. \*\*Texas A&M University, College Station. \*\*\*State University of New York, Stony Brook.

**Carolyn Anderson, PhD;** **Lynne Jones, BA;** **Laura Bass, PhD;** **Deborah McCarthy, PhD;** **Margaret Lanahan, MS;** **Elizabeth Sherman, BA,** "Copper-64 Teta-octreotide for radiotherapy: dose fractionation and toxicity in a tumor-bearing rat model."

## SYMPOSIA

Continued from page 31

**SESSION X: RADIOPHARMACEUTICALS FOR ENZYMES AND TRANSPORTERS**

**Stephanie Jonson, MS;** **Michael Welch, PhD**, "Development of cholesteryl-p-[<sup>18</sup>F]fluorobenzoate as a potential adrenal PET imaging agent."

**SESSION XI: <sup>11</sup>C-CHEMISTRY**

Eric Hostetler, graduate student\*; **Stephen Fallis**, research associate; **Timothy McCarthy, PhD;** **Carmen Dence, MS;** **Michael Welch, PhD;** John Katzenellenbogen, PhD\*, "New synthetic routes for the preparation of C-11 palmitic acid labeled at tail positions." \*University of Illinois, Urbana.

**POSTER SESSIONS**

**Carolyn Anderson, PhD;** **Lynne Jones, BA;** **Laura Bass, PhD;** **Deborah McCarthy, PhD;** **Margaret Lanahan, MS;** **Elizabeth Sherman, BA**, "Copper-64-Teta-octreotide for radiotherapy: dose fractionation and toxicity in a tumor-bearing rat model."

**Laura Bass, PhD;** **Deborah McCarthy, PhD;** **Jonathan Gitlin, MD\*;** **Carolyn Anderson, PhD;** **Michael Welch, PhD**, "Analysis of liver metabolites of copper radiopharmaceuticals *in vivo*." \*Washington University, St. Louis, Missouri

**Laura Bass, PhD;** **Deborah McCarthy, PhD;** **Lynne Jones, BA;** **Duffy Cutler, PhD;** **Ruth Shefer, PhD\*;** **Robert Klinkowstein, PhD\*;** **Sally Schwarz, RPh, MS;** **Jason Lewis**, research associate; **Carolyn Anderson, PhD;** **Michael Welch, PhD**, "High purity production and potential applications of copper-60 and copper-61." \*Newton Scientific, Inc., Cambridge, Massachusetts.

**Cathy Cutler, PhD;** **David Reichert, PhD;** **Carolyn Anderson, PhD;** **Cecilia Giron, PhD\*;** **Ramunas Motekaitis, PhD\*;** **Duncan Quarless, PhD\*\*\*;** **Lynne Jones, BA;** **Jason Lewis**, research associate; **Steven Koch, PhD\*\*\*;** **Arthur Martell, PhD\*\*;** **Michael Welch, PhD**, "Factors influencing the *in vivo* behavior of IN(III)S3N and Ga(III)S3N." \*University of Padua, Padua, Italy. \*\*Texas A&M University, College Station. \*\*\*State University of New York, Stony Brook.

**Carmen Dence, MS;** **William Powers, MD\*;** **Robert Gropler, MD;** **Michael Welch, PhD**, "High-yield synthesis of 1-[<sup>11</sup>C]d-glucose for clinical applications — problems and solutions." Washington University, St. Louis, Missouri.

**Barry Edwards, MS;** **Carolyn Anderson, PhD;** **Cynthia Fields, MS\*;** **Gregg Fields, PhD\*;** **Michael Welch, PhD**, "Evaluation of Cu-64-labeled segments of type-IV collages as tumor imaging agents." University of Minnesota, Minneapolis.

Eric Hostetler, graduate student\*; **Stephen Fallis**, research associate; **Timothy McCarthy, PhD;** **Carmen Dence, MS;** **John Katzenellenbogen, PhD\*;** "New synthetic routes for the preparation of C-11 palmitic acid labeled at tail positions." \*University of Illinois, Urbana.

**Stephanie Jonson, MS;** **Michael Welch, PhD**, "Development of cholesteryl-p-[<sup>18</sup>F]fluorobenzoate as a potential adrenal PET imaging agent."

**Margaret Lanahan, MS;** **Laura Bass, PhD;** **James Duncan, MD, PhD;** **A. Srinivasan, PhD\*;** **Michelle Schmidt, PhD\*;** **Carolyn Anderson, PhD;** "Identification of the major metabolites of In-111-DTPA-D-Phe-1-octreotide formed *in vitro*." \*Mallinckrodt, Inc., St. Louis, Missouri.

**Jason Lewis**, research associate; **Lynne Jones, BA;** **Duffy Cutler, PhD;** **Deborah McCarthy, PhD;** **Laura Bass, PhD;** **Margaret Lanahan, MS;** **Sally Schwarz, RPh, MS;** **Carolyn Anderson, PhD**, "Determination of tumor dosimetry for copper-64-Teta-octreotide by PET imaging in a tumor-bearing rat model."

**Timothy McCarthy, PhD;** **Michael Welch, PhD**, "Species specific metabolism differences of the nitric oxide synthase inhibitor S-2-[<sup>18</sup>F]fluoroethyl-isothiourea([<sup>18</sup>F]FEITU)."

**Eyal Mishani, PhD;** **Timothy McCarthy, PhD;** **Robbin Brodbeck**, postdoctoral fellow\*; **Carmen Dence, MS;** **James Krause, PhD\*;** **Michael Welch, PhD**, "Synthesis and evaluation of a fluorine-18-labeled NK-1 antagonist." \*Washington University, St. Louis, Missouri.

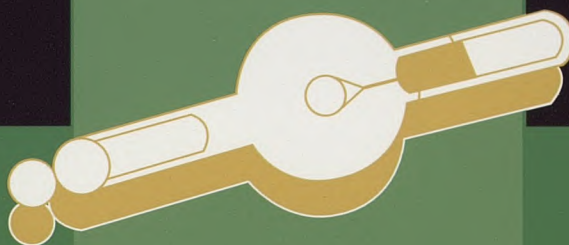
**David Reichert, PhD;** **Cathy Cutler, PhD;** **Carolyn Anderson, PhD;** **Teresa Jones-Wilson**, research assistant; **Michael Welch, PhD**, "Molecular mechanisms and semi-empirical studies of radiometal complexes."

**David Reichert, PhD;** **Michael Welch, PhD**, "Comparative molecular force-field analysis (COMFA) studies on radiolabeled estradiol derivatives."

**Todd Spradau**, graduate student\*; **Barry Edwards, M. Carolyn Anderson, PhD;** **Michael Welch, PhD;** **John Katzenellenbogen, PhD\*;** "Preparation and biodistribution of octreotide labeled with cyclopentadienyl tricarbonyl technetium Tc-99m." \*University of Illinois, Urbana.

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