JNM Article, Stanford Researchers Recognized with "Minnies"

After results were tallied from its annual reader poll, the imaging Internet site AuntMinnie.com awarded 2 prestigious "Minnies" to nuclear medicine recipients. An article published in the July issue of *The Journal of Nuclear Medicine* (2006;47:1081–1087), "'Flying Through' and 'Flying Around' a PET/CT Scan: Pilot Study and Development of 3D Integrated ^{18}F-FDG PET/CT for Virtual Bronchoscopy and Colonoscopy" was named "Scientific Paper of the Year." Stanford University researchers Andrew Quon, MD, Sandy Napel, PhD, Christopher Beaulieu, MD, PhD, and Sanjiv Sam Gambhir, MD, PhD, reported for the first time in this paper on the ability to create navigable 3D PET/CT images for "fly-around viewing" of cancer in the lungs and colon. Such visualization "may be used to detect and characterize cancer, spare someone from more invasive medical procedures, lead to better disease detection rates of colon cancer, provide surgical guidance, and detect which tumors may be easier to biopsy," Quon said. "Our new imaging and processing protocol can peel away the organs, highlight tumors and detect cancerous 'hot spots'—providing an omnipotent perspective on the body." The selection of this paper by the broad spectrum of imaging practitioners who vote on the annual awards indicates widespread interest in innovative clinical and research applications that combine functional and anatomic imaging.

Gambhir, professor of radiology and bioengineering, director of the Molecular Imaging Program, and head of the nuclear medicine division at Stanford, was also awarded the Minnie as "Most Influential Radiology Researcher." As a researcher, he uses a range of technologies, including microPET, microCT, bioluminescence optical imaging with a charge coupled-device camera, and fluorescence optical imaging, in small animal models. His research team has devised methods to image gene/cell therapy in living subjects, and he has developed several small animal–imaging strategies for studying basic cell/molecular biological events, including signal transduction, gene expression, and cell trafficking. Gambhir has provided innovations in both research and clinical applications of PET, developed and validated both enzyme and receptor-based PET reporter gene–reporter probe assays, and produced a novel way to use molecular imaging to examine the gate logic of protein–protein interactions in the living mouse. His studies have produced the first proof of principle that signals from protein–protein interactions that regulate cellular communication systems can be imaged in vivo.

AuntMinnie.com

Gadolinium Linked to Nephrogenic Systemic Fibrosis

In 2 articles appearing on November 8 online ahead of print in the *Journal of the American Academy of Dermatology*, researchers provided evidence suggesting a link between exposure to gadolinium-containing contrast agents and nephrogenic fibrosing dermopathy (NFD)/nephrogenic systemic fibrosis (NSF) in patients with renal insufficiency, an association first suggested in 2000. NSF is a potentially serious, scleroderma-like disease of unknown etiology. More than 215 cases of the disease have been described in the last decade.

In the first article, Whitney High, MD, from the University of Colorado at Denver and colleagues from in Colorado and New Haven, CT, reported on the detection of gadolinium in 4 of 13 tissue specimens from 7 patients with documented NSF who had been exposed to gadolinium-based radiographic contrast. The results indicated a tissue residence time of 4–11 months. They concluded that "Correlation is not equivalent to causation, but the presence of gadolinium may implicate certain contrast agents, or even the carrier molecules of this paramagnetic material, in a mechanism that may eventuate in the fibrosis characteristic of NSF." In comments carried by Reuters Health, High added, "until more data become available, we urge patients with end-stage kidney disease and their health care providers to be aware of this potentially fatal association between gadolinium and NSF and make every effort to avoid any unnecessary, excessive dosage of this contrast agent." In a second article, Boyd and colleagues from Vanderbilt University (Nashville, TN) suggested a "likely mechanism" for the initial dermal manifestations of gadolinium toxicity and reported on the presence of gadolinium in cutaneous biopsies from a patient with NFD.

Journal of the American Academy of Dermatology

SNM Holiday Travel Tips for Patients

The national and international media covered in detail an SNM press release issued on November 9 with updated advice for nuclear medicine patients preparing for holiday travel. In the release, SNM President Martin P. Sandler, MD, noted, "Occasionally, a patient who has had a nuclear medicine procedure may be stopped by security personnel because he or she may trigger the alarm on a radiation detector. On rare occasions, this could cause long delays, interrogation, and body searches." The press release explained how and why patients who had

undergone a recent radiation treatment or diagnostic procedure might set off alarms.

"The nuclear medicine community has been working for years with representatives from both the Department of Homeland Security and the Department of Transportation to help them understand how patients can set off the detectors after treatment and to make recommendations about how to deal with that situation," said Henry D. Royal, MD, a past president of the SNM and radiation safety expert.

The SNM offered several basic steps, each based on appropriate physician–patient communication, to ensure safe and confrontation-free travel:

1. *Preplan*. Patients should choose to schedule travel after nuclear medicine procedures based on the specific radioisotope received and the length of time it remains detectable.
2. *Know what radioisotope has been used in the treatment or study.*
   - Most nuclear medicine studies are performed with ^{99m}Tc, which should not be detectable by sensitive radiation monitors 3–4 days after a test.
   - ^{18}F-FDG, the most common PET imaging radioisotope, should be undetectable 1 day after a test.
   - Because myocardial perfusion imaging may be performed with ^{99m}Tc or ^{201}Tl or a combination of both, patients should be careful to ascertain which radioisotope was used. ^{201}Tl may remain detectable for 30 days.
   - A majority of security incidents with radiation monitors have involved treatment doses of ^{131}I, which may be detectable for as long as 3 months after therapy.
3. *Patients and health care providers should discuss how long patients may emit detectable radiation after treatment.*
4. *Patients should obtain a physician's letter that contains the following information:* the patient's name, contact information for the testing facility, name of the nuclear medicine procedure, date of the treatment or test, radionuclide used, its half-life, its administered activity, and 24-hour contact information.
5. *Patients should notify physicians if stopped by security personnel after triggering radiation devices.* SNM asks that doctors report such incidents so the society can work to educate relevant authorities.

Society of Nuclear Medicine

NCI Spotlight on Molecular Profiling

Researchers at the National Cancer Institute (NCI) commented in a November press release on the launch of a new series of research articles, "Spotlight on Molecular Profiling," assembled in the November 7 issue of *Molecular Cancer Therapeutics*. The series highlights molecular profiling studies, including imaging analyses, that provide broad-spectrum genomic and proteomic data that could prove useful for the discovery of new drugs and biomarkers. "Rather than forming a hypothesis about a specific gene or protein and designing experiments to test it, molecular profiling takes a more global approach to cancer research," said NCI Director John Niederhuber, MD. "This technique surveys the expression of thousands of genes in a single experiment to map the changes in the human genetic blueprint associated with cancer. The molecular profiling approach will accelerate our understanding of the molecular basis of cancer and will lead to new insights for the treatment, detection, and prevention of these diseases." The new series of articles examines and compares genetic profiles of different cancer types toward the goal of developing tools to personalize anticancer strategies. Among the contributions is a review by Cai et al. from the Stanford University School of Medicine of the ways in which molecular imaging is speeding up antiangiogenic drug development (*Mol Cancer Ther.* 2006;5: 2624–2633). The authors noted that molecular probes can allow imaging to "aid in many steps of the drug development process, such as providing whole body readout in an intact system, decreasing the workload and speeding up drug development/validation, and facilitating individualized anticancer treatment monitoring and dose optimization."

National Cancer Institute

NIAMS Funds New Centers of Research Translation

Bridging the gap between bench and bedside is the goal of 4 new Centers of Research Translation (CORTs) funded by grants from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) and announced on November 8. CORTs are designed to bring together basic and clinical research in a way that helps translate basic discoveries into new drugs, treatments, and diagnostics. CORT grants are a new funding mechanism for NIAMS and require centers to initiate at least 3 projects, including both clinical and basic research studies. A variety of imaging techniques will play significant roles in each of the 4 new centers, which include:

- Center for Translating Molecular Signal Pathways to Orthopedic Trauma Care, headed by Randy Rosier, MD, PhD, at the University of Rochester (NY). This center will study the biological basis of fracture healing and the efficacy of teriparatide, an injectable form of human parathyroid hormone that stimulates new bone formation.
- Center for Lupus Research, headed by M. Virginia Pascual, MD, at the Baylor Research Institute (Dallas, TX). This CORT will study the role of different cell types in the origin and development of lupus, develop markers of disease activity and severity, and look for new targets for treatment.
- Center for X-Linked Hypophosphatemic Rickets Research, led by

Thomas O. Carpenter, MD, at Yale University (New Haven, CT). This center will study the various molecular contributors to this genetic form of rickets and work toward developing new treatments.

- Center for Research Translation in Scleroderma, headed by Frank Arnett, MD, at the University of Texas Medical School (Houston). This center will study the molecular basis of scleroderma to understand its underlying causes using functional genomics and gene networks. Studies will involve a multiethnic cohort of scleroderma patients, as well as 2 mouse models of fibrosis recently developed at this center.

National Institute of Arthritis and Musculoskeletal and Skin Diseases

National Focus on Cardiovascular Imaging

On December 13, the National Electrical Manufacturers Association teamed with the American College of Cardiology, the Academy of Radiology Research, and the Coalition for Imaging and Bioengineering Research to present a panel briefing on "Medical Imaging: Transforming Cardiovascular Care" at the National Press Club in Washington, DC. The event marked the unveiling of a new report, *Changing the Landscape: How Medical Imaging Has Transformed Health Care in the United States.* The panel was moderated by journalist Morton Kondracke and featured speakers included William DeVries, MD, who in 1982 performed the first successful permanent artificial heart transplantation, Richard Robb, PhD, Allen Taylor, MD, and Paul Berger. The briefing highlighted new advances in imaging, including nuclear medicine technologies, and showcased ways in which patients benefit from sustained investments in imaging research through the continued development of less invasive, more precise, and cost-effective diagnostics and treatments. The briefing and the full text of the new report will be available at www.medicalimaging.org.

National Electrical Manufacturers Association

MIMS Nanoscale Imaging

An international team of researchers has developed a new technology that makes it possible to image and quantify molecules within individual mammalian or bacterial cells, according to a recent study published in the *Journal of Biology* (2006;5:20). The work was funded by the National Institute of Biomedical Imaging and Bioengineering and described in a November 13 press release. Claude Lechene, MD, of Harvard Medical School and Brigham and Women's Hospital (Boston, MA), worked with a team of scientists to develop multiisotope imaging mass spectrometry (MIMS), a method of separating ions of different mass and charge to analyze composition. MIMS has applications in all fields of biology, allowing researchers to generate a quantitative 3D atomic mass image of a biological sample. The image is constructed by scanning a beam of cesium ions across the surface of the sample. The cesium beam ionizes a fraction of the surface atoms, which are then directed into the input of a multichannel "secondary ion" ion mass spectrometer. By enriching the diet of experimental animals with specific metabolites labeled with stable isotopes (^{13}C, ^{15}N), MIMS can be used to give quantitative, 3D images of the metabolic turnover of proteins, DNA, RNA, sugars, and fatty acids at a resolution of ~50 nm without the use of radioactive tracers.

Although MIMS strategies cannot be used directly for in vivo human imaging, they can provide quantitative microimages of subcellular processes in human disease. One example provided by Lechene et al. was a demonstration that MIMS could be used to follow infiltration of rare donor-derived spleen cells into recipient lymphoid tissue. MIMS approaches could thus be used to validate quantitative imaging cell tracking approaches to monitoring labeled stem cells and immune cells in humans. MIMS approaches could also be used directly to study autoimmune or metabolic diseases in biopsy specimens.

National Institute of Biomedical Imaging and Bioengineering
Journal of Biology

FDA Amends Postmarket Program for Medical Devices

The U.S. Food and Drug Administration (FDA) announced on November 10 its action plan for strengthening its monitoring of the safety of medical devices after they reach the marketplace. "Many of today's medical devices are smaller and more complex than ever, offering new medical opportunities that have benefited literally millions of people," said Scott Gottlieb, MD, Deputy Commissioner for Medical and Scientific Affairs, FDA. "But this technical sophistication sometimes means that the margin for error with device manufacturing shrinks, and so we need to be working even harder, after devices and engineering changes are approved, to monitor for potential safety problems." FDA's Center for Devices and Radiological Health (CDRH) last year completed a comprehensive assessment of the tools used to monitor the safety of medical devices after the agency approves them for marketing. In January, the agency formed a Postmarket Transformation Leadership Team to develop an action plan focusing on 4 main areas: enhancing the center's culture of collaboration, developing world-class data systems, enhancing risk/benefit communication efforts, and collaborating on improved enforcement strategies and outcomes.

The Postmarket Transformation Leadership Team report outlines efforts designed to increase the agency's ability to identify, analyze, and act on risks that may be posed by the thousands of devices used by health professionals and consumers every day.

For additional information, see: www.fda.gov/cdrh/postmarket/mdpi.html.

U.S. Food and Drug Administration