

WINTER 2005/2006

VOLUME 36, NUMBER 3

FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY AT WASHINGTON UNIVERSITY



At the Core:
ADVANCES IN
MOLECULAR IMAGING

WASHINGTON UNIVERSITY MEDICAL LIBRARY



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CHICAGO WAS ALL DRESSED UP

*for the holidays and for
the 91st Annual Meeting
of the Radiological
Society of North America.*

*Turn to page 8 for
more information on
Mallinckrodt Institute's
participation in this
important meeting.*

Photograph courtesy of Michelle Wynn.

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Computed tomography (CT) images from the National Lung Screening Trial, which compared spiral CT and chest X-ray studies for their effectiveness in helping to reduce deaths from lung cancer, will be housed at Mallinckrodt Institute. This image library will be an important resource for future research.

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The 2005 meeting of the Radiological Society of North America drew more than 61,000 attendees. Institute faculty and staff once again participated in what is called the largest medical/scientific meeting in the country.



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Meet Marvin, the newest member of MIR's Molecular Imaging Center and the mainstay of the Center's new High-Throughput Screening Robotic Core. Marvin and his human colleagues are involved in research and imaging technologies that examine diseases at the cellular and molecular level.



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Positron emission tomography (PET), developed at Mallinckrodt Institute in the late 1970s, increasingly is being used for clinical oncology. Physician advocates for PET-based cancer imaging spearheaded the creation of a National Oncologic PET Registry that has led to broader Medicare coverage.



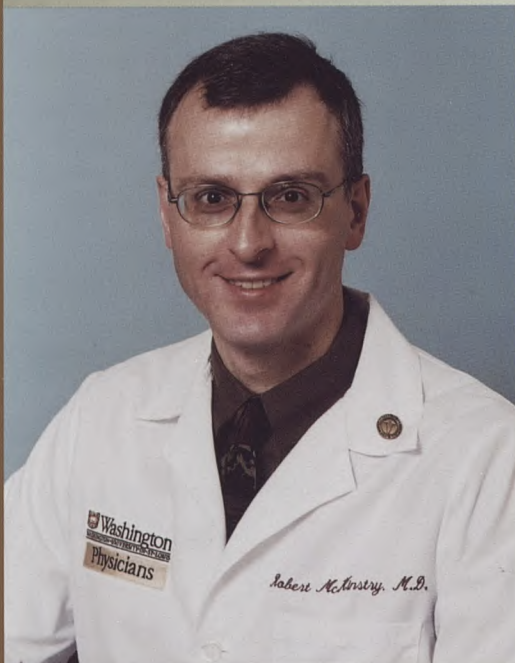
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MIR Mallinckrodt Institute
of Radiology

Visit the MIR web site at
www.mir.wustl.edu

ON THE COVER As director of the Molecular Imaging Center, David Piwnica-Worms, MD, PhD, leads an interdisciplinary research team focused on drug discovery, mechanisms of drug action, and the molecular pharmacology of metallopharmaceuticals. Photograph by Tim Parker.

SPOT NEWS



McKinstry heads pediatric radiology

Robert McKinstry, MD, PhD, associate professor of radiology, was named chief of pediatric radiology. He assumes the leadership position held for many years by William McAlister, MD, professor of radiology, who stepped down to devote more time to clinical responsibilities.

McKinstry has been affiliated with Mallinckrodt Institute since 1993 when he began a diagnostic radiology residency. He later completed a neuroradiology fellowship and joined the Institute's faculty in 1999. His clinical interest in pediatric neuroradiology and his expertise in magnetic resonance imaging (MRI) have led to extensive research in imaging the developing

brain and its response to injury.

He has played an active role in radiology education and currently serves as codirector for the research residency program. He was director for the Institute's neuroradiology and neuroimaging fellowship program for five years.

Jost named RSNA president-elect

At the December 2005 Radiological Society of North America's (RSNA's) annual meeting, Gilbert Jost, MD, chairman of the Department of Radiology and director of Mallinckrodt Institute, was named president-elect of the society. He was elected to the RSNA Board of Directors in 1999 as the liaison-designate for communications and corporate relations, has served as Board chairman since 2004, and will assume the office of president in 2007. Jost is the first MIR faculty member to serve in these RSNA top positions.

More than 38,000 radiologists, radiation oncologists, medical physicists, and related scientists in 116 countries are members of RSNA. Founded in 1915, RSNA is committed to promoting excellence in radiology through education and by fostering research, with the ultimate goal of improving patient care.

Hovsepian elected SIR fellow

David Hovsepian, MD, associate professor of radiology and of general surgery, was elected as a fellow of the Society of Interventional Radiology (SIR) in recognition of his valued contributions to the field of interventional radiology. Now in its 31st year, SIR's members are physicians, scientists, and allied health professionals who are dedicated to improving public health and disease management through minimally invasive, image-guided therapeutic interventions. Fewer than 10 percent of its members are elected to fellowship.

Hovsepian's clinical practice focuses on two areas: gynecological interventions, such as treatment of uterine fibroid tumors and Fallopian tube recanalization for infertility and the treatment of vascular malformations in children and adults.

Siegel authors third textbook

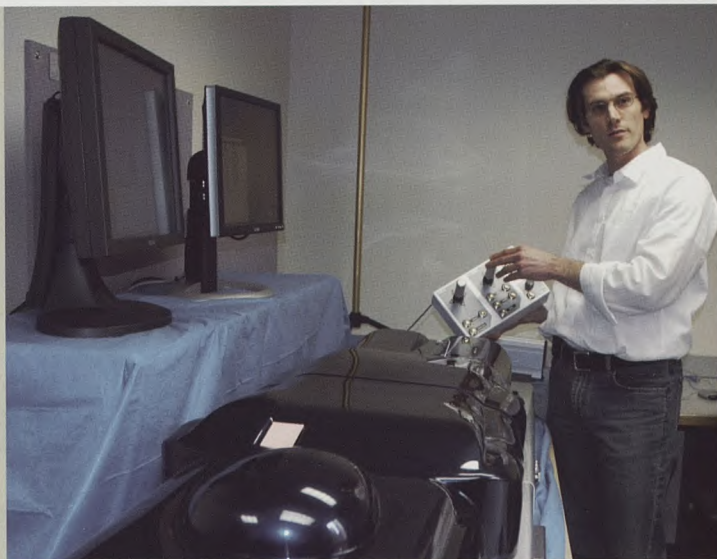
The Core Curriculum: Pediatric Imaging has been hailed as “an indispensable guide for radiology residents’ pediatrics rotations and an excellent study tool for written boards or recertification exams.” Authors Marilyn Siegel, MD, professor of radiology and of pediatrics, and Brian Coley, MD, Department of Radiology at Ohio State University Medical Center, organized the book by anatomic system and included key information about the evaluation of various diseases using current imaging modalities.

Published by Lippincott Williams & Wilkins, the 564-page volume employs a user-friendly format, including margin notes, key review points, chapter outlines, tables, bulleted lists, and boxed text. The book’s hundreds of illustrations are contained in a bound-in image bank CD-ROM.

Practice makes perfect

Much like cockpit simulators are used to train and improve the skills of aircraft pilots, an angiographic simulator may improve radiology resident training, specifically the catheter and guidewire techniques required for endovascular therapy cases being performed in interventional radiology. Karun Sharma, MD, PhD, diagnostic radiology chief resident, has submitted a Radiology Educational Research Development grant proposal to test the viability of this new approach to teaching residents. James Duncan, MD, PhD, assistant professor of radiology in interventional radiology, will serve as Sharma’s mentor. Craig Glaiberman, MD, assistant professor radiology; Christopher Moran, MD, professor of radiology; and Thomas Pilgram, PhD, instructor in radiology, also are involved in the project.

The increasing complexity of radiology procedures and the demand for patient safety quite naturally have led to a need for improved radiology resident education. Sharma will assist in developing a series of narrated video clips showing catheter and guidewire techniques. A resident’s skill acquisition then can be measured using the simulator in a controlled, reproducible, and safe environment. The Mentice Vascular Interventional System Trainer (VIST®) is



a physics-based angiographic unit that offers a well-controlled, ionizing radiation-free environment where training can be matched to the ability of the resident.



Under Sharma’s grant proposal, second-year residents scheduled for an 8-week rotation in the Institute’s interventional radiology service—and with no prior interventional radiology training—will comprise the study population. Simulation-based training will be combined with the existing traditional teaching program; an evaluation will be made of resident skills gained from each teaching protocol.

To see a video clip of this simulation technology, go to www.mir.wustl.edu—click on “Practice Makes Perfect” in the far right-hand column.

Craig Glaiberman, MD, is shown in the sixth-floor simulation area where the “patient” (dark blue supine form) is housed. Here, residents practicing with the simulator can safely develop their skills by maneuvering catheters, injecting contrast, and inflating balloons during angioplasty and stent placement. Three cameras are used to record real-time actions for expert review and feedback.



PAVING THE WAY FOR

IF all goes well, by March of 2007 Mallinckrodt Institute of Radiology (MIR) will have a catalogued computed tomography (CT) image library that could contain more than 12 million images from the National Lung Screening Trial (NLST)—some of those images may hold keys to breakthroughs in diagnosis and treatment.

by Mary Jo Blackwood, RN, MPH, CHES

LIFESAVING RESEARCH

A NATIONAL CT IMAGE LIBRARY FINDS A HOME AT MALLINCKRODT INSTITUTE.

As David Gierada, MD, associate professor of radiology and coprincipal investigator for the Washington University NLST site explains, the purpose of the archive is to make particular types of CT images readily available so that investigators involved in future approved research studies can look at the data from different perspectives and with different premises in mind. One possible application would be to use the images for computer-assisted diagnosis software programs, to test their validity and the algorithms used to design them. "It's an active research field: developing better ways to assist radiologists by refining computer programs to help identify potential lesions. A roadblock has been the lack of collections of scans available to develop and test the algorithms. This library will make an enormous number of scans available," says Gierada.

David Gierada, MD, and (right) Fred Prior, PhD, are shown in the atrium of the Scott Avenue Imaging Center.

NATIONAL LUNG SCREENING TRIAL UPDATE

The NLST began in 2002, with a goal of comparing spiral CT and chest X-ray studies for their effectiveness in reducing deaths from lung cancer. Thirty sites across the country have been collecting data from 50,000 smokers and former smokers. Enrollment was completed in February 2004, with nearly 3,800 participants from the Washington University site. Data come from two different sources: the Prostate, Lung, Colorectal, and Ovarian (PLCO) trial network, which started more than 10 years ago, and the American College of Radiology Network (ACRIN). According to Gierada, the NLST screening phase will be completed in about six months, then the ongoing process will continue for several years.

According to Gierada, Mallinckrodt Institute was already managing imaging quality control for the study, so MIR was a logical facility to house the CT Image Library (or CTIL, as it will be known). The CTIL project involves only the PLCO side of the NLST. Over 34,000 volunteers are enrolled in the PLCO arm of the NLST study, and half of those volunteers received CT scans. Each participant in the CT group receives

one scan a year for three years; each CT scan has an average of 250 slices (or images), making for an enormous potential library of scans available for further study.

The other half of the NLST images are chest X rays and are not being centrally archived at this point. There are two concerns with the chest radiographs. "Those images are being obtained in two formats: film medium and digital," says Gierada. "If we were to archive all images electronically, we would have to digitize all the film radiographs by a standard method to make them comparable. That would involve a tremendous amount of equipment, storage, and cost. We had some discussions with our contacts at NCI [*National Cancer Institute*] about setting up a similar library for those images, but it is not being pursued at the present time due to the cost involved and the fewer potential research applications. Currently, all the X-ray studies are being housed at the individual enrollment sites. However, there may be future discussion of an X-ray library."

PAVING THE WAY FOR
LIFESAVING
RESEARCH



ESTABLISHING THE CT LIBRARY

Kenneth Clark is a research associate in the Institute's Electronic Radiology Laboratory (ERL) and the data coordinator for the CT library. According to Clark, after only a year, about one third of the images, which are housed in the ERL, have been received. Image-study collection at the enrolling sites, delivery of the image studies to the CTIL, and image-study check-in and archiving are complicated laborious processes, involving multiple steps and requiring great attention to detail.

"This library will make an enormous number of scans available."

—David Gierada, MD

To help with the collection process, MIR provided each enrollment site with a laptop computer, a high-capacity external hard drive, software for image collection and transmission, and software for image study de-identification. Testing centers download image studies from their Picture, Archive, and Communications Systems (PACS) to the laptops. The DICOM [*Digital Imaging and Communications in Medicine—an established standard for distributing and viewing any kind of medical image, regardless of the origin*]

Left, top: Paul Koppel, PhD, and (right) David Maffitt



Left, bottom: Mary Wolfsberger and (seated) Joan Moulton scan images for complete coverage of the lungs.

headers of the image studies are then de-identified of protected health information and re-identified only with anonymous participant identifiers (PIDs). PIDs are assigned by Westat, an independent central management and data collection service contracted by NCI to supervise the NLST/PLCO project. De-identified image studies are then delivered to the CTIL either on DVD, on the external hard drive, or transmitted over a Virtual Private Network (called a VPN) on the Internet.

Image studies arriving at the

CTIL are checked to make sure they meet CTIL requirements: proper CT scanner reconstructions, image headers free of protected health

information, and the number of images received match the number of images sent from the originating site. The image studies also are visually inspected to ensure they are images of the lungs, are not corrupted, and contain no protected health information.

Failing image studies are discussed on an individual basis with the originating sites and remedies, where possible, are initiated. Certified image studies that meet all CTIL requirements are committed to the CTIL archive.

USING IMAGES FOR
FURTHER RESEARCH

Obtaining approval to conduct a research study using NLST images or other data is another complicated process: The investigator must submit a study proposal with its protocol to the PLCO-NLST Presentations, Publications, and Associated Studies Committee.

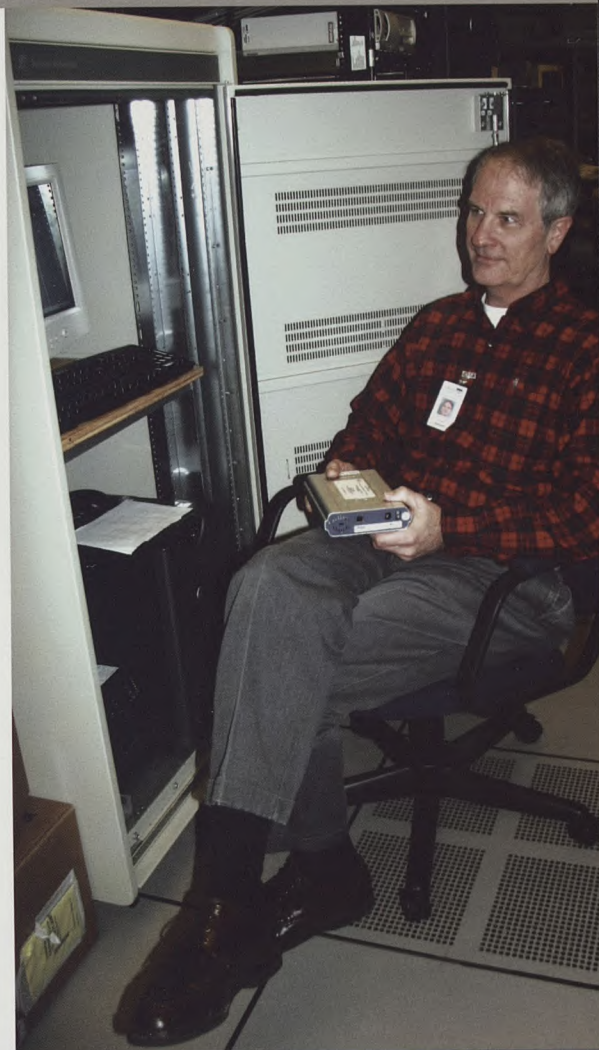
If that group approves it, the proposal is forwarded to the NCI for approval. After it clears NCI, the proposal is sent to the NLST Data Safety and Monitoring Board (DSMB), an independent body that meets twice a year to review the progress of the NLST, insure data integrity, and protect the welfare of the study participants. As part of these responsibilities, the DSMB ensures no data are released to investigators conducting associated studies that would affect the conduct and integrity of the primary study—the NLST in this case. Every large clinical trial must have a DSMB.

Creation of the CTIL will transform virtually all of the screening CT examinations obtained at PLCO-NLST sites into a centralized database for use by imaging researchers who wish to conduct associated studies using CT scans from the NLST. Through anonymous identifiers, the CTIL scans will be linked to the database of clinical information maintained on all NLST participants by Westat. Together, these two databases will provide a powerful means to provide investigators with cases that meet the inclusion criteria of their associated studies. For instance, if a study requiring scans of patients with proven cancer is approved, Westat will be able to generate a list of all such cases and provide the CTIL with ID numbers of the scans to release to the researcher. Because NLST is such a large study, the amount and variability of the data also could be used for important research on other smoking-related diseases such as emphysema and coronary artery disease. The NCI encourages this but stipulates that appropriate safeguards must be kept in place.

MEETING FUTURE NEEDS

During the processing of the images received so far, Gierada says the CTIL team has learned that visual inspection of all images is necessary, yet prohibitively time-consuming. In order to meet the March 2007 goal of cataloguing the images, the team has added part-time film-viewing personnel. "Meeting our goal depends on two things: screening centers transmitting all their scans to us in a timely manner and the CTIL staff viewing every scan submitted. This has to be accomplished with the constraints of the funding allocated to the project. NCI has agreed that in case the scans cannot be completely archived by the target date, the clinically most significant scans should be viewed first so they will be accessible earlier. Our goal is to make all of the scans available at the earliest possible time, while still maintaining the quality control of the process."

Kenneth Clark is shown in front of the equipment that manages NLST quality assurance. He's holding an external disk drive that can hold nearly 1,000 studies.



CTIL TEAM

- David Gierada, MD—NLST coprincipal investigator at Washington University in St. Louis
- Fred Prior, PhD—ERL codirector and CTIL systems architect
- Stephen Moore—Project manager, De-identification software author
- Kenneth Clark—Data coordinator
- David Maffitt—CTIL database management and Web site tracking software author
- Paul Koppel, PhD—Systems administrator
- Stanley Phillips—Network administrator
- Mary Wolfsberger and Joan Moulton—CTIL librarians
- Angelica Cosas, Patricia Ruelweler, and Rochelle Williams—Part-time image viewers

Editor's note: In 1983, the American College of Radiology and the National Electrical Manufacturers Association formed a joint committee to create a standard method for the transmission of medical images and associated data. For more information about DICOM, go to <http://DICOM.nema.org>. Or you can go to www.rsna.org and click on "Technology" in the left-hand column.



RSNA

Connecting for Lifelong Learning

THE 91ST SCIENTIFIC ASSEMBLY AND ANNUAL MEETING OF THE
RADIOLOGICAL SOCIETY OF NORTH AMERICA

NOVEMBER 27 – DECEMBER 2, 2005
CHICAGO, ILLINOIS



*“Communication between the fields of diagnostic and
therapeutic radiology has never been as important as it is today.”*

— David Hussey, MD, 2005 RSNA president



MIR PRESENTATIONS AT RSNA 2005

CASES OF THE DAY

Sanjeev Bhalla, MD, Chest; Gastrointestinal

EXHIBITS

Sanjeev Bhalla, MD; Christina Menias, MD, "Idiopathic inflammatory lesions from neck to pelvis"—*CERTIFICATE OF MERIT AWARD*

Ranista Tongdee, MD; Christine Menias, MD; Vamsidhar Narra, MD, "Vaginal masses: magnetic resonance imaging features with pathologic correlation"—*CERTIFICATE OF MERIT AWARD* and *EXCELLENCE IN DESIGN AWARD*

Christine Menias, MD; Sanjeev Bhalla, MD; Vamsidhar Narra, MD; Jeffrey Brown, MD, "Imaging manifestations of visceral hemangiomatosis syndromes"—*CERTIFICATE OF MERIT AWARD*

Lihuan Wang, MD; Brett Gratz, MD; Christine Peterson, MD; Christine Menias, MD; Sanjeev Bhalla, MD; Jay Heiken, MD, "Abdominal aortic aneurysm rupture—CT features: a pictorial review"—*CERTIFICATE OF MERIT AWARD*

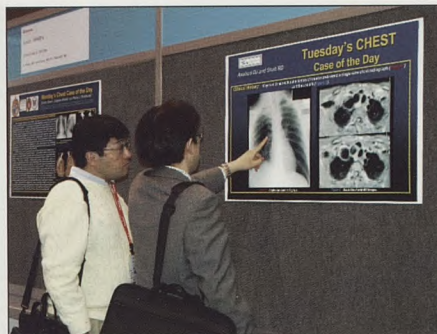
Sanjeev Bhalla, MD; Jamie Colonnello, MD; Fernando Gutierrez, MD; Christine Menias, MD, "Cardiac emergencies and CT"

Sanjeev Bhalla, MD; Tabassum Ahmed, MD; Christine Menias, MD; Fernando Gutierrez, MD, "The renaissance of imaging in pulmonary hypertension: MDCT and the Venice classification"

Vamsidhar Narra, MD; Christine Menias, MD; Kyongtae Bae, MD, PhD, "Contrast enhancement and morphologic features of focal nodular hyperplasia depicted on contrast-enhanced MRI"

Kyongtae Bae, MD, PhD; Vamsidhar Narra, MD, "Review of benign renal lesions misdiagnosed as renal cell carcinoma on magnetic resonance imaging"

Vamsidhar Narra, MD; Jeffrey Brown, MD, "The role of magnetic resonance imaging in the radiologic work-up of subtypes of renal cell carcinoma"



Christine Menias, MD; Christine Peterson, MD; Brett Gratz, MD; Sanjeev Bhalla, MD, "CT of pregnancy-related complications"

Ryan Murtagh, MD, MBA; Franz Wippold, MD; Robert McKinstry, MD, PhD, "Neuroradiology/head and neck (interventions and miscellaneous)—Review of the new American Society of Neuroradiology lumbar disc disease nomenclature and its relationship to the understanding of degenerative and traumatic disc disease"

Cylen Javidan-Nejad, MD; Pamela Woodard, MD; Sanjeev Bhalla, MD; Robert Gropler, MD; Fernando Gutierrez, MD, "Left ventricular aneurysms and pseudoaneurysms: imaging features, clinical implications, and surgical repair"

Vamsidhar Narra, MD; Christine Menias, MD, "Molecular biology and cytogenetics of ovarian cancers: implications on diagnosis and treatment"

Vamsidhar Narra, MD, "Characterization of benign hepatic neoplasms: impact of recent advances in cross-sectional imaging"; "Tumors of the perivascular epithelioid cell (PEComas): imaging findings with radiologic-pathologic correlation"; "MIRC case studies: using MIRC software for education and research"

Lisa Wang, MD; Anil Dasyam, MD; Christine Menias, MD; Cary Siegel, MD; Jay Heiken, MD; Kyongtae Bae, MD, PhD, "MDCTU: recent protocols, optimization schemes, and image interpretation"

DID YOU KNOW THAT...

- the RSNA meeting in Chicago is called the world's largest annual medical meeting?
- of the more than 38,300 RSNA members in 116 countries, approximately 5,900 have been members for 25-plus years?
- November 2005 marked the 110th anniversary of the discovery of X rays?
- there are 31,532 RSNA members in North America?
- the RSNA annual meeting has been held consecutively in Chicago since 1985?
- the first meeting held in McCormick Place was in 1975?



Dale Lange (left) and Debbie Melius from MIR's Information Systems group previewed the latest version of teleradiology software (PiCOM) being demonstrated at the ScImage booth.

RSNA

PLENARY SESSIONS

Colin Derdeyn, MD, instructor: Point/counterpoint: controversial issues in neuroradiology, part II. Are distal protection devices necessary in carotid stent placement?

Robert McKinstry, MD, PhD, instructor: Point/counterpoint: controversial issues in neuroradiology, part I—3T versus 1.5T: Does higher field strength imaging make a clinical difference in diagnosis and treatment?

REFRESHER COURSES

Michael Darcy, MD, instructor: Case-based review of interventional radiology: nonvascular intervention

Farrokh Dehdashti, MD; Barry Siegel, MD, moderators: PET in clinical practice minicourse: oncologic PET I

Farrokh Dehdashti, MD, instructor: Tumor diagnosis and staging

Robert Gropler, MD, instructor: Assessing myocardial viability: SPECT/PET and MR/multidetector CT; Cardiac PET

Jay Heiken, MD, instructor: CT of the acute abdomen: bowel origin (an interactive session)

David Hovsepian, MD, instructor: Hysterosalpingography and selective salpingography ("hands-on" workshop)

Mark Mintun, MD, instructor: Brain PET: approach to the image and use in dementia

Barbara Monsees, MD, instructor: Categorical course in diagnostic radiology: breast imaging—mammography: interpretation pointers for detection of early breast cancer: Supplementary views

RSNA 2005 FACTS AND FIGURES

- 1,230 Education Exhibit abstracts accepted
- 2,083 Scientific Abstracts accepted
- 299 Refresher Courses offered
- More than 61,000 attendees
- 718 vendor exhibitors
- 489,359 square feet of exhibit area

Vamsidhar Narra, MD, instructor: Imaging for prostate cancer radiation therapy planning: Imaging

David Piwnica-Worms, MD, PhD, instructor: Molecular-genetic imaging—Reporter systems in molecular imaging: a comparative analysis

Barry Siegel, MD, instructor: Oncologic PET II: monitoring and predicting response to treatment

Barry Siegel, MD, director: PET in clinical practice minicourse: basic principles; PET in clinical practice minicourse: neurologic and cardiologic applications; PET in clinical practice minicourse: oncologic PET II

Marilyn Siegel, MD, instructor: Essentials of cardiovascular imaging—Cardiac CT: beyond the coronary arteries; Pediatric vascular imaging with CT and MR: thoraco-abdominal; Techniques and applications for vascular imaging in children: multidetector CT of pediatric cardiovascular disorders

Pamela Woodard, MD, instructor: Cardiac MR and CT: read cases with the experts (an interactive session)

SCIENTIFIC PRESENTATIONS

Kyongtae Bae, MD, PhD, presiding officer: Genitourinary (upper tract MR imaging); Gastrointestinal (abdominal CT: contrast enhancement and scan timing)

Michael Darcy, MD, moderator: Vascular/interventional (CT angiography)

Colin Derdeyn, MD, moderator: Neuroradiology/head and neck (stroke: interventional)

Louis Gilula, MD, moderator: Musculoskeletal (interventional: nonvascular)

Barbara Monsees, MD, moderator: Breast (Interventional)

Vamsidhar Narra, MD, moderator: Gastrointestinal (liver: focal lesions—MR)

Daniel Picus, MD, presiding officer: Vascular/interventional (vascular: visceral)

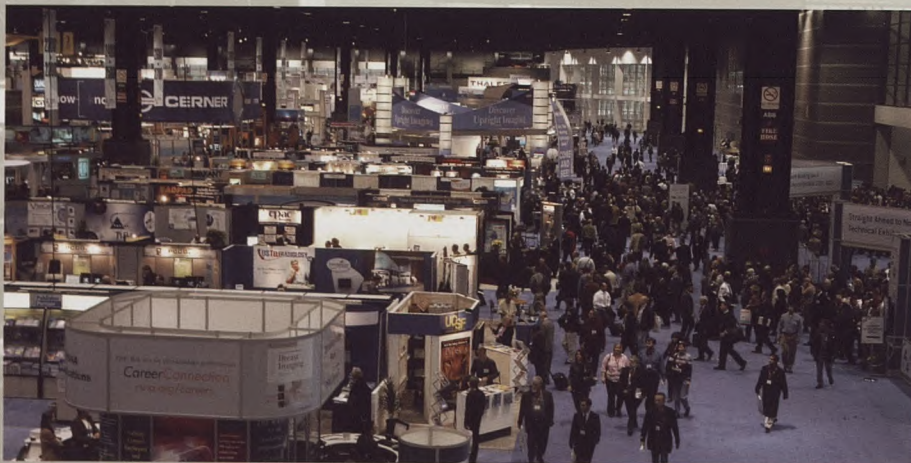
David Rubin, MD, moderator: Musculoskeletal (knee: internal derangement)

Sharlene Teefey, MD, moderator: Gastrointestinal (ultrasound: liver, contrast-enhanced)

Pamela Woodard, MD, moderator: Cardiac (MR imaging: myocardial perfusion, stress, and functional imaging)

Kyongtae Bae, MD, PhD; Cheng Tao, MD; Cheng Hong, MD, PhD; Fang Zhu, MD, PhD; Margherita Milite, PhD; Charles Hildebolt, DDS, PhD, "Degree of contrast enhancement in pulmonary CTA with MDCT: association with body weight and volume of contrast medium"

Kyongtae Bae, MD, PhD; Fang Zhu, MD, PhD, "MRI-based volumetric evaluation of complex cysts in patients with autosomal dominant polycystic kidney"



Kyongtae Bae, MD, PhD; Parinaz Massoumzadeh, PhD; Anil Dasyam, MD; Bruce Whiting, PhD, "Radiation dose reduction in MDCT urography: depiction of abnormalities on low-radiation-dose CT images simulated from clinical scans"

Kyongtae Bae, MD, PhD; Cheng Hong, MD, PhD; James Wible, PhD; Thomas Pilgram, PhD, "Contrast medium enhancement in aorta and liver in MDCT: effect of high concentration contrast medium in porcine model"

Daniel Brown, MD, "ISP: vascular/interventional (radiation and complications)"

Steven Don, MD; Bruce Whiting, PhD; Charles Hildebolt, DDS, PhD, "Pediatric (chest) neonatal pneumothorax simulation in a tissue-mimicking, digital-imaging phantom: observer performance"

David Gierada, MD; Thomas Pilgram, PhD; NLST Quality Assurance Working Group, "INTEROBSERVER agreement among low dose CT scan readers in the prostate, lung, colorectal, and ovarian cancer screening trial network of the National Lung Screening Trial"

Jin Mo Goo, MD, PhD; Kwang Gi Kim, PhD; David Gierada, MD; Kyongtae Bae, MD, PhD, "Volumetric measurements of lung nodules at MDCT: effect of changes in lung volume"

Cheng Hong, MD, PhD; Thomas Pilgram, PhD; Gregorio Sicard, MD; Jay Heiken, MD; Jennifer Gould, MD; Kyongtae Bae, MD, PhD, "Endoleaks after endovascular repair of abdominal aortic aneurysms: computed tomographic follow-up and significance"

Kevin Johnson, MD; Marilyn Siegel, MD; Charles Hildebolt, DDS, PhD; Sanjeev Bhalla, MD; Cylon Javidan-Nejad, MD; Fernando Gutierrez, MD, "CT angiography of tricuspid atresia"

Luis Landeras, MD; Vamsidhar Narra, MD; Jeffrey Brown, MD; Kyongtae Bae, MD, PhD, "The optimal signal intensity drop for diagnosing adrenal adenomas on MR chemical shift imaging"

Shao-Pow Lin, MD, PhD, "In vivo tracking of stem cell migration with magnetic resonance imaging"

Parinaz Massoumzadeh, PhD; Steven Don, MD; Kyongtae Bae, MD, PhD; Bruce Whiting, PhD, "CT dose reduction simulation tool: validation and task-specific clinical applications"

Lisa Wang, MD, "Abdominal aortic aneurysm rupture—CT features: a pictorial review"

Lisa Wang, MD; Brett Gratz, MD; Christine Menias, MD; Christine Menias, MD; Sanjeev Bhalla, MD; Jay Heiken, MD, "Abdominal aortic aneurysm rupture: diagnostic usefulness of secondary CT signs"

Lisa Wang, MD; Anil Dasyam, MD; Christine Menias, MD; Cary Siegel, MD; Jay Heiken, MD; Kyongtae Bae, MD, PhD, "MDCTU: recent protocols, optimization schemes, and image interpretation"

Franz Wippold, MD, "Contrast-enhanced MR imaging of CNS lesions: results of a large scale intraindividual crossover comparison of gadobenate dimeglumine versus gadopentetate dimeglumine"

Pamela Woodard, MD; Donna Lesniak, BSN; Robert Gropler, MD, "Cardiac (MR imaging: general cardiac diagnosis)—Comparison of transesophageal echocardiography (TEE) versus MRI for the detection of left atrial appendage thrombus"

SYMPOSIA

Daniel Brown, MD, presenter: Interventional oncology. Bone—How I do it: radiofrequency ablation and stabilization; panelist: Bone: Panel discussion

Joel Garbow, PhD; Jason Lewis, PhD; Robert Mach, PhD, "Interventional Oncology. Animal models for image-guided cancer therapy: in vivo monitoring of therapeutic response in a murine model of glioma using small animal MR and PET imaging"

Right: A familiar face on the American College of Radiology's kiosk—Barry Siegel, MD, chief of MIR's Division of Nuclear Medicine.



The Annual
MIR
Reception at
RSNA

ON NOVEMBER 28,
 FACULTY, ALUMNI, AND
 FRIENDS OF THE INSTITUTE
 GATHERED IN THE HYATT
 REGENCY'S MAGNIFICENT
 CRYSTAL BALLROOM TO
 VISIT AND TO SAMPLE THE
 "TASTES OF CHICAGO" BUFFET.



Dennis Balfe, MD, professor of radiology, and (right) former MIR faculty member Clark West, MD



Gilbert Jost, MD, director of the Institute, and (right) MIR alumnus Donald Wadsworth, MD



MIR alumnus Patrick Lester, MD, and (right) Gary Brink, director of radiology, Barnes-Jewish Hospital.



Pietro Biondetti, MD, radiology chairman of Milan, Italy's Ospedale Maggiore Hospital, and (right) James Brink, MD former MIR faculty member



(Left to right) Colin Peterson, MIR systems manager; Karun Sharma, MD, radiology chief resident; Kevin Lee, MD, radiology chief resident; and Christine Peterson, MD, abdominal imaging clinical fellow

RSNA HISTORY

- The Radiological Society of North America (RSNA) was begun in December 1915 by four Midwestern radiologists—three of whom were from St. Louis.
- The regional Western Roentgen Society, as RSNA was originally called, was to be independent from the American Roentgen Ray Society (ARRS), the dominant radiology organization that was comprised mostly of radiologists from the Eastern states.
- The first meeting was held on December 15 and 16, 1915, in downtown Chicago because it was deemed a central location that was convenient for most Midwestern radiologists.
- The first Gold Medal Award was presented in 1917 to Heber Robarts, MD, a St. Louis radiologist and charter member of the Western Roentgen Society.
- The first issue of the *Journal of Roentgenology*, the new society's first medical publication, was published in 1918.
- The Western Roentgen Society was renamed the Radiological Society of North America in 1919; that same year, the *Journal of Roentgenology* was renamed the *Journal of Radiology*.
- In 1975 the RSNA Annual Meeting moved from its cramped quarters in Chicago's Palmer House hotel to the more spacious convention center called McCormick Place—more than 12,000 radiologists and exhibitors attended the six-day meeting.

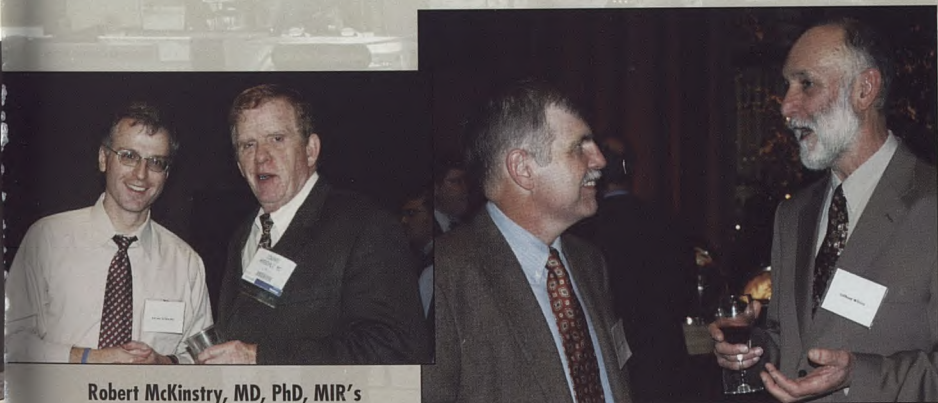
Editor's Note: This information was extracted from the 25-part "History of the Radiological Society of North America," which is on the RSNA's web site at www.rsna.org/about/history.



(Left to right) Neha Dahiya; Sanjeev Bhalla, MD, assistant professor of radiology; Bonnie Joe, MD, PhD, MIR alumna; Hal Bennett, MD, former MIR faculty member; and Hank Chen, MD, MIR alumnus

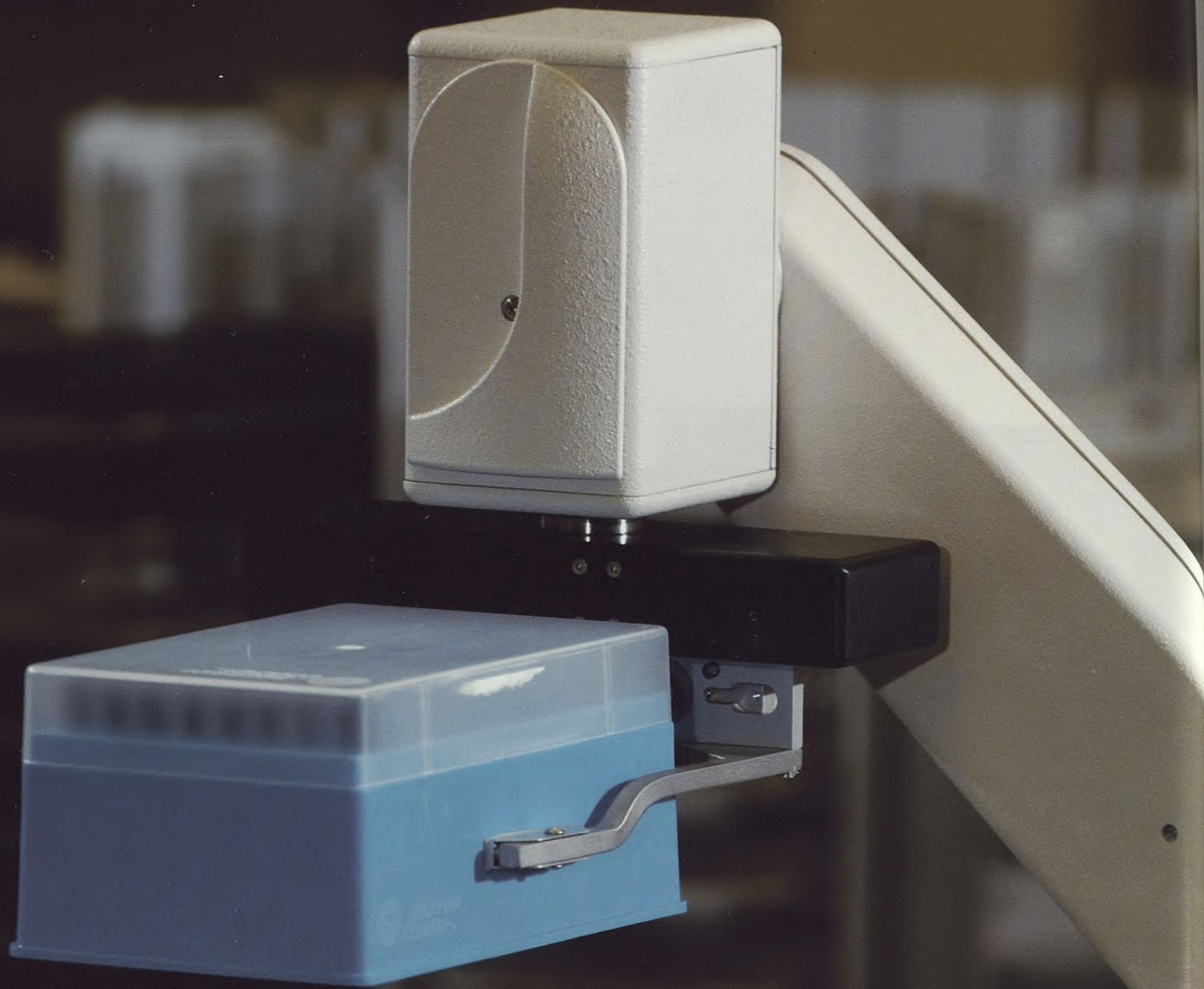


Peggy Jost and Tom McCausland of Siemens Medical Solutions



Robert McKinstry, MD, PhD, MIR's chief of pediatric radiology, and (right) MIR alumnus Edward Ragsdale, MD

William Dawson, MD, chief of radiology, Barnes-Jewish St. Peters Hospital, and (right) Anthony Wilson, MD, former MIR faculty member



At the Core:

ADVANCES IN MOLECULAR IMAGING

A NEW LAB ASSISTANT in Mallinckrodt Institute of Radiology's (MIR's) Molecular Imaging Center is proving to be an exceptional member of the team. Known to his colleagues as Marvin, he is a tireless worker with enough energy for a 24-hour day. Marvin's lab is spotless, with nary a particle of dust on the shiny black countertops. He puts all his materials away when finished, snapping lids onto well plates and seeing that they are replaced in the proper incubators or coolers. And Marvin is barely two years old.

by Anne Kessen Lowell

Optimized Robot for Chemical Analysis (ORCA)

Marvin

is a Beckman-Coulter Sagian Optimized Robot for Chemical Analysis (ORCA). He is the linchpin of the new High-Throughput Screening Robotics Core of the Molecular Imaging Center. Named after the self-effacing little robot from *The Hitchhiker's Guide to the Galaxy* (a science fiction comedy series created in 1978 by Douglas Adams originally for BBC Radio), Marvin is the latest resource in the high-tech toolkit at MIR's Molecular Imaging Center. The Center was established in 2002 to take advantage of remarkable advances in molecular biology research and imaging technologies to examine disease processes at the cellular and molecular level.

David Piwnica-Worms, MD, PhD, director of the Molecular Imaging Center, is bullish about the potential of the Core. "The Core is opening a whole new domain of molecular imaging, biology, and drug screening that just was not available before. We will have a new window into the complex cellular processes involved in life-threatening diseases, and we can seek out optimal treatment and prevention strategies aimed at those diseases. We even have the potential to identify individualized therapies for different patients."

Drs. Raphael Kopan, Helen Piwnica-Worms, and (right) David Piwnica-Worms are shown with Marvin.

The Core is the brainchild of Piwnica-Worms, professor of radiology and of molecular biology and pharmacology; his wife and colleague Helen Piwnica-Worms, PhD, professor of cell biology and physiology; and Raphael Kopan, PhD, professor of molecular biology and pharmacology. The trio spent two years conceptualizing, designing, and building the robotic system, laboratory, and computer needs. The Core is a multi-departmental element of the University's BioMed 21 project, supported by funding from the departments of Radiology, Molecular Biology and Pharmacology, and Cell Biology; and from the Siteman Cancer Center, Howard Hughes Medical Institute and

National Institutes of Health.

The power of the system is summed up in the term "high-throughput screening core." High-throughput screening refers to the ability of the system to process thousands of cell-based or chemical-based experiments in a single day. Core reflects a fundamental technology that is widely applicable to and will support the work of many disciplines and departments. In fact, six departments from the Washington University in St. Louis medical and Hilltop campuses have already signed up to run projects in the Core: molecular biology/pharmacology, neurology, cell biology, radiology, biochemistry, and internal medicine.



At the Core:

ADVANCES IN MOLECULAR IMAGING



Can you hear me now?

The intricate workings of the human cell and the communication system that runs the body have intrigued scientists since the 17th century, when Robert Hooke coined the term cell to describe slices of cork bark he viewed through a primitive microscope of his own design. The successful decoding of the human genome, in which Washington University's Genome Sequencing Center played a major role, has contributed vast new stores of knowledge to the fields of genetics, molecular biology, signal transduction, and molecular imaging. Now, says Piwnica-Worms, the fields have much to grapple with. "Imagine that someone took apart a BMW auto-

mobile and put all the parts on the floor of a garage. That's what gene sequencing did. Now our job is to understand the function of all those parts and how they contribute as a whole to making the car operate."

Signal transduction research today focuses on instructions that genes send throughout the body, that make human engines run properly. As long as cells send and receive their instructions correctly, our bodies enjoy normal function. But should an instruction go awry, at the sending, during delivery, or at the receiving end, a malfunction may occur and result in disease.

Simply put, each of our genes contains DNA, which in turn contains specific instructions meant to tell our cells what to do or what enzymes to make. These instructions are translated into proteins by the helpful messenger RNA, or mRNA, which relies on transfer RNA (tRNA) and other proteins to

Marvin glides up and down a track that is approximately nine feet in length. The blue object held in the robot's arm is a box of tips used to dispense cells, buffers, and libraries into well plates—one of hundreds that Marvin can process daily.

provide the machinery for the job. That cell will then carry out its task, which may be to divide, die, produce another protein (a hormone, enzyme, or antibody), or to continue a signaling process to additional proteins or other cells or proteins. Malfunctions in these intracellular and intercellular signaling processes are implicated in many types of cancers and other serious diseases.

Piwnica-Worms and his colleagues want to understand where in the process the signals are disrupted, to determine an early diagnosis method to use before symptoms occur, and to discover new and effective drug treatments targeted at the bull's-eye of the malfunction.

The mathematics of the human genome and its complementary proteins reveal how essential a high-throughput system is in studying cellular signaling and interactions. The Genome Project discovered about 25,000 genes in the human body. Each one contains a "recipe" for one or more protein concoctions that are modified depending on which cell it sends the recipe to. In all, there are believed to be between one million and five million proteins being cooked up in the cells of our bodies. Studying this cookbook in combination with newly available libraries of cellular and chemical structures (interfering RNAs, small molecules, and potential drug treatments) creates a mammoth volume of data that demands a high-throughput solution. Marvin, cool as a cucumber, can handle it.

Optimized Robot for Chemical Analysis (ORCA)

Core projects

One of the Core's first projects will look at protein-to-protein interactions in living cells using a specialized bioluminescent gene that Piwnica-Worms and his colleagues designed. Recent discoveries in molecular cell biology show that cell signaling continues after the initial message is sent from a gene to a target within the cell. Once an instruction to produce a protein is carried out, there may be additional signals sent down the line for a protein to interact with another protein. Viewing this signaling cascade in live tissue has considerable potential. "If we can isolate the protein-to-protein interactions that accompany cellular dysfunction," says Piwnica-Worms, "we may eventually be able to diagnose disease in people before symptoms appear, leading to earlier and, hopefully, more effective treatment."

Another major initial research effort will try to clear one of the most frustrating and puzzling clinical roadblocks in cancer treatment: multi-drug resistance (MDR). In certain cancers, especially of the breast, liver and kidney, an overabundance of a particular protein actually pumps chemotherapy treatment out of the organ being treated. MDR acts against many types of chemotherapy drugs, even if they have different chemical make-ups. High-throughput technology gives researchers a leapfrog advantage in understanding MDR.

Piwnica-Worms will use the recent discovery of the role of small interfering RNA, or siRNA, which prevents gene signaling from completing its course, to tease information out of MDR-involved genes. siRNA is a double-stranded form of RNA that cells do not normally utilize. When cells encounter siRNA, they attempt to destroy it, along with any mRNA that the cell

associates with it. Whatever instructions the mRNA was carrying will not be applied. This process probably evolved as a natural defense against viruses, some of which contain double-stranded RNA.

"This process existed in our bodies, and we didn't even know it. Now we can use it in a "knock-down" strategy, selectively knocking down or reducing gene expression," says Piwnica-Worms. The research team will combine siRNAs with suspect genes and watch the interactions, hoping to find the combination that halts the production of the multi-drug resistant protein.

But which siRNA should be used against which gene, and at which stage in the signaling process? Enter Marvin to take on the Herculean task of testing entire groups, or libraries, of siRNAs against a multitude of genes and their protein assignments.

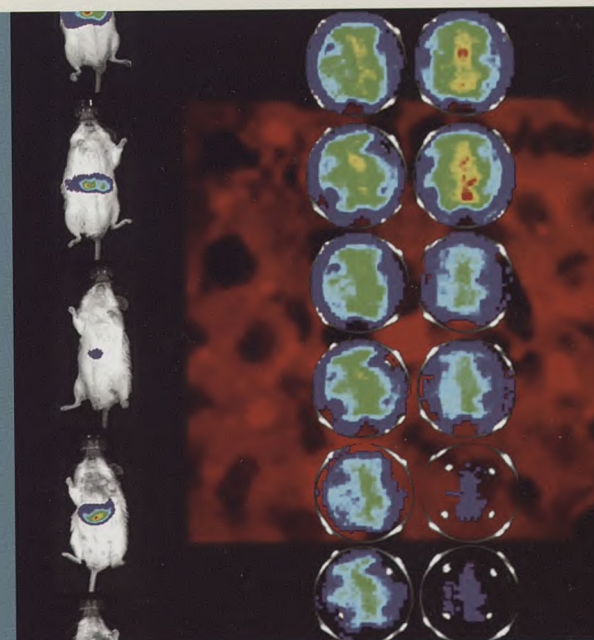
Bioluminescence

The flash of a firefly on a warm summer night is a delight to young and old alike. But we may not be aware of the important role this glowing bug—and its counterparts in nature, the Caribbean click beetle and coral-like *Renilla reniformis* organism—plays in molecular imaging. Bioluminescence (the application of these insects' glow to the study of cells, proteins, and their interactions) enables researchers to understand the origins of disease. Using biotechnology, scientists attach an alien gene, such as the firefly gene that expresses luminescence, to genes coded for a particular protein of interest. When that gene sends out its instructions and the protein is produced, the action is advertised in bright yellow, green, or red, depending on

which glowing gene was used. The results can be imaged optically and recorded in a computer database.

Although bioluminescence has been in use for several years, it was not applicable to the study of protein-to-protein interaction until 2004 when Piwnica-Worms' laboratory engineered a new type of luciferase (an enzyme that causes a compound derived from certain insects to produce a type of light)—the first luciferase that highlights protein-to-protein interactions and can be used in cell lysates, live cells, and live animals.

In this image, a human gene was linked to firefly luciferase to achieve bioluminescence in a mouse model of disease. For details, see volume 2, pages 607-614, 2005 issue of *Nature Methods*.



At the Core:

ADVANCES IN MOLECULAR IMAGING

A day in the life of Marvin

The high-throughput core's automation allows thousands of individual experiments to be run each day. With a to-do list programmed into a central computer, Marvin's robot arm runs the show. He starts with a well plate (containing either 96 or 384 tiny wells), inserts the cells or chemicals to be studied, adds any required reagents, bioluminescent or fluorescent compounds, and gently shakes the plate to mix the solutions thoroughly. After the plate is tagged with a bar code, the process continues with incubation if needed; then the well plate is sent on to the optical reader and computer. Data are recorded in a number grid corresponding to the well-plate layout. (The team even records results with visual images.) Data are saved in a central repository and are readily available to the researcher.

Without automation, only 100 or so similar experiments might be accomplished in an eight-hour workday. Mechanization increases reliability, as liquids are dispensed into well plates with precise uniformity, a significant advantage over manually transferring small volumes of liquids into pipettes. Thanks to the layout of equipment along a nine-foot rail, Marvin can scoot back and forth working on several well plates at one time. If a piece of equipment is missing or an instruction is not properly given, Marvin interrupts his routine to page Jayne Marasa, the laboratory manager.

Later this year, Piwnica-Worms hopes to install additional equipment to record real-time video of live-cell interactions that previously could not have been viewed except by standing over a microscope and observing. Using a script written by the research team, Marvin will hold auditions, make the sets, film the movie, edit it, and show the final cut in a bioinformatics theater.

among researchers who didn't even know they were interested in the same topic." Only summaries will be extracted from the repository, leaving data points and results secure and only accessible by the researcher in charge.

"Simply put," says Tarbox, "we are trying to 'Google-ize' the data—although this system will require vastly more complicated searches than you would try by using the Google search engine on the Internet."

A promising future

The breakneck pace of new discoveries in the molecular imaging field continues to open new paths for exploration. New components are being added to the molecular imaging toolkit to keep pace. The core is the most powerful tool to date, helping researchers explore huge stockpiles of genetic and chemical information and determine which path leads most directly to improved disease diagnosis and possibly to effective treatment tailored to individual genetic profiles.

Piwnica-Worms looks forward to the synergy the core makes possible. "I like the collegial interactive environment that has made Washington University famous. And that environment is a great part of what has made our core project in molecular imaging so successful. We have the ability to combine so many circles of expertise, including the medical and Hilltop campuses, researchers and clinicians, academics and industry." ■■■

Bioinformatics makes the connections

Bioinformatics holds the key to connecting heaps of diverse data points together and connecting departments and disciplines to common interests. "We want to facilitate collaboration among researchers," says Lawrence Tarbox, PhD, research assistant professor of radiology and part of the team setting up the complicated computer support for the core. "If investigators want to know if a colleague has tackled a particular question at the core, they will be able to view information summaries in the data repository and find out who has been working on it. We hope to encourage collaboration

Editor's Note: For more information about the High Throughput Robotics Core and Marvin, go online at <http://molecool.wustl.edu/robotics.html>.

The Society for
**Molecular
Imaging**

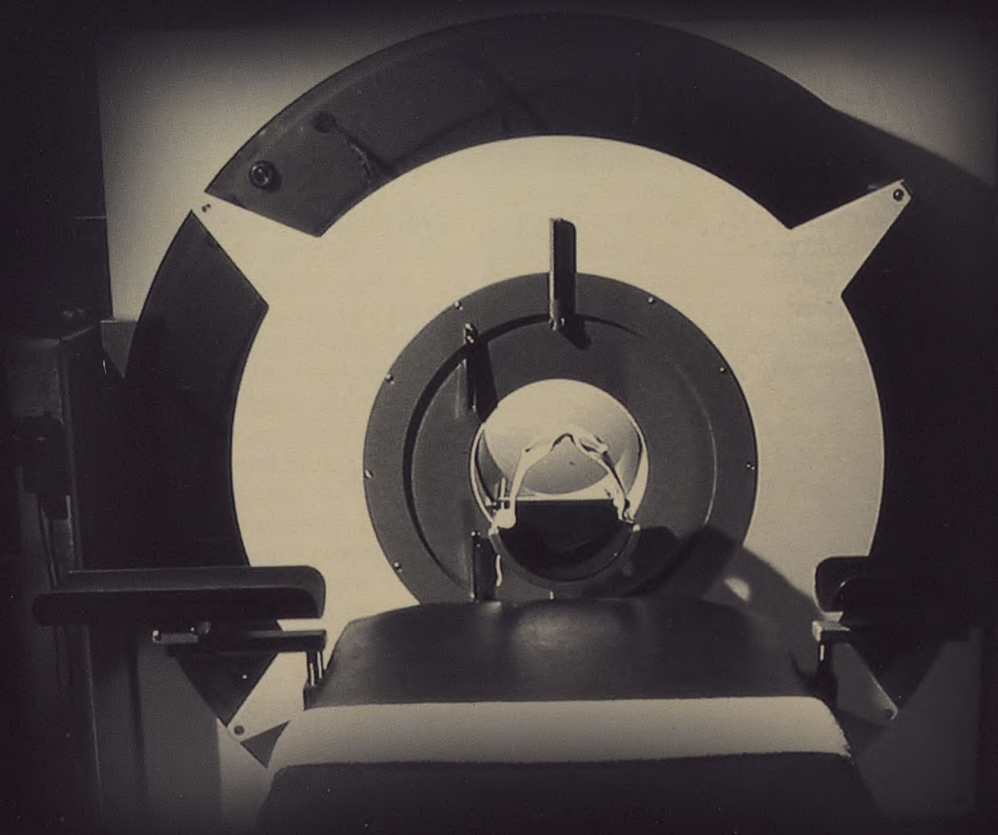
Now in its fifth year, The Society for Molecular Imaging (SMI) is an international scientific organization dedicated to "advancing the understanding of biology and medicine through the non-invasive in vivo investigation of molecular cellular events in the normal and pathological processes." Since 2002, SMI has presented an annual award to a researcher who has made a fundamental discovery that has changed the direction of molecular imaging.

In October, David Piwnica-Worms, MD, PhD, was named the 2005 recipient of the SMI Achievement Award. He is a founding member and past president of the Society.

PET *and* Politics: Part II

by Candace O'Connor

This article is a follow-up to "PET, Gynecologic Cancers, and Politics," which ran in the Summer/Fall 2005 issue of Focal Spot magazine. The 2005 issue is available online at www.mir.wustl.edu—click on "Publications" (top of page), choose "Focal Spot" in menu selection.





As chief of Mallinckrodt Institute's Division of Nuclear Medicine, Barry Siegel, MD, usually focuses his efforts on medical practice, research, and teaching.

But in recent months, he and several colleagues have been spending time in a far different world: of politics, red tape, and an alphabet soup of government agencies and medical groups. Their goal? To extend the use of positron-emission tomography (PET) scanning to people with a broad range of cancers, by convincing the Centers for Medicare and Medicaid Services (CMS) to provide these patients with Medicare coverage.

The physicians have achieved a crucial first step: the National Oncologic PET Registry (NOPR), sponsored by the Academy of Molecular Imaging (AMI) and managed through the American College of Radiology Imaging Network (ACRIN) opened in February 2006. Each time physicians from participating medical centers use PET involving patients with certain cancers, they submit data to the NOPR, which will compile the results to assess the impact

of PET on patient management; in turn, Medicare will pay for the studies. If the overall results prove positive, Medicare — which now covers only selected cancers — will agree to cover these additional PET uses permanently.

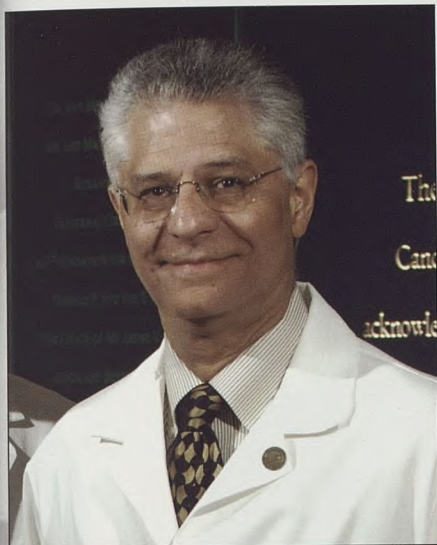
“Through this registry, many patients who could not get PET scans before will now have the technology available to them, and their physicians can use this tool to help manage their treatment,” says Siegel. “My colleagues and I believe that PET is a highly effective cancer imaging technique that helps with many problems. It has been unfortunate that, since the basic biological principle of PET is

the same across all types of cancers, some cancers were covered while others were not.”

Siegel, who calls himself “an evangelist for PET,” took a leadership role in pressing for broader PET coverage and in organizing this registry, which he cochairs with Bruce Hillner, MD of Virginia Commonwealth University. They were joined by one-time Washington University medical student and Mallinckrodt Institute resident and faculty member Edward Coleman, MD, now chief of the Division of Nuclear Medicine at Duke University, and oncologist Anthony Shields, MD, PhD, of Wayne State University.

“More people will have the benefit of the improved ability of PET to stage cancer and to provide an early response assessment of cancer therapy...”

—Barry Siegel, MD



Barry Siegel, MD

“We are optimistic that the results of the registry will show the utility of PET imaging in less prevalent cancers,” says Coleman. “Through physician questionnaires, we will quantify how often PET changes the referring physician’s management plan, and that will have an impact on PET coverage by Medicare and other third-party payers.”

But reaching this point took years of work. While other imaging modalities (such as magnetic resonance imaging and computed tomography) have always been broadly covered for use in cancer imaging, PET has not. The roots of this discrepancy go back more than a decade when the Health Care Financing Administration (HCFA), the agency then adminis-

tering Medicare, first considered covering PET. At that very point, HCFA (later re-named CMS) was just deciding to require scientific evidence that new modalities changed patient management and improved outcomes.

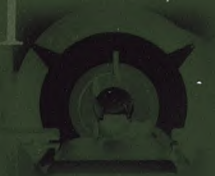
So HCFA decided not to approve PET broadly but instead gave approval for individual cancers: the characterization of lung nodules and the initial staging of patients with non-small-cell lung cancer in 1998; the restaging of patients with suspected recurrent colorectal cancer, some lymphoma cases, and the possible recurrence of melanoma in 1999; the diagnosis, staging and restaging of non-small-cell lung cancer, lymphoma, malignant melanoma, esophageal cancer, colorectal cancer, and head-and-neck cancer in 2000. Some breast cancer coverage was added in 2002, as was some coverage for the restaging of various thyroid cancers in 2003.

This partial coverage still frustrated many physicians, who were convinced of the broad utility of PET. In 2002 the AMI took action: urging medical centers to petition for further coverage. Nine institutions responded with formal requests, supported by hard evidence and letters from patient advocacy groups. At Mallinckrodt Institute, Perry Grigsby, MD, professor of radiation oncology and of radiology, and Siegel requested coverage for cervical cancer; at Duke University, Coleman and his colleagues petitioned for coverage of brain cancer. Applications for inclusion of ovarian, pancreatic, and testicular cancers also came in, along with one application for small-cell lung

cancer, submitted by Ramaswamy Govindan, MD, an oncologist at Washington University in St. Louis. Three more applications—for prostate cancer, multiple myeloma, and gastrointestinal stromal tumor—were submitted, although the CMS never responded to these requests.

A series of meetings then began with CMS and with attorney Brian Carey of the Boston firm, Foley Hoag LLP, who coordinated the application process. “The CMS consistently stated that there was not sufficient published literature to provide coverage for these cancers,” wrote Siegel with Carey, Coleman, and Grigsby in an article published in 2005 in the *Journal of the American College of Radiology*. However, they added, PET proponents responded that there was a Catch-22 situation at work—that “there was less available evidence for these tumor types, both because they were less prevalent than those already covered and because it was too costly to obtain the requisite data without Medicare coverage.”

Of the nine applications submitted, CMS decided in 2004 to approve only cervical cancer, with coverage effective January 28, 2005. But Carey also notified Siegel and his colleagues that “Medicare had a new concept in mind: ‘Coverage with Evidence Development.’” Siegel says, “It meant that they could cover these additional cancers if they could gather additional data at the same time.”



So Siegel and Coleman began discussing what kind of data collection might work and came up with the idea of a registry to assess the impact of PET on planned patient management. Already, a number of scientific papers had been published about previous studies that had documented two important points: how the referring physician had planned to treat the patient before PET was done and, after the PET scan was performed, what the physician would do differently. They liked a concept described in Hillner's article in the *Journal of Clinical Oncology*.

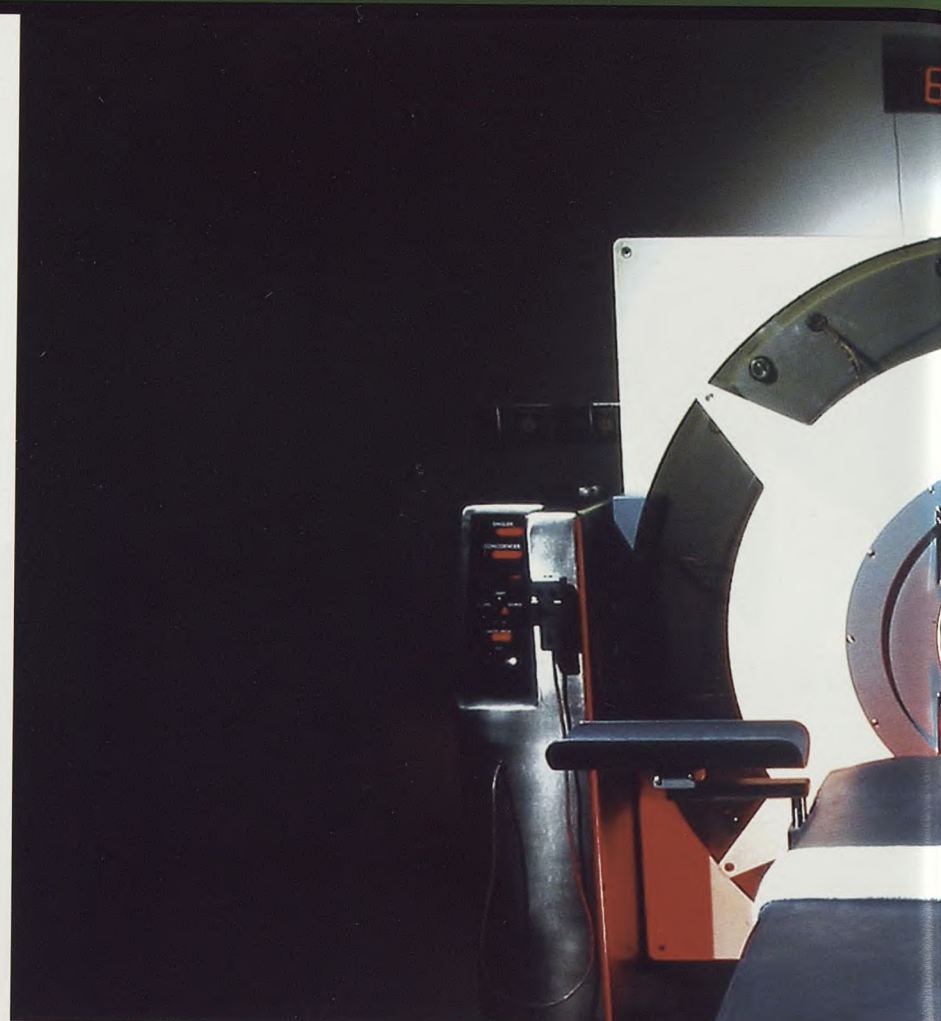
To collect the data, they turned to the American College of Radiology (ACR), asking whether its imaging research arm, ACRIN, could provide the needed infrastructure. Substantial funding came from the AMI, through its industry-supported arm, the Institute for Molecular Technologies. With assistance from Brown University statisticians, Siegel, Hillner, Coleman, Shields, and others worked on an operations manual, while enlisting the support of several key organizations—the ACR itself, the American Society of Clinical Oncology, and the Society of Nuclear Medicine.

But getting the registry up and running was even more difficult than they had imagined because of unforeseen obstacles: The CMS needed approval from the Office of Management and Budget under the Paperwork Reduction Act; CMS also needed to show that

data collection under the registry was in compliance with the Privacy Act. Siegel and his colleagues had to examine the Health Insurance Portability and Accountability Act—commonly called HIPPA—implications of the registry and seek exemptions for participating institutions from Institutional Review Board (IRB) approval. [*The Department of Health and Human*

Services mandates that an IRB reviews and monitors the rights and welfare of human participants involved in biomedical research.] “It turned out to be very complicated,” Siegel says. “I have spent an incredible amount of time on this project.”

Still, many physicians and medical centers are enthusiastic about the prospect of Medicare coverage for PET. Even before the registry opened, the ACR had





received more than 300 applications from PET facilities wanting to participate. Each facility must pay a \$50 fee to be included, and then a \$50 fee for each patient entered into the registry; these fees will be used to cover the set-up and operating costs of the registry.

Siegel estimates that the data collection will take at least two years. Periodically, the NOPR working group and experienced oncologists will review the findings to see how often PET use has led to a change in patient

management. “We can look at the results for a particular cancer and say: ‘twenty-five percent, we think that is enough.’ Then we can add that to what we know from the published literature, go to the CMS, and say, ‘OK, it is time to start paying for this.’ At that point, we hope CMS will eliminate that indication from the registry and make it an approved application,” says Siegel.

The results of the registry have significant financial implications for CMS and for the country, since

Siegel estimates that the cost of covering PET for these types of cancers may reach \$100 million or \$200 million a year. Yet PET also may save money for CMS—and for the whole United States healthcare system—since the use of ineffective treatments can be extraordinarily expensive. For example, forestalling only a few unnecessary liver transplants in patients with liver cancer would save some half million dollars per patient.

According to Siegel, patients ultimately are the primary beneficiaries of the registry. “More people will have the benefit of the improved ability of PET to stage cancer and to provide an early response assessment of cancer therapy so that, in those patients who are not responding to treatment, a different therapy can be selected.”

Despite the time and red tape involved, he also has come to respect the staff at CMS. “I used to think of the people at CMS in an adversarial way, but I now view them as allies,” adds Siegel. “We are in this together, responding to each other’s needs; we have an open line of communication. CMS’ Coverage with Evidence Development program provides an innovative way to get new technologies to patients faster.” **MIR**



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LEARNING & TEACHING CENTER

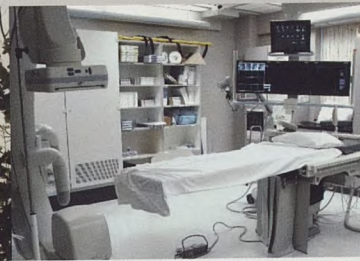
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Bricks

GI/GU suit
was compl
equipment



GI/GU suite on MIR's fourth floor was completely renovated and new equipment was installed.



MIR's East Building and Imaging Center on Scott Avenue received a fresh coat of paint.



The third-floor reading room involved a complete renovation and reconfiguration to accommodate the Picture, Archiving, and Communications System (PACS).

In order to provide every aspect of patient care and to accommodate the extensive research being performed, Washington University Medical Center is, by necessity, large—covering 230 acres and spreading over 12 city blocks. And the campus is constantly evolving, with new construction and renovations a common sight.

Left: The striking six-story facade of the Farrell Learning and Teaching Center—Washington University School of Medicine's main venue for teaching and events. The grand opening for the Center, located at the corner of Euclid and Scott avenues, was held September 16, 2005.

Right, above: Additional lab space was constructed in the MIR optimal imaging research area.

Right, below: With its brightly painted doors, the entrance to St. Louis Children's Hospital from the inside pedestrian walkway is hard to miss.

Editor's note: The renovations at Mallinckrodt Institute reflect the expertise of the MIR plant facilities group. Photography by MIR Photo Lab.



& Mortar

FYI

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

PROMOTION

Daniel Brown, MD, assistant professor of radiology, was promoted to associate professor of radiology, Division of Diagnostic Radiology.

Craig Glaiberman, MD, instructor in radiology, was promoted to assistant professor of radiology, Division of Diagnostic Radiology.

Cylen Javidan-Nejad, MD, instructor in radiology, was promoted to assistant professor of radiology, Division of Diagnostic Radiology.

Mark McAvoy, PhD, research instructor in radiology, was promoted to research assistant professor of radiology, Division of Radiological Sciences.

Vamsidhar Narra, MD, assistant professor of radiology, was promoted to associate professor of radiology, Division of Diagnostic Radiology.

Jason Oliphant, MD, instructor in radiology, was promoted to assistant professor of radiology, Division of Diagnostic Radiology.

NEW FACULTY

Joel Garbow, PhD, research associate professor of radiology, Division of Radiological Sciences.

Rebecca Hulett, MD, assistant professor of radiology, Division of Diagnostic Radiology.

John Kotyk, PhD, research associate professor, Center for Clinical Imaging Research.

Christopher Kroenke, PhD, assistant professor of radiology, Division of Radiological Sciences.

Daniel Marcus, PhD, research assistant professor, Center for Clinical Imaging Research.

Andrei Vlassenko, MD, PhD, research assistant professor of radiology, Division of Radiological Sciences.

Fumihiko Yamamoto, PhD, visiting assistant professor of radiology, Division of Radiological Sciences.

GRANTS

Harold Burton, PhD, professor of anatomy and neurobiology, of radiology, and of cell biology and physiology, as principal investigator, received a four-year grant from the National Institutes of Health/National Institute of Neurological Disorders and Stroke for research on "Braille reading and adaptive plasticity in the human brain." Coinvestigators for the \$2 million grant are **Marcus Raichle, MD**, professor of radiology, of anatomy, of neurology and neurological surgery, and of anatomy and neurobiology; **Abraham Snyder, MD, PhD**, research scientist of radiology and of neurology; and Robert Sinclair, PhD, research assistant professor of neurobiology.

Colin Derdeyn, MD, associate professor of radiology, of neurology, and of neurological surgery, as principal investigator of a three-year National Institutes of Health/National Institute of Neurological Disorders and Stroke (NIH/NINDS) subcontract, received \$80,000 for research on "Improved measurement of cerebral perfusion with MRI." Coinvestigator is **John**

Lee, research associate in radiology. Derdeyn will serve as a consultant to the five-year NIH/NINDS grant awarded to the University of Pittsburgh for research on "Quantitative occlusive vascular disease study (QUOVADIS)."

Igor Efimov, PhD, associate professor of biomedical engineering and of radiology, received a one-year grant of \$100,000 from Medtronic, Inc. for research on "Electrical stimulation of AV node/bundle of His (ESAB)." He received the Hartwell Foundation's Chancellor's Prize for Innovative Research (\$200,000 for a one-year period) for research on "Low voltage defibrillation in a large animal model."

Joseph Erinjeri, MD, third-year diagnostic radiology resident, as principal investigator, received a one-year Curriculum Development grant from Washington University in St. Louis School of Medicine for his project "Teaching living anatomy through radiology." **Sanjeev Bhalla, MD**, assistant professor of radiology, is faculty advisor for the \$19,800 grant.

Tamara Hershey, PhD, assistant professor of psychiatry and of radiology, as principal investigator, received a one-year grant of \$40,000 from the McDonnell Center for Higher Brain Function for research on "Prospective memory in PD."

Linda Larson-Prior, PhD, research associate professor of radiology, as principal investigator, received a two-year grant from the National Institutes of Health for research on "Error reduction in dipole-source localization models." Coinvestigators for the \$167,168 grant are **Fred Prior, PhD**, research professor of radiology, and **Don Jewett, MD, DPhil**, Abratech Corporation.

Joel Perlmutter, MD, professor of neurology, of radiology, and of physical therapy, as principal investigator, received a \$2.7 million grant from the National Institutes of Health to study "Carboxyfullerene treatment of MPTP-induced parkinsonism." Collaborators for the five-year grant are **Stephen Moerlein, PhD**, associate professor of radiology; **Jonathan Mink, MD**, University of Rochester,

New York; and **Laura Dugan, MD**, University of California, San Diego. **Perlmutter**, as principal investigator, received a \$500,000 grant from the Greater St. Louis Chapter of the American Parkinson Disease Association for research on "Neuroimaging of dementia in Parkinson disease."

Yoram Rudy, PhD, professor of engineering, of biomedical engineering, cell biology and physiology, and of medicine, and research professor of radiology, as principal inves-

tigator, received a five-year, \$1.9 million grant from the National Institutes of Health/National Heart, Lung and Blood Institute (NIH/NHLBI) for research on "Cardiac excitation and arrhythmias." He also received a five-year NIH/NHLBI award of \$1.3 million to study "Inverse and forward problems in electrocardiography."

APPOINTMENTS/ ELECTIONS

Colin Derdeyn, MD, associate professor of radiology, of neurology, and of neurological surgery, was appointed to a two-year term on the Marketing and Communications Committee of the American Heart Association.

Scott Lecture

On October 20, **Nick Bryan, MD, PhD**, professor and chair, Department of Radiology, University of Pennsylvania, Philadelphia, presented the Thirty-fourth Annual Wendell G. Scott Memorial Lecture. He spoke on "The power of imaging: the dilemma of the radiologist."



APPOINTMENTS/ ELECTIONS

Continued from page 27

Igor Efimov, PhD, associate professor of biomedical engineering and of radiology, was appointed to the editorial boards of the following scientific publications: *Circulation Research*, *Heart Rhythm Journal*, *Journal of Cardiovascular Electrophysiology*, and the *Journal of Molecular and Cellular Cardiology*.

Louis Gilula, MD, professor of radiology and of surgery, was named organizer of the International Wrist Investigators' Workshop, San Antonio, Texas, September 21.

Perry Grigsby, MD, professor of radiation oncology and of radiology, was appointed director of the Department of Radiation Oncology's Brachytherapy and Micro-RT[®] Treatment Center.

Joel Perlmutter, MD, professor of neurology, of radiology, and of physical therapy, was appointed to the Scientific Advisory Board of the Dystonia Medical Research Foundation. He also was appointed to the Editorial Board of the journal *Movement Disorders*.

Fred Prior, PhD, research associate professor of radiology, was named organizer of the Image Quality Workshop (a segment of the U.S. Measurement System Workshop series: Imaging Metrology for Telemedicine), cosponsored by the National Institute of Standards and Technology and the National Library of Medicine in collaboration with the American Telemedicine Association, Gaithersburg, Maryland, December 7.

Yoram Rudy, PhD, professor of engineering, of biomedical engineering, cell biology and physiology, and of medicine, and research professor of radiology, was elected 2005-2006 vice president (2007-2008 president-elect) of the Cardiac Electrophysiology Society. He was elected to the Nominations Subcommittee of the Governance Committee and to the Subcommittee on Research of the Committee on Health Policy of the Heart Rhythm Society.

HONORS/AWARDS

Joel Perlmutter, MD, professor of neurology, of radiology, and of physical therapy, was listed in the 2005 directory of *America's Top Doctors*, published by Castle Connolly Medical Ltd. He also was listed in the "Best Doctors in St. Louis—2005," as reported in *St. Louis Magazine*.

Yoram Rudy, PhD, professor of engineering, of biomedical engineering, cell biology and physiology, and of medicine, and research professor of radiology, received the Kazuo Yamada Lecture Award from the Japanese Society of Electrophysiology at the Society's 22nd Annual Meeting, Toyama, Japan, October 6 and 7.

LECTURES

Jeffrey Brown, MD, professor of radiology, presented "Effective investment strategies for physicians. Part 1: innovations in finance" and "Effective investment strategies for physicians. Part 2: financial planning" at the American College of Radiology Summit on Lifetime Career Management for Radiologists, Las Vegas, Nevada, November 5 and 6.

Farrokh Dehdashti, MD, professor of radiology, spoke on "Diagnostic perspectives" at the 2nd International Meeting of Metabolic PET Imaging for a New Radiotherapy, Reggio Emilia, Italy, October 4 and 5.

Jennifer Demertzis, MD, second-year diagnostic radiology resident, presented the Poster Session Case of the Day at the American Society of Emergency Radiology Conference, Tucson, Arizona, September 23.

Colin Derdeyn, MD, associate professor of radiology, of neurology, and of neurological surgery, spoke on "Chronic hemodynamic impairment" at the 4th International Symposium on CT and MR Brain Perfusion, sponsored by the Department of Radiology, Northwestern University, Northwestern Memorial Hospital, Chicago, Illinois, September 16-18. He presented "Treatment of extra and intracranial atherosclerotic disease: aspirin, surgery or stent?" at the Boone County Memorial Hospital Stroke Symposium, Columbia, Missouri, November 5.

Igor Efimov, PhD, associate professor of biomedical engineering and of radiology, presented "Imaging arrhythmias: toward painless defibrillation" at the Cardiac Bioelectricity and Arrhythmia Center, Washington University in St. Louis, Missouri, October 17.

Louis Gilula, MD, professor of radiology and of surgery, presented "Approach to trauma" and "Ligamentous instabilities of the wrist" at Oregon Health & Science University, Portland, September 2 and November 16, respectively. He spoke on "Vertebroplasty—technical challenges and problems" at the International Skeletal Society, Republic of Singapore, September 29. As visiting professor, Gilula presented "Analysis of complex carpal trauma" at the University of California, San Francisco, November 9. He presented "Vertebroplasty, introduction, technical aspects, complications" and "Demonstration of vertebro-

plasty on 2 patients" at Seminar on Vertebroplasty, Bhatia Hospital, Mumbai, India, December 14. He spoke on "Vertebroplasty, introduction, technical aspects, complications" and "Approach to complex carpal problems" at the Indian Orthopaedic Association 2005 Meeting, Mumbai, India, December 26-28.

Tamara Hershey, PhD, assistant professor of psychiatry and of radiology, spoke on "Probing cognitive pathways in PD with deep brain stimulation" at the Cognition and Neuroscience Research Seminar, Columbia, Missouri, September 5. She presented "Probing functional neural pathways in PD" at the Slovenia Neuroscience Association meeting, Ljubljana, Slovenia, November 5.

William Middleton, MD, professor of radiology, presented "Doppler evaluation of the liver" and "Evaluation and treatment of pseudoaneurysms" at the National Diagnostic Imaging Symposium, sponsored by Loma Linda University, Lake Buena Vista, Florida, December 4-8.

Joel Perlmutter, MD, professor of neurology, of radiology, and of physical therapy, presented "Have neuroimaging and brain mapping identified the source of oscillations in Essential Tremor?" at the National Institute of Neurological Disorders Stroke Conference on Essential Tremor, Bethesda, Maryland, October 29.

Yoram Rudy, PhD, professor of engineering, of biomedical engineering, cell biology and physiology, and of medicine, and research professor of radiology, spoke on "Noninvasive electrocardiographic imaging (ECGI) of cardiac electrophysiology and arrhythmia" at the 22nd Annual Meeting of the Japanese Society of Electrophysiology, Toyama, Japan, October 6 and 7. He presented a "How-to Session" at American Heart Association Scientific Sessions 2005, Dallas, Texas, November 13-16.

Joshua Shimony, MD, PhD, assistant professor of radiology, presented "Tracer kinetic models in perfusion imaging" at the 4th International Symposium on CT and MR Brain Perfusion, sponsored by the Department of Radiology, Northwestern University, Northwestern Memorial Hospital, Chicago, Illinois, September 16-18.

Barry Siegel, MD, professor of radiology and of medicine, presented "PET & PET/CT in oncology" at the Fundacion de Lucha contra las Enfermedades Neurológicas Infantiles and at the Instituto Argentino de Diagnostico y Tratamiento, Buenos Aires, Argentina, September 7 and 8, respectively. He presented "PET imaging" at the 2nd International Meeting of Metabolic PET Imaging for a New Radiotherapy, Reggio Emilia, Italy, October 4 and 5. Siegel spoke on "Spread and use of PET in USA: the Medicare experience" at the 5^o Workshop PRI E-R, The Evaluation of the High Cost of Technology: the Example of Positron Emission Tomography (PET) in Oncology, Reggio Emilia, Italy, October 6. He presented "PET & PET/CT in oncology: diagnosis"; "Breast cancer"; "PET & PET/CT in oncology: monitoring and predicting therapeutic response"; and

LECTURES

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"PET & PET/CT in oncology: beyond FDG" at Oncologic Imaging for the Practicing Radiologist: PET and PET/CT, Asheville, North Carolina, October 28-30. He spoke on "Current status of PET and PET/CT in clinical practice: overview of applications in oncology, neurology, and cardiology"; "PET in oncology: diagnosis, staging, monitoring and predicting response in therapy" and "PET in oncology: beyond FDG" at PET: State of the Art Symposium, sponsored by the Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand, November 4. He spoke on "PET in gynecologic cancers" and "PET in oncology: beyond FDG" at the National Diagnostic Imaging Symposium, sponsored by Loma Linda University, Lake Buena Vista, Florida, December 4-8.

Marilyn Siegel, MD, professor of radiology and of pediatrics, spoke on "MRI of the bone marrow in oncologic diseases in children," "Pediatric multidetector CT angiography," and "CTA of pediatric heart disease" at the 51st Argentine Congress of Radiology, Buenos Aires, Argentina, September 7-9.

She presented "Advances in oncologic imaging" at the 2nd International Meeting of Metabolic PET Imaging for a New Radiotherapy, Reggio Emilia, Italy, October 4 and 5. She presented "Multislice pediatric imaging" at the 6th Annual Siemens CT Symposium, Calgary, Canada, October 15, and in Montreal, Canada, October 22. Siegel spoke on "CT of congenital lung anomalies"; "CT of mediastinal vascular lesions: variants and pitfalls"; "CTA/MRA of hepatic masses in children"; and "MDCT in congenital heart disease" at the 6th Asian and Oceanic Society for Pediatric Radiology, Bangkok, Thailand, November 3-5. She presented "Pediatric CT angiography" at the National Diagnostic Imaging Symposium, sponsored by Loma Linda University, Lake Buena Vista, Florida, December 4-8.

Yuan-Chuan Tai, PhD, assistant professor of radiology, presented "Positron emission tomography" at Medical Imaging Fundamentals, the 2005 IEEE Nuclear Science Symposium & Medical Imaging Conference, Fajardo, Puerto Rico, October 24. He spoke on "MicroPET imaging" at the 2005 Animal Molecular Imaging International Symposium, Taoyuan, Taiwan, November 12.

SYMPOSIA

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

SOCIETY FOR MOLECULAR IMAGING

*4th Annual Meeting
Cologne, Germany
September 7-10, 2005*

David Piwnica-Worms, MD, PhD, chair, Plenary III: Imaging Signal Transduction, Transcription and Cell Cycle *in Vivo*.

Kristin Bullock; Julie Prior; David Piwnica-Worms, MD, PhD, "Biochemical characterization of a cell-permeable, activatable fluorescence probe for imaging commitment to apoptosis."

Joseph Culver, PhD; Yunpeng Ye, PhD; Sharon Bloch, PhD; Sachin Patwardhan, PhD, "Rational design, synthesis, and biodistribution of disease-specific molecular probes."

Paul Frohnert, PhD; David Piwnica-Worms, MD, PhD, "Optimization of N-Luc and C-Luc fragments for luciferase complementation by directed truncation of a common overlapping domain."

Seth Gammon; Shimon Gross; David Piwnica-Worms, MD, PhD, "Technicolor luciferase imaging: spectral unmixing of bioluminescent signals for *in cellulosa* imaging."

Shimon Gross; David Piwnica-Worms, MD, PhD, "Monitoring transformation, tumorigenesis, tumor growth and dissemination by bioluminescence imaging in a transgenic model of adult T-cell leukemia/lymphoma"; "Real-time imaging of ligand-induced IKK activation in intact cells and living mice *in vivo*"; "Continuous delivery of D-luciferin by implanted micro-osmotic pumps allows true real-time bioluminescence imaging of luciferase activity *in vivo*."

Poster Award Winner

At the 13th Scientific Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine, the 2nd Place Award in the Body/Cardiac Imaging Program was presented for the scientific exhibit "Hyperpolarized ³He diffusion MRI of acinar airways in canines with induced emphysema: comparison with computed tomography." Coauthors of the exhibit included **Tariq Tanoli; Kyongtae Bae, MD, PhD; Mark Conradi, PhD; and Dmitriy Yablonskiy, PhD.**

Scott Harpstrite; Julie Prior; Jiling Song; David Piwnica-Worms, MD, PhD, ^{99m}Tc complexes for imaging β -amyloid in the brain."

Andrea Pichler, PhD; Julie Prior; David Piwnica-Worms, MD, PhD, "In vivo RNAi-mediated ablation of *MDR1* Pgp: validation of therapeutic efficacy with bioluminescence imaging."

Victor Villalobos; Snehal Naik; David Piwnica-Worms, MD, PhD, "Novel luciferase complementation pairs to study protein-protein-interactions *in vivo*."

SOCIETY FOR NEUROSCIENCE

35th Annual Meeting
Washington, DC
November 12-16, 2005

PLATFORM PRESENTATIONS

Randy Buckner, PhD, "Frontal—parietal responses to increasing control demands in young and old adults: evidence from task switching"; "Evidence that default activity includes memory retrieval."

Nico Dosenbach; Francis Miezin; Erica Palmer; Eliza Burgund, PhD; Bradley Schlaggar, MD, PhD; Steven Petersen, PhD, "Mixed blocked/event-related fMRI suggests that anterior cingulate/medial superior frontal cortex and anterior insula form a core network for the instantiation and maintenance of task set."

Michael Fox; Abraham Snyder, MD, PhD; Justin Vincent; Maurizio Corbetta, MD; Marcus Raichle, MD, "Intrinsically defined anticorrelated networks in the human brain."

Mark Mintun, MD; Robert Mach, PhD; Carmen Dence, MS; Gina LaRossa, "Correspondence between *in vivo* amyloid imaging and CSF A β_{42} levels in humans: implications for antecedent biomarkers of Alzheimer's disease."

Marcus Raichle, MD, "Decreases in cerebral blood flow and BOLD signals: neuronal correlates and mechanisms of regulation."

POSTER SESSIONS

Kevin Black, MD; Joel Perlmutter, MD, "Template images for neuroimaging in *Macaca Fascicularis*."

Randy Buckner, PhD, "Evidence for a probabilistic prediction error in humans using event-related fMRI and cognitive pupillometry"; "The Oasis project: a publicly available human brain imaging data resource."

Adrian Epstein; Christopher Lewis; Joshua Shimony, MD, PhD; Anthony Jack; Abraham Snyder, MD, PhD; Maurizio Corbetta, MD, "Reproducibility and accuracy of diffusion tensor tractography related to functionally defined areas of human visual cortex."

Maurizio Corbetta, MD, "fMRI comparison of the Macaque cortical substrates for smooth pursuit and saccadic eye movements."

Mokhtar Gado, MD, "Inter-rater reliability of manual segmenting the inferior, middle, and superior frontal gyri."

Linda Larson-Prior, PhD; Justin Vincent; Abraham Snyder, MD, PhD; Marcus Raichle, MD, "An EEG-fMRI study of the relationship between α -band power and bold signal."

Robert Mach, PhD, "Comparative mapping of the D₂/D₃ dopamine receptor binding sites."

Robert Mach, PhD; Jinbin Xu; Wenhua Chu, PhD, "Characterization of [³H]4-(dimethylamino)-N-[4-(4-(2-methoxyphenyl) piperazin-1-yl)butyl]benzamide, a selective radioligand for dopamine D₃ receptors."

Joanne Markham; Stephen Moerlein, PhD; Tom Videen, PhD; Lori McGee-Minnich; Joel Perlmutter, MD, "Validation of a reference region method for calculating binding potential of [18F] (N-methyl) benperidol in humans."

Joel Perlmutter, MD, "Modified Rondelli method for plasma measurement of levodopa, 3-O-methyldopa, and carbidopa."

Steven Petersen, PhD; Bradley Schlaggar, MD, PhD, "Longitudinal fMRI reveals a novel functional neuroanatomy for lexical processing in a child with perinatal stroke."

Marcus Raichle, MD; Russell Hornbeck; Abraham Snyder, MD, PhD, "The regional distribution of aerobic glycolysis in the resting human brain."

Melissa Rundle; Mark Mintun, MD; Abraham Snyder, MD, PhD; Yvette Sheline, MD, "fMRI activations to anticipation in a monetary incentive delay task."

Zhude Tu, PhD; Jinbin Xu; Datta Ponde, PhD; Lynne Jones; Carmen Dence, MS; Robert Mach, PhD, "¹⁸F-labelled VAcHT receptor ligand for study of cholinergic terminal function with PET."

Suwanna Vangveravong; Jinbin Xu; Robert Mach, PhD, "Identification of D₂ dopamine receptor-selective antagonists."

Justin Vincent; Linda Larson-Prior, PhD; Marcus Raichle, MD; Abraham Snyder, MD, PhD, "Moving GLM ballistocardiogram reduction for EEG data acquired simultaneously with fMRI."

Jinbin Xu; Zhude Tu, PhD; Lynne Jones; Robert Mach, PhD, "Evaluation of the sigma-2 receptor status in rat brain with two novel sigma-2 receptor radioligands, [³H]RHM-1 and [³H]RHM-2."

FACULTY AND ALUMNI NAMED TO TOP 10

Medical Imaging, a monthly news, technology, and business magazine for healthcare and industry professionals, published a listing of the “best and the brightest in the field of radiology” in the January 2006 issue. More than 16,000 readers were asked for nominations (based on research, innovation, industry interaction, patient care and outcomes, attitude, unique solutions, and general knowledge) in the following categories:

- Radiology department within a hospital
- Free-standing imaging center or group
- Radiologist
- Technologist
- Radiation oncologist/cancer researcher
- Nuclear physicist/nuclear medicine researcher
- Cardiovascular imager/cath lab director
- Women’s imaging specialist
- PACS/RIS/radiology administrator
- Association/trade show/CME event/imaging-related educational program.

During October and November 2005, readers voted online for the 10 best in each category. Among that list were these MIR faculty and alumni:

- Radiologist—Barry Siegel, MD, director of MIR’s Division of Nuclear Medicine
- Radiologist—Elizabeth McFarland, MD, former MIR faculty; now in private practice
- Women’s imaging specialist—Judy Destouet, MD, former MIR resident and faculty; now chief of mammography, Advanced Radiology, Baltimore
- Nuclear physicist/nuclear medicine researcher—Richard Wahl, MD, former MIR resident and fellow; now director of nuclear medicine, Johns Hopkins Medical Center, Baltimore

ALUMNI NEWS

Judy Destouet, MD, chief of mammography for Advanced Radiology PA, was named one of the Baltimore, Maryland, region’s top doctors. The list of 97 physicians in 59 specialties was published in the November 2005 issue of *Baltimore Magazine*. Destouet joined the staff of the Greater Baltimore Medical Center (GBMC) in 1992 and has been chief of mammography of Advanced Radiology, part of GBMC’s oncology division, since its inception in 1995. Under her guidance, Advanced Radiology has one of the largest mammography programs in the country.



Destouet, who chairs the American College of Radiology’s Mammography Accreditation Committee, completed a diagnostic radiology residency at Mallinckrodt Institute and was head of the Institute’s mammography group until 1992.

- CONCERNED ABOUT THE HIGH RISK OF COLON CANCER?
- SCHEDULED FOR A SCREENING COLONOSCOPY WITHIN THE NEXT 12 MONTHS?
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Colorectal cancer is the second most common cause of cancer-related deaths in the United States. If colorectal cancer is diagnosed in its early stages, the survival rate is 90%.

Help fight colon cancer by volunteering for the National Colon Cancer Screening at Mallinckrodt Institute of Radiology at Washington University in St. Louis.

This study is part of a National Cancer Institute-funded effort to determine whether computed tomography (CT) colonography can provide the necessary information for doctors to diagnose colon cancer in its early stages.

CT colonography, also called virtual colonoscopy, is faster (takes about 20 minutes) and less invasive than standard colonoscopy. Eligible study participants will receive a CT colonography (free of charge) in addition to your regularly scheduled colonoscopy (billed to your insurance carrier or to you).

Christine Menias, MD, a board-certified radiologist, is the principal investigator of the Washington University segment of the study. For more information, call Ruth Holdener, RT, at **(314) 747-2034**.



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