U.S. Ranks Highest in High-Tech Imaging Use

The United States ranks highest in utilization of high-tech imaging compared with other countries worldwide, and Germany and Singapore rank high in utilization of both high- and low-tech imaging, a new study shows. The study was presented on May 18 at the annual meeting of the American Roentgen Ray Society in New Orleans, LA, by Mark Schweitzer, MD, of the Hospital for Joint Diseases Orthopedic Institute (New York, NY). The study's authors compared utilization of radiography (low-tech imaging) with CT and MR (high-tech imaging) in 15 countries to determine how the world's radiology resources were being used. Germany, Singapore, and South Korea had the highest per capita utilization for x-rays, with the lowest in India, China, and Indonesia. The United States, not unexpectedly, had the highest per capita use of MR and CT, almost 10 times more than Singapore and Germany, which each ranked second in per capita utilization of high-tech imaging. The lowest MR usage was in India, China, and Indonesia. "X-ray use per capita varied by a factor of 3 between less and more developed nations, whereas MR and CT use varied by a factor of 100," Schweitzer said.

Some of the world's poorest countries (India, China, and Indonesia) had the highest utilization of x-rays relative to dollars of income. "Not surprisingly, the most capital intensive countries more often used CT and MRI," said Schweitzer. France was an outlier among wealthier nations, he noted. The study authors did not specifically research reasons for the global differences, but looked at "who is paying for the studies may be a driving force in image utilization." The study was based on 2001 data from multiple national and regional organizations, vendor information, and data from the U.S. Department of Commerce and the World Bank.

American Roentgen Ray Society

Imaging as Hospital Cost Driver?

The substantial increase in the use of medical imaging during recent years has fueled speculation that imaging costs have been a major factor in the rise in overall health care costs. However, a study from the Institute for Technology Assessment at Massachusetts General Hospital (MGH; Boston, MA) has found that imaging costs remained at a steady percentage of overall hospital costs during a 6-year period. The report, by Molly T. Beinfeld, MPH, and G. Scott Gazelle, MD, MPH, PhD, appeared in the June issue of *Radiology* (2005; 235:934–939). "There have been several news stories and reports from insurers claiming that imaging costs are catching and even surpassing drug costs as major drivers of health care inflation," said Gazelle, an MGH radiologist and director of the Institute for Technology Assessment. "Those of us who work in imaging believe that its use should be celebrated, since imaging has truly transformed the way we deliver health care. But we also need to understand the value that imaging brings to health care; and when looking at its costs, we need to make sure our analyses are accurate."

To assess imaging's contribution to hospital costs, the authors analyzed billing records for patients admitted to MGH between 1996 and 2002. They reviewed data on more than 17,000 patients with diagnoses in 6 areas typically using imaging: stroke, appendicitis, lung cancer, upper gastrointestinal disorders, colon cancer, and back pain, and compiled information regarding specific imaging studies that were carried out and their costs. During the study period, the total number of CT and MR studies more than doubled, reflecting increases in the number of patients in the groups analyzed, how many underwent imaging, and the number of studies ordered per patient. However, the contribution of imaging to the overall cost of care for these patients remained steady at about 10%. "We actually expected that imaging would represent a higher percentage of costs, but this result makes it hard to say that imaging is driving increased overall costs," said Gazelle. "A particularly surprising finding suggests that patients with higher imaging costs might have a shorter length of stay, but that observation needs to be confirmed in further studies." He added that future research should look at the impact of imaging costs across a broader range of institutions and settings and throughout patients' entire courses of care, not only during hospitalization. Nuclear medicine studies were not specifically considered in the survey.

Massachusetts General Hospital

Scientists Make Case for Rare Isotope Accelerator

Scientists from academic institutions and industry joined colleagues and students from across the United States in Washington, DC, on May 11 to deliver a letter signed by more than 800 scientists from around the world urging U.S. officials to support nuclear physics by building the Rare Isotope Accelerator (RIA), a proposed billion-dollar research facility. The RIA was recommended as the highest priority for major new construction by the Nuclear Science Advisory Committee in its long-range plan published in 2002. The proposed

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facility tied for third-highest priority out of the 28 listed in the Department of Energy's outlook for new science facilities, published in 2003. Recent proposed government cuts, however, have threatened plans to build the RIA. "This is a crucial time for the world of nuclear physics," said Hendrik Schatz, a Michigan State University associate professor of physics and astronomy. "RIA will yield exciting discoveries and retain U.S. world leadership in this important field." The letter delivered to Congress stated, in part: "Continued leadership in science requires investment in new technologies and facilities. RIA will provide the basis to attract, educate and train the future generations of scientists, engineers, and technical professionals that are essential for the United States to take advantage of the renaissance in nuclear technology and its widespread applicability to medicine, national security, engineering, energy, materials research, and the environment."

Michigan State University

IAEA Simulates Accident in Romania

On May 10, 60 member states of the International Atomic Energy Agency (IAEA) took part in a simulated accident at a nuclear power plant in eastern Romania as part of a 2-day exercise to test preparedness for a nuclear emergency. The exercise began at 6 AM in Cernavoda, a town of 20,000, at a Canadian-designed power plant near the Black Sea, said Florin Baciu, head of the radiological emergency sector at the Nuclear Regulatory Authority of Romania. In the exercise, participants pretended that one of 300 radioactive rods in the reactor broke and leaked onto the floor in the chamber. Local authorities, the government, and the Nuclear Regulatory Authority of Romania responded. Within an hour, 5 neighboring countries, Bulgaria, Russia, Hungary, Slovakia, and Greece were also alerted, along with the IAEA in Vienna, Austria, and the World Health Organization in Geneva, Switzerland. "This is the biggest exercise that has occurred since the power plant started functioning [in 1996]," said Cernavoda mayor Gheorghe Hansa. "The reactions of us, the local authorities, in the face of an emergency were being tested," he said. "I personally hesitated for half an hour to give orders. I realized later that I had hesitated," he said. He said local authorities were being evaluated by international specialists to assess their reactions and to determine whether an evacuation of local residents should have been ordered. A number of nuclear medicine specialists participated in the simulation, including Sang Moo Lim, MD, head of nuclear medicine at the Korea Institute of Radiological and Medical Sciences, who noted that he was especially interested in the outcomes of the exercise because 4 of his country's 19 reactors are by the same maker as the plant in the simulation.

International Atomic Energy Agency

PET Finds Merit in Acupuncture

In a study widely covered in the popular media, scientists at University College London and Southampton University (UK) published results indicating that pain-relief benefits gained from acupuncture may be quantifiable and may exceed what is widely believed to be a mere placebo effect associated with the therapy. In a study to be published in an upcoming issue of the journal *Neuroimage*, the authors used PET to image 14 volunteers who regularly experienced arthritis pain and who underwent 3 serial "interventions" in random order: (1) volunteers were touched with blunt needles that they knew would not puncture the skin and were not therapeutic; (2) volunteers were touched with "trick" needles that gave the impression of piercing the skin without actually doing so; and (3) volunteers received actual acupuncture treatment. PET revealed marked differences in reactions to each of these 3 test situations. In situation 1, uptake was seen only in areas of the brain associated with the sensation of touch. In situation 2, uptake was seen in the same areas of the brain associated with the production of natural opiates. Uptake was seen in these areas in situation 3 as well, but additional uptake was seen in the insular area, believed to play a role in pain modulation. Although advocates of acupuncture and alternative therapies welcomed this news, others, including the authors of the study, noted that the great bulk of randomized controlled trials to date do not provide convincing evidence of pain relief with acupuncture as anything more than a placebo effect.

BBC News

ORNL Nanoscience Center and Medical Compounds

A device that could quickly create custom-tailored medical compounds, including PET tracers, is one of the first projects launched under the new Center for Nanophase Materials Science (CNMS) at Oak Ridge National Laboratory (ORNL; Oak Ridge, TN), according to a press release issued on May 24. Project director Joseph Matteo, founder and CEO of the Oak Ridge research firm NanoTek, is building a small, microfluidic machine to quickly and reliably synthesize drugs, medicines, diagnostic imaging agents, and other compounds. This work is part of the CNMS Jump Start Program, which gives selected nanoscience projects access to ORNL research facilities and staff before the center begins full operation in October. The program includes more than 75 research proposals, all of which are evaluated by an external scientific review committee, selected for scientific merit and quality, and slated for publication in the scientific literature. CNMS is the first of 5 Nanoscale Science Research Centers being built by the Department of Energy.

Matteo's device uses ORNL-developed technology to manipulate ions in a stream of solution. Potential commercial applications can be found in industry, medicine, and even biothreat detection. The high-speed, low-volume characteristics are ideally suited to demanding applications, such as individualized medicines and drugs tailored to each patients needs, short-order manufacturing of drugs/chemicals with a short shelf life, and a better way to make short-lived radioactive compounds for medical diagnostic imaging technology, including PET. His ideas to enhance the chemistry of drug development offer many advantages over commercially available technology. Although current methods can rapidly explore thousands of variants of a compound to achieve a certain solution, their parallel high-volume nature is not information driven. A closed-loop, information-driven system offers a serial or sequential discovery method and promises a more "intelligent" drug-making process, Matteo said: "With a serial approach, if you can learn something every step of the way, you can very efficiently find a solution. The challenge is to build more and more intelligence into a closed-loop discovery machine that synthesizes the drug, tests it, gets information along the way, feeds it back, and optimizes the drug to the desired properties."

For more information on the CNMS and Jump Start program, see: www.cnms.ornl.gov/workshops/inaugural/announcement.shtm.

Oak Ridge National Laboratory

Neuro and Psych are Fastest-Rising "Unmet" Needs

Research and Markets, a Dublin, Ireland-based company, announced on May 11 the release of *The Neurotechnology Industry 2005: Strategic Investment and Market Analysis Report of the Global Neurological Disease and Psychiatric Illness Markets,* a comprehensive report indicating that neurologic and psychiatric illnesses represent the largest and fastest growing "unmet" medical market, including 1.5 billion people worldwide. The report stated that, "Building on decades of brain research and the success of the Human Genome Project, neurotechnology companies hold the greatest potential for major scientific discoveries, commercial success, and sustainable investment opportunities." The report identified 3 key sectors within the $100 billion industry: neuropharmaceuticals, neurodevices, and neurodiagnostics. The study authors cited fundamentally different investment requirements, research and development challenges, regulatory milestones, and social drivers that set neurotechnology companies apart from other life science and health care companies.

Included in the publication are profiles of more than 300 public and private neurotech companies, a comprehensive analysis of 15 major neurologic diseases, the "NeuroInsights' Neurotech Index," an investment benchmark that measures the stock performance of 30 publicly traded neurotechnology companies; extensive discussion of the specific technological, demographic, regulatory, and intellectual property trends driving the global neurotech industry; and an analysis of the biological causes, current treatment options, emerging therapeutic strategies, and compounds in clinical trials by company, mechanism of action, and stage of development for each indication. A summary of the report and information on purchasing the full text is available at: www.researchandmarkets.com/reportinfo.asp?report_id=298346.

Research and Markets

Bill Restores Hanford Funds; Jury Makes Awards to Thyroid Patients

The U.S. House of Representatives passed a bill on May 24 that would restore $200 million in cuts to the 2006 budget for the Hanford nuclear installation (Richland, WA). The Department of Energy (DOE) had proposed cutting Hanford's $2.1 billion budget for fiscal year 2005 by $267–$290 million in 2006. The May bill also provides money for a new campus for the Pacific Northwest National Laboratory, where more than 1,000 DOE employees must be relocated when the Hanford cleanup effort demolishes their current workspace. Additional funds were provided to preserve Hanford's historic B reactor, the world's first full-scale production reactor, which produced plutonium for the bomb dropped on Nagasaki, Japan, in World War II. The bill also included money for the initial steps to consider temporary storage of spent nuclear fuel from commercial reactors at a DOE site, possibly Hanford, raising immediate expressions of concern from the Hanford community. Hanford is undergoing a massive cleanup effort budgeted at $50–$69 billion and scheduled for completion no sooner than 2035.

On the same day that the Hanford bill passed, a federal jury in Spokane, WA, awarded more than $500,000 to 2 thyroid cancer patients who attributed their disease to radiation from the Hanford nuclear installation. The jury deadlocked over whether another plaintiff's thyroid cancer was caused by Hanford radiation, and it ruled against 3 others with thyroid-related autoimmune diseases. The lawsuit was brought against 3 government contractors that ran operations at Hanford: General Electric Co., DuPont Co., and UNC Nuclear, Inc. Under federal law, the government will pay the damages and the costs of defending the contractors. In their lawsuit, the 6 plaintiffs asserted that they were exposed to radiation during the 1940s as children living downwind from Hanford, near Richland. "The Department of Energy should take a hard look at this," said plaintiffs' attorney Richard Eymann, who represents more than 2,300 individuals with similar claims.

U.S. Department of Energy
Associated Press

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Clinical Trial Agreements Vary in Standards

A survey of academic medical centers released by the Harvard School of Public Health (Cambridge, MA) and published in the May 26 edition of the *New England Journal of Medicine* (2005;352:2202–2210) found that requirements vary widely in the 70% of clinical drug trials in the United States that are funded by industry sponsors. Michelle Mello, JD, PhD, MPhil, associate professor of health policy and law at the Harvard School of Public Health, and colleagues examined medical school research administrators' standards for clinical trial contracts established with industry sponsors. Detailed questionnaires, including questions about 17 specific contractual provisions restricting investigators' control over clinical trials, were sent to all 122 accredited medical schools in the United States. A total of 107 administrators from medical school offices of sponsored research completed the survey. More than half of the respondents handled 100 or more clinical trial agreements per year.

On some issues, research administrators agreed about what was ethically acceptable. For example, 89% said they would not permit an industry sponsor to revise a manuscript written by academic investigators (other than revisions to protect proprietary information); 93% found it unacceptable to allow sponsors to decide that research results should not be published; and 96% would allow industry sponsors to review manuscripts for a limited time before publication, with 60 days being the most widely accepted maximum review period. Two thirds of the schools would let sponsors prohibit investigators from discussing ongoing clinical trials, but the same proportion would disallow this prohibition once the trial was over.

Other questionnaire items showed more divergence in standards. Asked whether sponsors should be allowed to draft manuscripts reporting research results and limit the role of academic investigators to suggesting revisions, 50% said they would allow it and 40% would not. Twenty-four percent of schools would allow industry sponsors to insert their own statistical analyses into manuscripts; 47% would not; and 29% were not sure. More than 40% of schools would allow sponsors to bar investigators from sharing data with third parties after the trial was complete—a practice some scientists view as important for verifying research findings. Mello wrote, "We found a few areas of consensus and many differences among the institutions in what they viewed as acceptable or unacceptable provisions in agreements with industry sponsors of clinical research. The variation raises the possibility that industry sponsors could 'forum shop,' channeling their studies to relatively permissive institutions." In response to questions about the implications of the study, Mello added, "Partnerships between industry sponsors and academia are absolutely essential to the advancement of medical science, and the public benefits incalculably from them. But these relationships have to be carefully managed to avoid problems. Further dialogue about how to structure them would be helpful in balancing sponsors' needs against investigators' academic freedom and the public's interest."

Harvard School of Public Health

Research Partnership Targets Radiation Exposure

The Henry M. Jackson Foundation for the Advancement of Military Medicine (HJF; Bethesda, MD) announced on May 26 that it had entered into an agreement with the Uniformed Services University of the Health Sciences (USUHS; Bethesda, MD) and Humanetics Corporation (Minneapolis, MN) to develop and commercialize nutritional supplements and drugs that show promise in boosting the immune system to protect against challenges from exposure to radiation. The primary aim of the program is to screen, develop, and test compounds that could protect from dangerous radiation levels associated with a nuclear incident or terrorist attack. Operating through a unique Master Cooperative Research and Development Agreement (CRADA), USUHS is conducting the research program through the Armed Forces Radiobiology Research Institute (AFRRI) and the F. Edward Ebert School of Medicine.

AFRRI Director Col. David G. Jarrett, MD, said, "We believe that this program will accelerate the development of new ways to address radiation-related terrorism threats and may provide a safe, cost-effective means of diminishing radiation injury for large numbers of people." In July 2004, HJF, USU and Humanetics entered into their first CRADA to develop a nutritional supplement that will support general immune system function. Under this agreement, AFRRI researchers are working with Humanetics to develop a compound to support immune function and to explore the potential benefits of the compound for military personnel. Recognizing the potential for nutritional supplements to strengthen immune function, AFRRI and Humanetics expanded these efforts by designing and implementing a joint research program to test several nutritional supplements that exhibit such potential.

Henry M. Jackson Foundation