RESOLVING THE MYSTERIES OF AUTISM
Imaging Sciences Retreat

Pathways to Discovery

In the future, solving complex biomedical problems may be determined by how well the next generation of imaging scientists is trained in basic biological issues and technical know-how. Washington University’s innovative curriculum—called Imaging Sciences Pathway (ISP)—offers a unique learning experience for undergraduate and graduate students from several disciplines. In April 2008, the Imaging Sciences Retreat highlighted the ISP as well as the students who are enrolled in this challenging program.

Top, left: Keynote Speaker Robert Balaban, PhD, of the National Heart Lung and Blood Institute’s Laboratory of Cardiac Energetics, spoke on “In vivo sub-cellular imaging using non-linear optical microscopy.”

Top, right: Kari Alca coordinated the registration for the Retreat, which was held at the Hyatt Regency St. Louis Riverfront.

Right: Carolyn Anderson, PhD, professor of radiology and codirector of ISP, presented an update of the Imaging Sciences Pathway initiative.

Photography by Mickey Wynne, MIR Photography Lab
5 The Center for Clinical Imaging Research
After five years in the making, the CCIR—a comprehensive imaging center dedicated to innovative research—hosted an open house in February of this year.

8 Radiotherapy for Graves' Disease
A nuclear medicine specialist discusses the safety and effectiveness of using radiotherapy to manage Graves' disease, the most common cause of hyperthyroidism.

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A five-year national study involving siblings of children diagnosed with autism uses magnetic resonance imaging to investigate structural and functional neural development.

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The results of a nationwide effort to measure the effect that findings of PET scans have on cancer treatment decisions may lead to changes in the Center for Medicare and Medicaid Services coverage policy.

22 On Duty in Iraq
A Mallinckrodt Institute physician shares his experiences as the only radiologist on duty at the 325th Combat Support Hospital, the primary United States military healthcare facility in Al Anbar province.

ON THE COVER Magnetic resonance imaging-based research involving volunteers like this little girl may provide new insights into diagnosing autism in very young children. Courtesy photo.
WUSM moves up a notch

In the 2008 U.S. News & World Report rankings, Washington University in St. Louis School of Medicine (WUSM) moved from its 2007 fourth-place spot and is now positioned third in overall rankings among research-oriented medical schools. WUSM continues to hold first place in student selectivity, based on college grade-point averages and MCAT scores. Other medical schools listed in the top five are Harvard University (ranked first); Johns Hopkins University (second); University of Pennsylvania (fourth); and University of California, San Francisco (fifth).

SCC earns excellence award

The American College of Radiology (ACR) has designated the Joanne Knight Breast Health Center at Siteman Cancer Center (SCC) as a Breast Imaging Center of Excellence. The Center of Excellence award recognizes the SCC for earning accreditation in all of the ACR’s voluntary breast-imaging accreditation programs and modules as well as the mandatory Mammography Accreditation Program. The SCC’s breast imaging services are fully accredited in mammography, stereotactic breast biopsy, breast ultrasound, and ultrasound-guided breast biopsy.

Middleton named Teacher of the Year

Radiology senior residents annually present the Diagnostic Radiology Teacher of the Year award to a faculty member who has made outstanding contributions to resident education. William Middleton, MD, professor of radiology—and the 2007-2008 honoree—is a two-time recipient.

PAST RECIPIENTS

David Ling, MD .......................................................... 1985
Fernando Gutierrez, MD .................................................. 1986
Dennis Balfie, MD ...................................................... 1983 and 1987
Stuart Sagel, MD .......................................................... 1988
Marilyn Siegel, MD ..................................................... 1984 and 1989
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
Premrs Barton, MD ......................................................... 1997
Harvey Glazer, MD .......................................................... 1998
William Totty, MD .......................................................... 1999
Thomas Herman, MD ...................................................... 2000
Barbara Monsees, MD ..................................................... 2001
William McAlister, MD ..................................................... 2002
Sanjeev Bhalla, MD .......................................................... 2003
Christine Menias, MD ...................................................... 2004
Katie Vo, MD ................................................................. 2005
Vamsi Narra, MD ............................................................ 2006
Robert McKinstry, MD, PhD ............................................. 2007

Middleton is shown with Sara Rohr, MD, 2007-2008 diagnostic radiology chief resident.
Matching Program results announced

In July, 18 physicians will begin their first year of training in diagnostic radiology at Mallinckrodt Institute. The 2008-2009 trainees come from the following schools:

- Albert Einstein College of Medicine, Yeshiva University (1)
- Duke University School of Medicine (2)
- Kazan State Medical University (1)
- Mount Sinai School of Medicine of New York University (1)
- New York Medical College (1)
- Pontificia Universidad Catolica de Chile (1)
- Pritzker School of Medicine, University of Chicago (1)
- Saint Louis University School of Medicine (1)
- Southern Illinois University School of Medicine (1)
- University of California Los Angeles David Geffen School of Medicine (1)
- University of Louisville School of Medicine (1)
- University of Miami School of Medicine (1)
- University of Texas Medical School at Houston (2)
- Washington University in St. Louis School of Medicine (3)

Wilson Award in its 40th year

The 2008 Hugh M. Wilson Award for Meritorious Work in Radiology was presented on May 16, at the senior program following Washington University’s 147th Commencement ceremony, to two outstanding recipients: Michael Fox, and Mai-Lan Ho. Fox, an MD/PhD student, completed his doctoral research in the Neuroimaging Lab with Marcus Raichle, MD, professor of radiology, of neurology, of neurobiology, and of psychology. Ho, a fourth-year medical student, worked in the Abdominal Radiology section under the mentorship of Vamsi Narra, MD, associate professor of radiology. The annual Wilson Award honors Mallinckrodt Institute’s second director, an advocate of the advancement of education.

Haven joins the Institute

Joy Haven, PhD, newly appointed executive officer for business operations, comes to Mallinckrodt Institute from the Washington University School of Medicine (WUSM) Cardiovascular Division, where she served as executive officer for six years. Prior to her WUSM experience, she held leadership positions in the medical insurance field. Haven graduated summa cum laude from Washington University with a double major in economics and psychology. She also earned an MBA and a doctoral degree in clinical psychology at the University.

Haven’s appointment was announced as Linda Davidson, executive director of business affairs and an MIR employee for 21 years, transitions to retirement.
Of note

The Washington University School of Medicine (WUSM) Alumni Association Executive Committee named one of the four WUSM Distinguished Professor 2008 scholarships in honor of Emily Smith, MD, assistant professor of radiology. The four-year, full-tuition, merit-based scholarships are awarded annually to first-year medical students.

Vamsi Narra, MD, associate professor of radiology, was named chief of radiology at Barnes-Jewish West County Hospital. Narra also is chief of clinical operations at the West County Hospital, where enhanced radiology services are an integral part of Washington University School of Medicine’s expanded operations.

Benzinger receives dual awards

Tammie Benzinger, MD, PhD, assistant professor of radiology, may be the only honoree to have been named an ARRS Scholar and an ASNR/NER Foundation Scholar in the same year. Benzinger, a neuroradiologist, received both awards based on her research involving magnetic resonance imaging (MRI).

The two-year American Roentgen Ray Society (ARRS)/Bracco Diagnostics award of $140,000 will fund the use of MRI to better understand the microstructural environment of the central nervous system—a collaborative study between Mallinckrodt Institute’s Center for Clinical Imaging Research (CCIR) and the Beckman Institute at the University of Illinois at Urbana-Champaign (UIUC). Benzinger’s mentors for this project are Victor Song, PhD, associate professor of radiology; Mark Mintun, MD, professor of radiology and of psychiatry, and director of the CCIR; and Zhi-Pei Liang, PhD, at UIUC. The focus of the $60,000 American Society for Neuroradiology (ASNR)/National Education and Research (NER) Foundation scholarship is the application of MRI directional diffusivity as a tool for prognosis and response to therapy in childhood leukodystrophy with neuromuscular disability.

Becky Salmo, manager, information systems, was a member of a delegation of healthcare information and management system professionals that travelled to India, an emerging leader in the field of health information technology. During the eight-day visit, the delegation—sponsored by People to People Citizen Ambassador Programs and in partnership with the Healthcare Information and Management Systems Society (HIMSS)—met with representatives of various healthcare groups, including New Delhi’s Maulana Azad Medical College (one of India’s premier medical schools) and its five associated hospitals, and Indraprastha Apollo, the largest hospital in the Apollo Hospitals Group, the largest integrated healthcare company in India; and Fortis Healthcare Ltd, the leading healthcare provider in North India. Salmo (left) is shown receiving a plaque from a representative of Fortis Healthcare Ltd, citing the HIMSS visit to create global synergies in the development of healthcare technology.
Mark Mintun, MD, professor of radiology and director of Mallinckrodt Institute's Center for Clinical Imaging Research (CCIR), is understandably proud of this multimillion-dollar facility that provides an enormous opportunity for advancing medical science and improving clinical care. From the first planning discussions in 2003 to the installation of the most advanced, FDA-improved imaging technology in 2007, the CCIR has been eagerly anticipated by the Washington University School of Medicine (WUSM) research community. With the February 28th Open House, the facility was officially presented to Mallinckrodt Institute faculty and staff, WUSM clinicians and researchers, and industry collaborators.

Photography by Kimberly Kania, MIR Photography Lab
(Left to right) Doctors Larry Shapiro, executive chancellor for medical affairs and dean of the School of Medicine; Gilbert Jost, head of the Department of Radiology and director of Mallinckrodt Institute; Mark Mintun; and Mark Wrighton, chancellor of Washington University, presided at the ribbon-cutting ceremony that officially opened the CCIR.

Above: Scott Love, RT, MRI technologist, discusses magnetic resonance imaging with Washington University Chancellor Mark Wrighton.

Left: Magnetic resonance imaging scanner (MRI), one of two high-powered units in the CCIR.
Right: (Second from left) John Kotyk, PhD, CCIR associate director, led a tour of the positron emission tomography/computed tomography (PET/CT) area.

Below: CT Supervisor Tim Street (third from right) answers questions about the 64-slice CT scanner.

The CCIR staff: (left to right) Betsy Thomas, RN, CCRC, clinical research specialist and protocol developer; Mark Nolte, RT, MRI technologist; Linda Becker, CNMT, PET technologist; Michael Harrod, CNMT, PET technologist; Marion Harris, division administrator; Tim Street, RT(R)(CT), CT supervisor; Scott Love, RT, MRI technologist; Crystal Cannon-Henderson, medical secretary; and Dott Wallace, special project administrator. Not shown are Robin Link, administrative coordinator; Ruth Holdener, RT, research patient coordinator; Glenn Foster, RT, MRI supervisor; Christopher Allen, RT, ultrasound technologist; Matthew House, systems manager; Steve Baldwin, senior programmer analyst; and Weimin Shen, senior programmer analyst.
From the classic, "What your doctor won't tell you," to the pointed, "Top 20 reasons why I'll never have radioiodine therapy," Internet posts by the lay public often enhance common suspicions about the use of radioactive agents (or radiopharmaceuticals) in the treatment of Graves' disease (GD)—the most common cause of hyperthyroidism that affects women up to 10 times more often than men. Patients with GD often experience a period of vague complaints such as fatigue or weight loss before a diagnosis is evident.
The initial abatement of anxiety upon learning the cause of their ailments is short-lived and followed by uncertainty regarding treatment options—particularly the use of radioactive iodine. Anxiety-provoking statements can burden the informed consent of patients with GD and cause undue stress for both former and potential recipients of radioactive iodine therapy. But based on experience and clinical studies, nuclear medicine specialists like Bennett Greenspan, MD, instructor in radiology at Mallinckrodt Institute, agree that radiotherapy is a safe and effective management choice.

Hyperthyroidism in GD is due to an autoimmune process in which thyroid-stimulating antibodies bind receptors on the thyroid gland, resulting in an increased production of thyroid hormones T3 and T4.

A closer look at the role of radioactive iodine in the evaluation and treatment of Graves’ disease provides much needed reassurance for patients.

THE THYROID AND ITS HORMONES

The thyroid gland, a butterfly-shaped organ situated in the neck near the larynx and the trachea, is one of the largest endocrine glands in the human body. It produces hormones (T3 and T4, of which iodine is an essential component) that control metabolism, protein production, and sensitivity to other hormones.

Because thyrotoxicosis (excessive levels of thyroid hormone) affects many organ systems, the early manifestations of GD—including anxiety, insomnia, irritability, and weight loss—are not specific enough for physicians to make a definitive diagnosis. The subtle evolution of symptoms may cause a patient to disregard the early warning signs or to attribute symptoms to stress and aging. More specific symptoms—like tachycardia (rapid heart rate), tremor (in the hands, for example), and brittle hair—alert the clinician to possible thyrotoxicosis. Classic signs of skin disease (especially thickening of the skin) and eye disease (most notably, the protuberance of one or both eyes) can firmly establish the diagnosis of GD. Untreated, GD can result in serious complications, including cardiac rhythm disturbance and vision loss. The course of disease without treatment is thyroid burnout and reduced function over an extended time.

Hyperthyroidism in GD is due to an autoimmune process in which thyroid-stimulating antibodies bind receptors on the thyroid gland, resulting in an increased production of thyroid hormones T3 and T4. The clinical presentation is due to the various effects of excess thyroid hormone, in addition to autoimmune-mediated inflammation of ocular and connective tissue.

Top: Normal thyroid scan
Middle: Graves’ disease: diffuse, uniform enlargement of thyroid gland
Bottom: Multinodular goiter: enlarged thyroid gland but irregular in uptake; nodules vary in size and levels of function. Can cause symptoms of hyperthyroidism.
DIAGNOSTIC IMAGING

Patients with thyrotoxicosis may initially be evaluated by ultrasound, which can detect nodules a doctor cannot feel during a patient’s physical examination and can identify an enlarged thyroid gland with increased blood flow that is consistent with a diagnosis of Graves’ disease. But ultrasound cannot show thyroid function.

Nuclear imaging of the thyroid allows visualization of biologic processes at the cellular level and provides useful information about thyroid activity. Patients are often referred to a nuclear medicine physician for diagnosis confirmation and for subsequent treatment of GD with radiotherapy.

Radioactive iodine uptake and thyroid scanning are the diagnostic studies most often used to determine Graves’ disease; the isotope I-123 is typically the agent of choice. In a thyroid uptake test, I-123 taken orally is concentrated in the thyroid gland. A gamma camera, which detects and localizes emitted radiation, is used to calculate the thyroid’s iodine uptake. Increased iodine uptake indicates increased de novo synthesis (in which simple molecules turn into complex molecules instead of being recycled) of thyroid hormone, which is consistent with a hyperactive gland. Normal values for 24-hour radioiodine uptake are between 10 percent and 30 percent, while uptake in patients with GD is typically in the range of 50 percent to 80 percent.

Uptake tests are usually done over a two-day period, with imaging performed when radiotracer uptake is maximal (24 hours for I-123), and there are precautions for patients:

- Discontinue use of thyroid medications prior to the examination as these agents could reduce iodine uptake to the normal range despite the presence of Graves’ disease.
- Do not undergo computed tomography (CT) screening for four to six weeks prior to a scheduled uptake test because the iodinated contrast agents used with CT may interfere with the uptake test.
- Do not use amiodarone, an iodine-rich medication, ideally for three to six months prior.
- Avoid other agents, including cough syrups, some vitamin preparations, and seaweed (kelp).
Since radioiodine uptake can confirm a diagnosis of GD and further imaging is unlikely to change the management of the disease, thyroid scanning is performed less often; however, it may be useful in differentiating Plummer’s disease from that of GD superimposed on a nodular goiter. Though both conditions can be treated with radioactive iodine, the dose needed to treat GD is usually lower. Thyroid scans of patients with GD typically reveal a gland with smooth contours and diffusely increased radiiodine uptake. A prominent thyroid pyramidal lobe—one of the thyroid’s four components and descending from the base of the tongue into the anterior midline of the neck—is also a common finding.

No specific safety precautions are needed with the use of I-123: It is administered at a low dose and does not emit beta rays, so radiation exposure is negligible compared to that of other radioisotopes.

Following I-131 therapy, patients must have follow-up laboratory studies throughout their lifetime. Most patients will develop hypothyroidism but, since hormone replacement therapy is effective and inexpensive, many consider

“...The added benefits are a shortened duration of symptoms and less risk of complications from sustained antithyroid medication use...”

A SAFE AND EFFECTIVE CHOICE

Treatment with radioiodine (I-131) is the most commonly used therapy for GD in the United States, with efficacy at more than 90 percent. Contrary to popular belief, studies of adults with GD who are treated with I-131 show no subsequent risk of any kind of cancer, including thyroid cancer or lymphoma. Treatment begins to take effect in two to three weeks, maximal results occur between three and four months, and the end result includes many patients who are thankful for the resolution of their symptoms. While antithyroid medications such as propylthiouracil (PTU) and methimazole (MMI) are reasonable alternatives, they have a 50 percent failure rate and can cause rare but severe adverse effects, including suppression of white blood cells (agranulocytosis), liver toxicity, and vasculitis (blood vessel inflammation). Given these risks, clinicians and patients often opt to go directly to radioiodine therapy, a safe and effective choice.

Bennett Greenspan, MD, is a past president of the American College of Nuclear Physicians and of the Missouri Radiological Society.
PROPER PRECAUTIONS

Greenspan emphasizes that an uptake test must always be obtained before treatment begins. Occasionally patients will have uptakes in the normal range and, although subacute disease may be present, they should not be treated for two reasons: the possibility of another diagnosis; and, with normal uptake, the need for three to five times the usual dose of radioiodine to achieve therapeutic concentrations in the thyroid gland.

While some medical facilities use a fixed-dose method, Mallinckrodt Institute radiologists calculate the radioiodine dose to allow the highest likelihood of treatment success using the least amount of I-131. Patients with high uptake ranges can be effectively treated with lower doses of radioiodine, as more of the isotope reaches the gland. In contrast, patients with larger thyroids need a higher dose of radioiodine to effectively reduce the gland’s function.

As with I-123 studies, there are some precautions:

- Discontinue use of antithyroid medications and iodine-rich agents prior to radiotherapy.
- Do not administer I-131 to pregnant patients due to the risk of fetal thyroid damage and death.
- Avoid pregnancy for one year after treatment.
- Have a negative pregnancy test, ideally the day of or day prior to treatment, required for women of child-bearing age.
- Nursing mothers must stop breastfeeding their infants three to four weeks before treatment and cannot resume post-therapy.
- Exposure in one minute is one tenth of the amount of exposure in 10 minutes, and a distance twice as far from the radiation source results in one quarter of the exposure.
- Sitting across the room from a treated patient for a few minutes is significantly less exposure than sitting on that person’s lap for the same few minutes.
- If the car ride home is more than two hours, the patient may want to sit in the back seat, opposite the driver’s side.
- Because radioiodine is excreted in urine, feces, and perspiration, good hygiene can also reduce unnecessary exposure to others, including laundering clothing, bed linens, towels, and utensils separately from those of other family members; showering daily; washing hands frequently; and flushing the toilet two to three times after voiding.
- Physicians also recommend that patients abstain from having sexual intercourse for three to four days after treatment.
- Patients should avoid contact with pregnant women and young children, especially infants, for at least one week.

Radioactive iodine fills a gap in treating GD by providing an option other than surgery or medications with high failure rates. Greenspan concludes, “Quite frankly, radioactive iodine is a very effective and safe treatment for Graves’ disease. I would choose this option for myself and my family members if the need arose. If done with proper precautions and appropriate dose calculation, it works.”

FOR MORE INFORMATION

National Graves’ Disease Foundation: www.ngdf.org

American Thyroid Association: www.thyroid.org
RESOLVING THE MYSTERIES OF AUTISM

In Mallinckrodt Institute of Radiology’s East Building, what was a technologically sophisticated but otherwise plain magnetic resonance imaging (MRI) suite has been converted into a cozy nursery with rocking chairs, a crib, and blankets. Customized to accommodate an uncommon group of study participants, it’s the site of seminal research into autism, and the pioneering subjects are just six months old.
RESOLVING THE MYSTERIES OF AUTISM

The infants arrive in the evening to be rocked and cuddled by their parents, then put comfortably to bed—in the bore of the scanner. For as long as 10 days before their imaging appointment, the infants have become accustomed to the subdued knock, buzz, and beep of the high-tech imager as their parents have played them a tape of the noises they'll hear during the scanning process. The babies wear little earplugs, under noise-shielding headphones. And after they're deeply asleep and perfectly still, late-night scans record exquisitely detailed images of their heads and brains. They are exposed to no radiation and need no anesthesia or injection of contrast agents. The research is so noninvasive and unobtrusive that the babies often sleep right through it. If they fuss a little, the scanning pauses; if they wake, the session ends. Their parents agree to participate even though they probably have their hands full with both an autistic child and a new baby. That's one measure of how deeply committed they are to resolving the mysteries of autism.

DIAGNOSTIC IMAGING AND EARLY INTERVENTION

The infants offer invaluable insights to the research team because, first, they are siblings of children diagnosed with autism and, due to autism's genetic component, are far more likely to develop the disorder than are the population at large. The tender age of the subjects is also crucial because autism is "clearly a problem of early brain development," says Kelly Botteron, MD, associate professor of psychiatry and of radiology. "Early intervention is where the future of autism treatment lies."

Today, by the time a diagnosis of autism is stable, the effectiveness of intervention may already have been limited. To help change that, the youngsters are participating in a five-year national study funded by the National Institutes of Health-sponsored Autism Centers of Excellence (ACE) Network. Summarizing the goal of the research, Botteron, the principal investigator of its St. Louis arm, says it will "relate images of the infants' developing brains to the diagnosis of autism," helping to understand the underlying neurophysiology and provide a target for further research. "A study connecting imaging to diagnosis has never been done in infants before," she says.

The children—who will be scanned at six months, 12 months, and 24 months of age—will be joined by a control group of identically aged, healthy youngsters with no predisposition to autism. All of the youngsters will likewise be carefully tested to either make a diagnosis of autism or rule it out. Any abnormalities revealed by the scans can then be associated with developing autism and perhaps to the wider range of related disorders.
ABOUT AUTISM

Autism is a neurobiological developmental disorder usually diagnosed by three years of age. It interferes with a person's ability to communicate, the capacity to relate to others and cognitive function. Those with autism often display repetitive motions and follow rigid routines. Autism carries a strong genetic component, but the genetics of the disorder are complex and not well-understood.

It lasts throughout a lifetime but does not shorten life expectancy, although people with autism often suffer from a number of physical ailments including recurring infections, asthma, and digestive disorders. There is no cure, but early intervention can reduce the severity of symptoms, and behavioral or cognitive intervention can help children gain self-care, social, and communication skills.

Autism is one of a group of disorders known as ASD, for autism spectrum disorders, with a wide range of symptoms and severities. Together, autism spectrum disorders affect an estimated 1.5 million Americans, according to the Autism Society of America (ASA).

Controversy exists over just how rapidly the incidence of autism is increasing. Improved diagnostic procedures contribute to larger numbers, but there also appears to be an actual rise in the number of cases. According to the group Autism Speaks, prevalence has risen until one in every 150 children is diagnosed with autism, making it more prevalent than pediatric cancer, diabetes, and AIDS combined. It affects boys disproportionately.

A diagnosis of autism can be life changing for a family; frequently, one parent must devote full time to providing care. The lifetime cost of that care has been estimated at between $3.5 million and $5 million. In the United States, all autism-related expenses may be as high as $90 billion annually, according to the ASA.
RESOLVING THE MYSTERIES OF AUTISM

sedative-free scanning of infants during a 1999 to 2007 national MRI study of normal brain development. So far in the autism study, the protocol has been used to scan the first five young subjects, with unqualified success.

McKinstry, who is chief of Mallinckrodt Institute’s Pediatric Radiology section, also designed the imaging protocol and scanning implementation for the autism study. High-speed MRI is capable of structural neuroimaging—the capacity to visualize parts of the brain such as the amygdala and the frontal centers where facial processing occurs, both areas of concern to autism researchers. The technology reveals the volume and shape of the brain’s gray matter, made up of nerve cell bodies.

But the latest evolution of sophisticated MRI technology, called diffusion tensor imaging (DTI), goes a big step further. DTI reveals the secrets of white matter, the long tentacles of nerve cells (or axons) that compose the wiring connecting the various parts of the brain. “DTI images the microstructure that carries signals, showing whether the wires are properly organized, aligned, and insulated,” McKinstry says. “We can follow them from one point in the brain to another and test whether the connections play a role in autism.”

DTI uses radio waves and magnetic pulses to nudge water molecules in the brain. Water in the axons is constrained by the myelin sheaths that protect them, much like a wire’s insulation, so it tends to move along the wire rather than dispersing in every direction like water molecules elsewhere. By making images of the water’s organized movement, investigators can map the wires and locate their terminals.

A COLLABORATIVE EFFORT

The researchers will make scans of the 100 infants with autistic older siblings whom they hope to enroll in St. Louis, plus the control group. Similar efforts at the University of North Carolina, the University of Washington at Seattle, and the University of Pennsylvania will bring the total number of infants scanned to 400, along with 160 healthy, contrast subjects. The large majority will not go on to develop autism, but perhaps 60 of the youngsters are expected to be diagnosed with the disorder, given established statistics. Data from the four centers then will be collected and analyzed at two additional coordinating centers at the Montreal Neurologic Institute and the University of Utah. To recruit qualified participants who can visit at precise times requires a region-wide effort, Botteron says, and support groups such as Autism Speaks are helping by alerting their highly motivated members.

CHALLENGES AND POSSIBLE SOLUTIONS

Another challenge faced by the researchers is making accurate autism diagnoses at very young ages. John Constantino, MD, who brings a large autism research portfolio to the study, says that many in the field believe that the symptoms of autism must be appreciable at even six months, but “we’re just not sure.” For those youngest children, he will observe and archive video recordings that can be revisited for even the most subtle clues. And he will use the still-face paradigm, in which a caregiver who has been interacting with a child quickly disengages; the sudden...
indifference upsets most normal babies, but autistic infants often are not bothered, he says. Constantino, associate professor of psychiatry and of pediatrics, says the researchers also may be able to employ eye-tracking technology to measure precisely where babies focus their attention for a “finer-grained evaluation.” A broader range of established tests will be used to evaluate the subjects as they reach 12 months and 24 months of age. Finally, Constantino will make a firm diagnosis when the subjects reach three years, the age at which diagnoses are widely regarded as stable.

The researchers’ hope for the work is that it will produce observable differences in the brains of autistic children that can serve as a basis for discerning the mechanisms by which the disorder develops. McKinstry says that, ideally, the study could lead to a diagnostic tool to be used as a means to assess children who may be at risk and even become the basis for developing strategies to limit disability.

More likely, Botteron says, is that the research may eventually help to sort out the effectiveness of the wide range of treatments and interventions that are available. Families have several broad varieties and dozens of individual plans from which to choose when considering treatment. “Many of the approaches are untested, and it would be helpful to know which ones work,” she says. Any treatment shown to be symptomatically effective could be evaluated using the study’s results to see if underlying physiological changes are affected by a given treatment. For example, the well-regarded approach called applied behavioral analysis (ABA) that is generally regarded as a successful treatment approach could be tested to reveal if and how the underlying physiology is normalized as the treatment progresses.

Botteron warns that the size of the sample of children who eventually develop autism—perhaps 60—is small and that autism is aggravatingly complicated, most likely attributable to several or even many causes, and with a wide range of symptoms and severities. For one study to unravel all of its complexities is not possible. Nonetheless, “families are desperate for something to help,” Botteron says, and the young volunteers who go to sleep in Mallinckrodt Institute’s scanner are providing a first look at the condition as it develops—a big step in a promising new direction before they can even walk.

Editor’s Note: For more information about participating in this important study, go online at http://infantsibs-stlouis.org. Or call Study Coordinator Lisa Flake, MSW, toll free at 1-888-845-6786.
The National Oncologic PET Registry

AN IMPORTANT MILESTONE

by Candace O’Connor

The National Oncologic PET Registry (NOPR), which began accruing patients in May 2006, has reached an important milestone with exciting results. In March 2008, the NOPR announced that, based on the findings of PET scans performed with the radiotracer F-18 fluorodeoxyglucose (FDG), clinicians at more than 1,200 facilities around the country—participants in this sweeping effort to measure the effect of positron emission tomography (PET) findings on treatment decisions—had changed the care of 36.5 percent of the 23,000 registered cancer patients.

Now this data has been submitted to the Center for Medicare and Medicaid Services (CMS), which will begin a review process to determine whether these findings should lead to coverage of more forms of cancer. Currently, CMS only covers PET scans for certain cancers—ovary, uterus, prostate, pancreas, bladder, kidney, stomach, and others—among patients who receive their scans at facilities that participate in the Registry.
The impact of FDG-PET comes as no surprise to Arizona resident Laurel Pracht, now 62, who was diagnosed with late-stage ovarian cancer in 1999. She had surgery and chemotherapy, but it was hard to determine whether she had residual cancer because her tumor did not express the usual tumor marker, CA-125. When Pracht’s oncologist warned her to get her affairs in order, based on the findings of a computed tomography (CT) scan and an elevated tumor marker, she paid the out-of-pocket cost for a PET scan that showed no cancer! A sixth round of planned chemotherapy was canceled.

In a later episode of suspected recurrence—covered this time by the Registry—PET again came to the rescue, showing that Pracht was cancer-free. During the years before the Registry, she had paid out of pocket for two PET scans. “My survival is due to skilled medical care, a good response to chemotherapy, being an educated patient, and not being denied PET scans, proven in my case to be cost-saving and accurate,” says Pracht, a vocal advocate for PET scan coverage. “Cancer patients should not be more concerned about making an installment payment on the cost of a scan than about how long they have to live.”

Mallinckrodt Institute’s Role

The success of the NOPR in completing this innovative “coverage-with-evidence-development” study also comes as no surprise to Barry Siegel, MD, cochair of the NOPR working group. Siegel, professor of radiology and of medicine, has been a key advocate and organizer of the NOPR, which was sponsored by the Academy of Molecular Imaging (AMI) and managed by the American College of Radiology through the American College of Radiology Imaging Network (ACRIN). He believes that the Registry’s decisive results should substantially change the coverage policy of CMS, which is now reviewing the NOPR data in a process that includes a six-month analysis to produce a draft decision, then another analysis period to create a final decision.

“The NOPR was launched successfully, has accrued successfully, and has made PET accessible to a large number of patients,” says Siegel, who is also deputy cochair of ACRIN and medical director of its PET Imaging Core Laboratory. “We believe it has generated compelling data that we hope will convince Medicare that much broader coverage of PET than is currently available is indeed reasonable and necessary.”

On March 24, Siegel and his colleagues published their findings in the on-line version of the Journal of Clinical Oncology; the print version appeared on May 1. Also in March, they submitted a reconsideration request to CMS, asking the agency to provide coverage for the diagnosis, staging and restaging of all cancers except three, already listed as “nationally non-covered”: diagnosis of breast cancer when an abnormality is present by mammography or palpation, and regional node assessment in breast cancer, and malignant melanoma.

Background of the Study

While other forms of imaging—especially magnetic resonance imaging (MRI) and CT—have long been covered for cancer patients, PET has not. More than a decade ago, the agency that preceded CMS in administering Medicare considered covering PET broadly
but decided against it, because it was concurrently adopting regulations that would require scientific evidence to prove that new technologies improved patient outcomes.

So the agency instead decided to approve PET only for certain types of cancer:

- 1998—evaluation of lung nodules and the initial staging of non-small-cell lung cancer
- 1999—restaging of patients with recurrent colorectal cancer, some lymphoma cases, and possible recurrence of melanoma
- 2002—partial breast-cancer coverage
- 2003—partial coverage for restaging of various thyroid cancers.

Still, many physicians felt frustrated by these limitations since they believed in a much broader use of PET; in 2002 the AMI acted, encouraging medical centers to petition for more coverage. Nine institutions responded, including Mallinckrodt Institute, where Siegel and Perry Grigsby, MD, professor of radiation oncology, of radiology, and of obstetrics and gynecology, requested coverage for cervical cancer. In 2004, CMS decided to approve only cervical cancer, but the agency also announced that it would consider covering other cancers as part of a large-scale “coverage-with-evidence-development” effort to evaluate PET’s effectiveness.

How the NOPR Worked

Siegel and his colleagues began discussing this idea and came up with the plan for a registry. They contacted the American College of Radiology and asked whether its imaging network, ACRIN, could provide the necessary infrastructure. Other key groups, including the American Society of Clinical Oncology and the Society of Nuclear Medicine, also offered support. Substantial funding came from the AMI, through its Institute for Molecular Technologies.

Medicare-eligible patients could participate when they came in with a referral for a PET scan to evaluate a form of cancer not otherwise covered by Medicare. Before the test, the facility had to collect, from the referring physician, a pre-PET questionnaire, indicating planned treatment without PET data; afterwards, another questionnaire assessed the physician’s treatment plan in light of FDG-PET findings. All information was collected electronically through the NOPR Internet site.

The NOPR organizers spent hours educating PET facility personnel and referring physicians about data collection and about the uses and misuses of PET. Despite minor bumps, the process went “quite smoothly,” says Siegel. “It exceeded our expectations as to how smoothly it ran.”

PET and Cancer

Although FDG-PET is a valuable tool in diagnosing or staging certain forms of cancer, says Siegel, there are forms of cancer in which it may be less sensitive than other imaging methods. It does not do particularly well with the diagnosis or initial staging of prostate cancer, liver cancer, or “mucinous cancers” such as stomach cancer.

Yet in this study, “we have drilled down and do not find that there are any cancers for which PET is an exceptionally outstanding performer or exceptionally poor performer in terms of changing management,” he says. Overall, he believes it is an effective tool for many cancers, so Medicare should trust physicians, and the radiologists who advise them, to understand PET’s limitations and to use PET whenever appropriate.

In this study, PET also showed one surprising result in patients for whom a biopsy was being planned to evaluate their cancers. In some three quarters of these patients, the PET scan eliminated the need for this procedure.

Does PET save lives?

Although the NOPR findings demonstrate that PET has a substantial effect on the way in which physicians treat cancer patients, does that translate into more lives saved? Intuitively, most people might guess that it does. But so far, says Siegel, no hard data exist to show that using PET leads to a pro-
longed life span for cancer patients. Existing studies do show that PET allows doctors to find certain recurrent cancers at an earlier—and presumably more treatable—stage than they would have been otherwise. In fact, this early detection has sometimes allowed surgeons to perform a complete surgical removal of the recurrence.

Clearly, PET also has another advantage: It gives both physicians and patients the chance to “conserve resources.” For example, pancreatic cancer, caught early enough, can be treated surgically with the “Whipple procedure,” an extensive operation with a difficult recovery period.

“But if you look at the PET scan, and find that the patient has distant metastatic disease, then PET findings have steered the patient away from radical therapy that is intended to be curative but that cannot be curative,” says Siegel.

In the future, PET may also be useful in the area of treatment monitoring. After a patient has had one or more cycles of chemotherapy, what effect is it having? It may be too early for CT scanning to have shown any response. By assessing the cancer’s metabolism rather than its size, PET is usually able to determine early on if the drug is not working, thus conserving expensive medications, conserving the patient’s strength, and allowing the patient to shift to a drug therapy that may work better.

“That is the whole concept of using molecular imaging for what has been called individualized medicine but may be more correctly labeled ‘risk-stratified medicine,’” says Siegel. “We may not be certain that our answer will work for a patient all of the time, but we enrich the probability that it is the right one because we have shown, metabolically, that the patient is in the responder group rather than the non-responder group.”

Future of NOPR Findings

The CMS review process should be complete by January 2009, with a report issued detailing the new guidelines. Meanwhile, CMS coverage of PET scans for cancer patients who have Medicare coverage continues during the more than 87,700 patients have received scans covered under the Registry to date.

The NOPR working group is hopeful about the outcome, and patients like Laurel Pracht are eager for a positive decision. Within her on-line support group of ovarian-cancer survivors, some have had PET scans that changed their course of treatment. “Others have died, while making installment payments on the cost of their scans,” she says.

“Doctor Siegel has stayed the course, taking the NOPR from an idea to the first collaboration between the private medical imaging sector and CMS,” says Pracht. “He and the committee were fully aware that patients were divided into those who could afford the out-of-pocket cost for this diagnostic tool and those who could not—and they have directly benefited this patient’s future.”

The NOPR Working Group

- Barry Siegel, MD, professor of radiology and of medicine; chief, Division of Nuclear Medicine—Mallinckrodt Institute of Radiology at Washington University School of Medicine
- Edward Coleman, MD, professor of radiology; chief, Division of Nuclear Medicine—Duke University School of Medicine
- Bruce Hillner, MD, professor of internal medicine; associate chair, information systems—Virginia Commonwealth University
- Anthony Shields, MD, PhD, professor of medicine and of oncology—Wayne State University; director, clinical research—Karmanos Cancer Institute, Detroit, Michigan
- The Statistical Center—Brown University.
Most radiologists at Mallinckrodt Institute of Radiology (MIR) probably don’t think twice about the diagnostic technology available at MIR—they’re accustomed to having multiple units of cutting-edge equipment on hand to provide the highest quality care for patients. Matthew Parsons, MD, assistant professor of radiology in the Institute’s Neuroradiology section, now has a new appreciation for these ready resources after his stint in Iraq at the 325th Combat Support Hospital (CSH, pronounced “CASH”).
"We did our work at the hospital with two CT [computed tomography] scanners, an X-ray unit, and an ultrasound," says Parsons. "There was no MRI [magnetic resonance imaging] or PET [positron emission tomography]."

Parsons joined the Army Reserve in September 2000, was activated in August 2007 and sent to Iraq. He served 100 days as the only radiologist in the hospital at Al Asad (Arabic for “The Lion”) Airfield, approximately 180 kilometers west of Baghdad and the largest United States military airbase in the mostly Sunni-populated, western Iraq province of Al Anbar. When Parsons arrived at the hospital and met the radiologist he was replacing, they discovered they had been medical students together at the University of Cincinnati. Radiologists, a scarce specialty in the military, are required to serve for 100 to 110 days during one stint, with probable redeployment of 18 months to two years between tours of duty.

Left: Parsons’ office was a subdivided module, containing a desk and two laptops for viewing digital radiology images.

Below: Abraham’s Well at Al Asad: According to theologians, Abraham—who is referenced in literature of the Muslim, Jewish, and Christian religions—stopped at this oasis while travelling from Mesopotamia (modern-day Iraq) to the land of Canaan.
ON DUTY IN IRAQ

ON THE JOB

The 325th is staffed by United States military and, according to Parsons, the only Iraqi nationals who work there serve as translators. Parsons’ job description was simple: interpret all films and be on call 24/7. While stationed at Al Asad, he received and read films transmitted by satellite from Tikrit Airbase (100 miles northwest of Baghdad) and handled trauma cases.

While he may not have had as much equipment as is readily available at Mallinckrodt Institute, the equipment Parsons did have saved lives. “Radiology is crucial to survival in Iraq. For example, when people were brought to the hospital after being injured by a car bomb or by a suicide bomber wearing an IED [Improvised Explosive Device], I could determine the extent of the injuries and if surgery was needed,” says Parsons. “The hospital there couldn’t function without radiology; its absence would result in more—and perhaps less accurate—surgery being done. I could tell the surgeons where the fragments were, which could decrease the need for exploratory surgery, or I could pinpoint the surgical target. Our CT scanners were crucial for that job. With diagnostic imaging, it was possible to pinpoint the shrapnel relative to sensitive structures, so we could determine whether surgery was required.”

“Our rule for accepting people at the hospital: If life, limb, or eyesight was at risk, they were seen. That included United States service men and women, Iraqi soldiers, Iraqi civilians, government contractors, and people from other countries who happened to be there.” The hospital also ran an outpatient clinic for noncombat-related minor injuries, which often included sports injuries from running, basketball, football, or soccer. Imaging helped to nail down the causes and treatment options.
LIFE ON THE BASE

Most of the housing units on base are called “choos,” explains Parsons. “The choo that I shared with another doctor had two beds, two desks, a TV, and a DVD player. We had satellite cable for the Armed Forces Network, so we got *Monday Night Football* on Tuesday! There was also an Internet connection. And, we had an air-conditioner, which is pretty much a necessity when you’re living in a metal box in a country where the daily temperature can reach 130 degrees Fahrenheit. The hospital and the two large dining facilities also were air-conditioned.”

Commuting to work was no problem. “My living quarters were a quarter of a mile from the hospital, and the two dining facilities were each about one mile away. The highlight of my day was lunch and dinner,” Parsons says with a smile. “I walked everywhere and felt very safe, partially because all personnel on the base are required to carry side arms.”

Parsons took his laptop computer and a digital camera to Iraq, so he could send pictures home over the Internet. He was able to call his wife almost everyday. “The only exception was when a soldier died,” Parsons says. “No one was allowed to send e-mails or call home until the military had notified the soldier’s family in the correct compassionate way.” Once a week, Parsons had a video conference call with his wife and 14-month-old son Jack. “My wife said that because of the video calls, Jack thought his daddy lived in the computer.”

RADIOLOGY CASES FROM AL ASAD

Head CT scan of a patient who was injured by an Improvised Explosive Device (IED) blast.

CT scan of a Marine, with symptoms of nausea, vomiting, and persistent headache, reveals a six-centimeter tumor in the frontal lobe of his brain. He was transferred to a hospital in the States.

A United States government contractor who had a history of breast cancer was suffering from severe headaches. After a CT image showed brain metastases, she was sent to the States for treatment.

Left: This house belonged to a date farmer whose land was confiscated during Sadaam Hussein’s presidency; the land became part of an Iraqi Air Force base called Al Asad.
ON DUTY IN IRAQ

TEAMWORK

When asked about his memories of his time in Iraq, Parsons says that it is hard to forget the extreme heat and that all the surroundings seem to be in shades of tan or brown, no greenery or color. “But I think mainly it’s the doctors I worked with,” he adds. “We really were a team. I keep in contact with some of the other physicians; one of them from San Francisco came here for a visit. They were very professional and treated everyone with the same courtesy and care—military officers and Iraqi citizens alike. It was a great example of the phrase: ‘Medicine knows no boundaries.’”

Matthew Parsons, MD, (kneeling, fifth from the left) and the physicians of the 325th Combat Support Hospital, Al Asad.

A MEMORABLE CASE

A young Marine and his canine partner, Leah, were on patrol in Fallujah, about 40 miles west of Baghdad, when a suicide bomber detonated an IED next to them. Most of the bombers fill their vests with either nails or ball bearings to do the most damage—this one had used ball bearings. “The Marine had facial injuries,” says Parsons. “We used CT to scan his head, neck, and face, which showed that a ball bearing had fractured his mandible and was lodged near the carotid artery.

The CT scan located the ball bearing so precisely that we were confident it could safely be left in place without causing more injury. It saved the Marine from having exploratory surgery to a delicate area.”

Leah, on the other hand, seemed to have only superficial wounds on the chest and abdomen, but she was acting as though she was badly injured. “So I performed my first ever CT scan of a dog and discovered she had a ruptured spleen and damaged bowel,” says Parsons. Leah was taken to the OR so surgeons could repair the bowel and remove the spleen. The dog recovered but was retired from active duty and returned to the States.
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.

NEW FACULTY

Kristopher Cummings, MD, instructor in radiology, Division of Diagnostic Radiology.

Michelle Lee, MD, instructor in radiology, Division of Diagnostic Radiology.

Nael Saad, MD, instructor in radiology, Division of Diagnostic Radiology.

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

JOINT APPOINTMENT

Carolyn Anderson, PhD, professor of radiology, of molecular biology and pharmacology, and of chemistry, was appointed professor of biochemistry, Department of Biochemistry and Molecular Biophysics.

GRANTS

Kevin Black, MD, associate professor of psychiatry, of neurology, of radiology, and of anatomy and neurobiology, received a one-year grant in the amount of $61,825 from the Tourette Syndrome Association for “Finding tics in the community without putting a doctor on every corner.” He received a one-year grant from Synosia Therapeutics for “A randomized, double-blind, placebo-controlled, two-way cross-over study to explore the effects of 7 days dosing with SYN115 20 mg p.o. BID or 60 mg p.o. BID on clinical and fMRI response to intravenous levodopa in patients with mild to moderate Parkinson’s disease.”

Colin Derdeyn, MD, professor of radiology, and of neurology and neurological surgery, is the principal interventional neuroradiology investigator for a $27 million grant from the National Institute of Neurological Disorders and Stroke (NINDS) for research on “Stenting vs. aggressive medical management for preventing recurrent stroke in intracranial stenosis (SAMMPRIS).” Marc Chinnowitz, MBChB, Medical University of South Carolina, is principal investigator for the five-year multicenter study. Derdeyn serves as chair of the Advisory Committee for the six-year, $1.9 million NINDS-funded “Vertebrobasilar flow evaluation and risk of transient ischemic attack and stroke (VERITAS) Study.” Sepideh Amin-Hanjani, MD, University of Illinois, Chicago, is principal investigator. Derdeyn is coinvestigator for the four-year, $4.2 million NINDS-funded “Carotid occlusion surgery study.” Principal investigators are William Powers, MD, University of North Carolina, and Robert Grubb, Jr., MD, professor of neurological surgery and of radiology.

Robert McKinstry, MD, PhD, associate professor of radiology, is the study center principal investigator for the American College of Radiology Imaging Network (ACRIN) Protocol 6677 “Staging with MR perfusion imaging and MR spectroscopy.” ACRIN 6677 is being conducted in collaboration with the Radiation Therapy Oncology Group Protocol 0625, “A randomized phase II trial of bevacizumab with temozolomide in recurrent glioblastoma.” Funding for the study is on a per-subject basis, with current funding at $34,174.

Suresh Vedantham, MD, associate professor of radiology, as principal investigator, received a five-year, $7.2 million grant from the National Heart, Lung and Blood Institute, National Institutes of Health, for research on “Pharmacomechanical catheter-directed thrombolysis for acute DVT.”

Karen Wooley, PhD, professor of chemistry and of radiology, received a three-year grant in the amount of $443,917 from the Office of Naval Research for “The development of non-toxic anti-fouling coatings based upon nanoscopic surface complexities.” She is a coinvestigator for a five-year grant in the amount of $9.3 million from the National Institutes of Health for research on “Targeted nanoparticles optimized for cancer diagnosis and therapy.” She is a coinvestigator for a five-year, $1.9 million grant from the National Institutes of Health for research on “Adhesive-based nanotherapeutics in urinary tract infection.”

APPOINTMENTS/ELECTIONS

Deanna Barch, PhD, associate professor of psychology, of psychiatry, and of radiology, was named director of the Silvio Conte Center for Neuroscience Research at Washington University in St. Louis.

Mikhail Berezin, PhD, instructor in radiology, was appointed to the program committee for the 2009 SPIE International Symposium of Biomedical Optics.

Colin Derdeyn, MD, professor of radiology, and of neurology and neurological surgery, was appointed to the Clinical Neuroscience and Disease Study Section of the National Institutes of Health’s Center for Scientific Review. He was appointed to a four-year term as a consultant to the Neurological Devices Panel of the Medical Devices Advisory Committee of the Food and Drug Administration’s Center for Devices and Radiological Health. He also was appointed to a five-year term on the Steering Committee of the National Institute of Neurological Disorders and Stroke Specialized Programs for Translational Research in Acute Stroke (SPOTRIAS) Center Network.

Joel Perlmutter, MD, professor of neurology, of radiology, and of physical therapy, was appointed to the Advisory Board of the Bauder Center for Business Medical Ethics at Saint Louis University, St. Louis, Missouri.
APPOINTMENTS/ ELECTIONS
Continued from page 27

Fred Prior, PhD, research associate professor of radiol-
ogy, was appointed chairman of the Georgetown University Biomedical Informatics External Advisory Board.

Brian Rubin, MD, PhD, professor of surgery and associate professor of radiol-
ogy, was elected president of the Midwestern Vascular Surgical Society.

Barry Siegel, MD, professor of radiology and of medicine, was appointed deputy cochair of the American College of Radiology Imaging Network (ACRIN) and was reappointed as medical director of the ACRIN PET Imaging Core Laboratory.

Marilyn Siegel, MD, professor of radiology and of pediatrics, was appointed chair of the Radiology Committee of the National Cancer Institute’s Children’s Oncology Group.

Jerold Wallis, MD, associate professor of radiology, was appointed to the Board of the Intersocietal Commission for the Accreditation of Nuclear Medicine Laboratories.

Karen Wooley, PhD, professor of chemistry and of radiology, was appointed to the Review Committee on Faculty Personnel Procedures, Washington University, St. Louis, Missouri.

Pamela Woodard, MD, associate professor of radiology, was appointed chair of the American College of Radiology Imaging Network’s newly formed Cardiovascular Imaging Research Committee.

Kevin Black, MD, associate professor of psychiatry, of neurology, of radiology, and of anatomy and neurobiology, presented “Dopaminergic modulation of working memory in Tourette’s syndrome” at the American Neuropsychiatric Association’s 19th Annual Meeting, Savannah, Georgia, March 1-4.

Jeffrey Brown, MD, professor of radiology, spoke on “MR contrast agents: a brief history” at the Nebraska Radiological Society, Omaha, April 23. He presented “Gadolinium-based contrast agents: summary of existing knowledge on NSF” at the University of Nebraska Medical Center, Omaha, April 24.

Carmen Dence, MS, research associate professor of radiology, spoke on “PET imaging in nuclear chemistry—role of radiopharmacy and applications to nuclear medicine” at Atlantic University, College of Pharmaceutical Chemistry, Barranquilla, Colombia, February 8. She presented “PET imaging in nuclear chemistry—applications to nuclear medicine” at the National Cancer Institute, Bogota, Colombia, February 13. As keynote speaker, Dence presented “Role of radiopharmacy in PET imaging and radiochemistry” and “Comparison of national PET radiopharmaceutical regulations” at the 5th National Congress of Hospital Pharmacy, Bogota, Colombia, March 7 and 8.

Carolyn Anderson, PhD, professor of radiology, of molecular biology and pharmacology, and of chemistry, presented “New radiopharmaceuticals for oncological imaging” at the Society of Nuclear Medicine Mid-Winter Meeting, Newport Beach, California, February 16. She presented “Copper-64-labeled biomolecules for molecular imaging of cancer metastasis” at the Department of Chemistry, Virginia Commonwealth University, Richmond, April 17.

Kyle McCommis, research technician, Division of Radiological Sciences, as lead author, received the Young Investigator Award for his presentation on “Detection of changes in myocardial blood flow and volume: a CMR study in a canine model of coronary artery stenosis” at the Society for Cardiovascular Magnetic Resonance (SCMR) 11th Annual Scientific Sessions in Los Angeles, California, January 31-February 3.

McCommis (left) accepts the award from Mathias Friedrich, MD, SCMR program chair, and Stefan Neubauer, MD, SCMR president.

As lead author of “Quantification of myocardial blood volume during dipyridamole and dobutamine stress: a perfusion CMR study,” McCommis also received second-place recognition for the Gerald Pohost Journal of Cardiovascular Magnetic Resonance (JCMR) Best 2007 Manuscript.

LECTURES

Carolyn Anderson, PhD, professor of radiology, of molecular biology and pharmacology, and of chemistry, presented “New radiopharmaceuticals for oncological imaging” at the Society of Nuclear Medicine Mid-Winter Meeting, Newport Beach, California, February 16. She presented “Copper-64-labeled biomolecules for molecular imaging of cancer metastasis” at the Department of Chemistry, Virginia Commonwealth University, Richmond, April 17.

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Colin Derdeyn, MD, professor of radiology, and of neurology and neurological surgery, presented "Overview of cerebral hemodynamics" at the 8th Annual International Meeting on Cerebral Revascularization, St. Louis, Missouri, January 10. He spoke on "Natural history of North American Moyamoya disease" at the 10th Annual Joint Meeting of the American Association of Neurological Surgeons/Congress of Neurological Surgeons Joint Section on Cerebrovascular Disease, New Orleans, Louisiana, February 18.

Igor Efimov, PhD, professor of biomedical engineering and of radiology, spoke on "Biophotonic imaging of atrial pacemaker complex" at the Cardiovacular Research Seminar, Washington University, St. Louis, Missouri, January 24. He spoke on "Electroporation in the intact heart: implications for defibrillation, arrhythmia and stunning" at Medtronic, Inc., Minneapolis, Minnesota, January 28. He presented "Mechanisms of ventricular fibrillation and a new approach to cardioversion-defibrillation," "New approaches for the low energy cardioversion and defibrillation," and "Basic electrophysiological mechanisms of initiation of supraventricular tachyarrhythmia" at the VIII Pan Slavic International Congress on Cardiac Pacing and Electrophysiology "CARDIOSTIM," Saint Petersburg, Russia, February 15. Efimov presented "Functional anatomy of the AV junction" at the Cardiac Bioelectricity and Arrhythmia Center, Washington University, St. Louis, Missouri, March 31. He presented "Molecular and structural basis of arrhythmia in the human AV junction: insights from biophotonic imaging" at Cardiology Grand Rounds, University of Cincinnati College of Medicine, Ohio, April 22. He spoke on "Translation of basic cardiac arrhythmia research from animal models to clinical therapy: need of the human heart research" at Mid-America Transplantation Services, St. Louis, Missouri, May 6.

Louis Gilula, MD, professor of radiology, of orthopaedic surgery, and of plastic and reconstructive surgery, as visiting professor, spoke on "Analysis of complex carpal trauma" and "Radiographic entities to know that often are not known" at the University of California, San Diego, February 25 and 26. As visiting professor, he presented "Radiology Board Review in musculoskeletal system" at the Oregon Health and Science University, Portland, April 16 and 17.


Rebecca Hulett-Bowling, MD, assistant professor of radiology, as visiting professor, spoke on "Untwisting the mystery of malrotation—Is it possible?!" at the University of Arizona, Tucson, April 3.

Cylen Javidan-Nejad, MD, assistant professor of radiology, spoke on "Coronary CTA: How to do it"; "Coronary CTA: How to read it"; "CT/MR of myocardial diseases"; and "Cardiac valves: MRI and echocardiography at Non Invasive Cardiac Imaging Review: MDCT, ECHO, MRI, presented by Mallinckrodt Institute of Radiology and Somascan Medical Imaging, San Juan, Puerto Rico, February 16 and 17.

Richard Laforest, PhD, associate professor of radiology, presented "The three photon yield from e+ annihilation in biological liquids" at the American Physics Society Annual Meeting, St. Louis, Missouri, April 10-14.

Robert McKinstry, MD, PhD, associate professor of radiology, spoke on "Imaging of brain injury in newborns" and "Neuro cases from the Mallinckrodt Institute of Radiology" at Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, March 7.


Fred Prior, PhD, research associate professor of radiology, presented "Integration of images for knowledge discovery" and served as session chair for the National Forum on the Future of the Defense Health Informatics, Washington, DC, March 26-28.

Barry Siegel, MD, professor of radiology and of medicine, spoke on "PET and PET/CT in gynecologic malignancies" and "Monitoring and predicting tumor response to treatment with PET and PET/CT" at Advances in Diagnostic and Interventional Radiology Symposium, sponsored by King Faisal Specialist Hospital & Research Centre, Riyadh, Kingdom of Saudi Arabia, January 8-10. He presented "Endocrine, RE, non-imaging & lymphatic, GI", "PET & PET/CT coding & reimbursement", and "PET coverage with evidence development (CED) & National Oncologic PET Registry (NOPR)" at the Society of Nuclear Medicine Reimbursement Seminar, St. Louis, Missouri, January 18. Siegel spoke on "PET in gynecologic cancers" at the PET/CT Oncology Symposium, Philadelphia, Pennsylvania, February 9. He presented "PET in thoracic oncology" and "PET in women's diseases" at the Philippine College of Radiology 2008 Annual Convention, Makati City, Manila, Philippines, February 21-23.


Marilyn Siegel, MD, professor of radiology and of pediatrics, presented "CT imaging of congenital heart disease," "Magnetic resonance imaging of pediatric bone marrow," "Advances in cancer imaging," and "Ultrasound of pediatric spine" at Advances in Diagnostic and Interventional Radiology Symposium, sponsored by the Uniformed Services Hospital of the Health Services, Bethesda, Maryland, March 2. She presented "MDCT of adult congenital heart disease" at the 31st Annual Course of the Society of Computed Body Tomography and Magnetic Resonance Imaging, Charleston, South Carolina, April 4 and 5. She presented "Pediatric CT angiography," "CT angiography of adult mediastinal anomalies," and "CT angiography of adult congenital heart diseases" at Advanced Topics in CT Scanning: CT Angiography, 3D Imaging, Virtual Imaging Course, sponsored by Johns Hopkins University, Las Vegas, Nevada, April 12 and 13.
Franz Wippold, MD, professor of radiology, presented “Head and neck imaging, a case-based review” at Saint Louis University, St. Louis, Missouri, April 7.

Karen Wooley, PhD, professor of chemistry and of radiology, spoke on “Polymer chemistry as applied to the emerging field of nanotechnology” at the Society of Professors Emeriti, Washington University, St. Louis, Missouri, January 14. She spoke on “Synthetic methods for the preparation of well-defined nanostructures, designed as versatile scaffolds for imaging and therapy of acute vascular injury, cancer, and other targets” at the Institute for Environmental Medicine, University of Pennsylvania Medical Center, Philadelphia, February 8. Wooley presented “Polymer chemistry as applied to the emerging field of nanotechnology: with emphasis on devices for nanomedicine” at the University of California, Irvine, March 12, and at Central Michigan University, Mt. Pleasant, April 23. Wooley presented “Shell crosslinked knedel-like (SCK) nanoparticles and hyperbranched fluoropolymers (HBFP)” at Johns Hopkins University, Baltimore, Maryland, April 1. Wooley presented “RAFTpolymerization of functional monomers” at the 235th American Chemical Society National Meeting, New Orleans, Louisiana, April 6. She presented “Synthesis and characterization of well-defined poly(acrylic acid)-containing homo- and block (co)polymers” at The Mitsubishi Chemical Corporation, Tokyo, Japan, April 21.

**SYMPOSIA**

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

**SOCIETY OF GASTROINTESTINAL RADIOLOGISTS AND SOCIETY OF UROLOGY**

**Abdominal Radiology Course 2008**

Rancho Mirage, California February 17-22, 2008

Dennis Balfe, MD, “Cases for aces”; “ABR update”; “Imaging the peritoneal cavity: pearls and pitfalls.”

Jay Heiken, MD, “CT colonography: MDCT technique”; “Diagnosing benign liver lesions with CT and MR”; Imaging the pancreas: neoplastic and inflammatory disease.”

Christine Menias, MD, “CT of lower abdominal pain”; “Acute gynecology conditions: US and CT.”

Jay Weene, MD, “Solid renal mass and role for renal mass biopsy.”

**CARDIAC CT ANGIOGRAPHY: A PRACTICAL APPROACH**

Sponsored by American Roentgen Ray Society

Ft. Lauderdale, Florida February 29-March 1, 2008

Sanjeev Bhalla, MD, course director.

Sanjeev Bhalla, MD, “Case-based presentation: cardiac masses and pericardium.”

Cylen Javidan-Nejad, MD, “Artifacts and coronary artery disease.” “Case-based presentation: artifacts and CAD.”

Kevin Johnson, MD, “Quantification and characterization of coronary plaque.”

Marilyn Siegel, MD, “CT of adult congenital heart disease.” “Case-based presentation: CHD.”

**SOCIETY OF INTERVENTIONAL RADIOLOGY**

33rd Annual Scientific Meeting

Washington, DC

March 15-20, 2008

Michael Darcy, MD, “Morbidity and mortality: learning from our mistakes”; “Cases 10-12: case-based review: emolization”; “Microcatheter in peripheral.”

Colin Derdeyn, MD, “Endovascular stroke intervention: now and in the future.”

Craig Glaiberman, MD; Benjamin Jacobs; James Duncan, MD, PhD; Thomas Pilgram, PhD, “Simulation in training: one year experience using a performance to assess IR fellow training status.”

Nael Saad, MD; Craig Glaiberman, MD, “CT-guided percutaneous cryoablation of unresectable renal tumors: initial outcomes.”

Nael Saad, MD; Christine Menias, MD; Thomas Pilgram, PhD; Daniel Picus, MD, “Portal vein embolization for future liver remnant hypertrophy prior to trisegmentectomy: choice of embolic agent.”


**FOCAL SPOT, SPRING 2008**
**SYMPOSIA**

*Continued from page 31*

**ASSOCIATION OF UNIVERSITY RADIOLOGISTS**

59th Annual Meeting
Seattle, Washington
March 25-29, 2008

Jennifer Demertzis, MD; Meghan Lubner, MD; Sara Rohr, MD, moderators, "ACR problem solving 1."

Jennifer Demertzis, MD; Meghan Lubner, MD; Sara Rohr, MD, moderators, "ACR problem solving 2: the role of informatics in optimizing resident education."

Bennett Greenspan, MD, moderator, "Society of Nuclear Medicine Session: Radiation safety radiopharmacy and regulatory issues—an update for senior radiology residents."

Christine Peterson, MD, moderator; Faculty: Jonathan Baker, MD; Dennis Balfe, MD; Sanjeev Bhalla, MD; Jennifer Demertzis, MD; Travis Hilen, MD; Meghan Lubner, MD; Sara Rohr, MD; Jason Stephenson, MD, "Philips Vydareny imaging: imaging competition—preliminary (presented by Mallinckrodt Institute of Radiology)."

Joshua Shimony, MD, PhD, "Informatics and functional brain connectivity."

**AMERICAN ROENTGEN RAY SOCIETY**

108th Annual Meeting
Washington, DC
April 13-18, 2008

Sanjeev Bhalla, MD, "CT evaluation of pulmonary embolic disease"; "CT of acute lung and pleural: traumatic and nontraumatic findings"; "Cardiovascular imaging: CXR findings of cardiac disease"; "Congenital conditions."

Jay Heiken, MD, "The PREDICT study: a randomized double-blind comparison of contrast-induced nephropathy after a low- or iso-osmolar contrast agent in high-risk patients."

Cylen Javidan-Nejad, MD, "Cardiovascular imaging: coronary arteries."

Meghan Lubner, MD; Sanjeev Bhalla, MD; Cylen Javidan-Nejad, MD; Christine Menias, MD, "Atypical imaging features of fibrosing mediastinitis."

Meghan Lubner, MD; Christine Menias, MD; Christine Peterson, MD; Sanjeev Bhalla, MD; "Atypical imaging features of gastrointestinal (GI) stromal tumors."

Prakash Masand, MD; Marilyn Siegel, MD, "Noninvasive evaluation of post surgical cardiovascular conduits in the pediatric age group using multidetector imaging."

Prakash Masand, MD; Sushilkumar Sonavane, MD; Marilyn Siegel, MD, "CT angiography of abdominal coarctation in children."

Christine Menias, MD, "CT of acute intestinal ischemia and bleeding"; "Wunderlich's syndrome (nontraumatic perirenal hemorrhage) revisited: cross-sectional imaging spectrum"; "Borderline ovarian tumors: of borderline significance?"

Marilyn Siegel, MD, "Imaging of pediatric abdominal emergencies."

Pamela Woodard, MD, Keynote Lecture—"Cardiac CT: the future."

**SOCIETY FOR PEDIATRIC RADIOLOGY**

51st Annual Meeting and Postgraduate Course
Scottsdale, Arizona
May 6-10, 2008

Steven Don, MD; Bruce Whiting, PhD; Parinaz Massoumzadeh, PhD, "Evaluation of quality assurance control phantom for digital neonatal chest projection imaging."

—Caffey Award for Best Basic Science Paper

William McAlister, MD, "Bisphosphonate-induced osteoporosis: novel bone modeling defects, osteosclerosis fractures, and metaphyseal osteopenia after drug exposure ceases"; "Physical closure from chronic vitamin A intoxication"; "Osteoporogen deficiency (Juvenile Paget's disease): responses to oral and IV bisphosphonates in 3 children"; "Molecular exclusion of mutations in EXT1 and EXT2 as the cause of metachondromatosis."

Prakash Masand, MD; Marilyn Siegel, MD, "CT angiography of pulmonary atresia, pre and post repair"; "Patterns of delayed myocardial enhancement on cardiac MRI in pediatric patients with myocarditis."

Prakash Masand, MD; Rebecca Hulett-Browning, MD, "Multidetector CT angiography in the evaluation of congenital thoracic aortic anomalies in the pediatric age group."

Marilyn Siegel, MD, "Cardiac CTA: congenital heart disease."

Sushilkumar Sonavane, MD; Madelyn Stazzone, MD, "Prenatal fetal MRI imaging in genitourinary abnormalities."

Madelyn Stazzone, MD, "Osteomyelitis of the pubic symphysis: MR findings and pitfalls in diagnosis"; "2D-flash sequences: Should they be part of the standard protocol for fetal MRI?"

Editor's Note: In the listing of MIR's 2007 RSNA Grant Recipients (page 6 in the Winter 2007/2008 issue of *Focal Spot*), the Toshiba Research Scholar Grant should have read: Jeffrey Lin, MD, PhD, "Noninvasive characterization of NFkB activation in non-alcoholic fatty liver disease."
Below: David Piwnica-Worms, PhD, professor of radiology and director of the Washington University Molecular Imaging Center.

Above: As part of the Industry Viewpoints segment of the program, Jeffrey Evelhoch, PhD, director of Imaging Sciences Imaging at Amgen, Inc., discussed "Imaging in the biopharmaceutical industry."