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Nanotechnology Holds Potential in Imaging Diagnosis, Treatment of Cancer

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The RSNA promotes excellence in patient care and healthcare delivery through education, research and technologic innovation.

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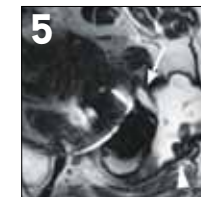
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RSNA Extends Support of Imaging Physics Residencies

The board of directors of the American Association of Physicists in Medicine (AAPM) has approved \$560,000 for new imaging physics residencies, either diagnostic or nuclear medicine. With an additional \$280,000 from RSNA, it will be possible to provide matching support for six new imaging residencies.

RSNA supports establishment of new imaging physics residency programs to fulfill projected staffing needs, provide comprehensive education, and prepare physicists to attain the American Board of Radiology (ABR) Qualified Medical Physicist (QMP) designation. Beginning next year, ABR will require medical physicists to complete an accredited two-year residency program in order to take board exams and achieve the QMP designation. According to a recent AAPM manpower assessment, at least 30 new diagnostic imaging medical physicists will be needed annually to meet current demands as well as those beyond 2014.

"Imaging physics residencies perform an important function by training physicists to work in a clinical environment," said Beth Schueler, Ph.D., a clinical medical physicist and associate professor of radiology at the Mayo Clinic in Rochester, Minn. The Mayo Clinic imaging physics residency was started in 1990 and has graduated 13 residents.

"I encourage others to establish residency programs to ensure the availability of medical physicists with clinical training to support quality, safety and innovation in medical imaging," said Dr. Schueler, who serves as AAPM secretary.

In 2011, RSNA and AAPM contributed a combined \$100,500 toward residents' salaries at new programs created at MD Anderson Cancer Center in Houston, Duke University in Durham, N.C., and Upstate Medical Physics in Victor, N.Y. In addition to financial support, AAPM offers resources including descriptions of existing residencies, self-study documentation and business models.

Departments interested in obtaining funding to create an imaging physics residency can get started at www.aapm.org/education/GrantsFellowships.asp. George S. Bisset III, M.D., 2012 RSNA President, and N. Reed Dunnick, M.D., RSNA President-elect, will join AAPM representatives Robert Pizzutiello, M.D., Donald Peck, Ph.D., and Charles Willis, Ph.D., in reviewing applications.

The Commission on Accreditation of Medical Physics Education Programs (CAM-PEP) offers more information on the requirements for an imaging physics residency. Go to campep.org/resguidelines.pdf.



Radiologist Marries During RSNA 2012

Amid the refresher courses, scientific sessions and special lectures, one RSNA 2012 attendee fit in another important event—**Marius E. Mayerhoefer, M.D., Ph.D.**, an assistant professor of radiology at Medical University of Vienna, wed **Beatrix Krauskopf, Ph.D., LL.M.**, on Thursday, Nov. 29, 2012, during the RSNA annual meeting.

After getting engaged in Rome in 2011, the couple agreed that RSNA 2012 would be the perfect opportunity to get married, as many of their friends and colleagues would be in town to celebrate. The couple was in search of a unique, unforgettable experience. "She instantly fell in love with Chicago, just like I did," Dr. Mayerhoefer said. "Both of us find Chicago's skyline extremely impressive—in particular at nighttime when all the lights are bright—it's very romantic."

Their ceremony was held at the Mount Prospect, Ill., home of their officiant, the Rev. Pamela Magnuson. The couple hosted their reception at the Signature Room at the 95th@, atop Chicago's John Hancock Center. Guests included 2007 RSNA Honorary Member **Christian J. Herold, M.D.**, who postponed his flight to be present.



Numbers in the News

15

Number of "Connectathons" that have been hosted by the Integrating the Healthcare Enterprise (IHE®) initiative. Turn to Page 20 to learn more about the annual event, which helps participants work toward achieving interoperability in health information technology systems.

25

Minimum number of the 75 CME credits that now must be qualified as self-assessment CME (SA-CME) to meet requirements for Part II of Maintenance of Certification for diagnostic radiologists. Learn about the new requirements, and how RSNA can help physicians meet them, on Page 19.

25

Estimated cost, in billions of dollars, of the latest "doc-stop" fix that defers cuts to physician payment rates as mandated by the sustainable growth rate (SGR) formula. Read more about radiology leaders' reactions to the latest Congressional actions on Page 11.

2,047

Number of retracted papers in the biomedical and life sciences since 1977. Misconduct was the reason for retraction in three-quarters of the cases, according to a study published in the Proceedings of the National Academy of Sciences. Turn to Page 13 to learn more about the tools and tactics editors are using to combat plagiarism in scientific publishing.

MILLS RECEIVES IMAGE GENTLY BUTTERFLY AWARD

Thalia Mills, Ph.D., has received the Image Gently Butterfly award from the Alliance for Radiation Safety in Pediatric Imaging (ARSPI). The award is presented to an individual or organization within or outside of the alliance who makes a significant contribution to radiation protection for children. ARSPI launched the "Image Gently" campaign in 2009 to raise awareness of pediatric radiation safety and to lower radiation dose in the imaging of children.

Dr. Mills is a physicist with the U.S. Food and Drug Administration in the Center for Devices and Radiological Health, Office of In Vitro Diagnostics and Radiological Health, Division of Radiological Health, Diagnostic X-ray Systems Branch. Dr. Mills has coordinated the efforts of the U.S. FDA to work with vendors, the public and Image Gently in dose reduction initiatives and education.

RSNA is among the 60 alliance organizations within ARSPI. For more information on Image Gently, go to www.imagegently.org.



Thalia Mills, Ph.D. (left), was presented the Butterfly Award by Donald P. Frush, M.D., a member of the Image Gently Steering Committee.

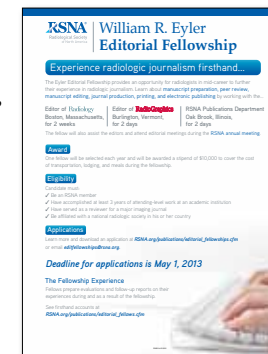
Apply Now for RSNA Editorial Fellowships

APPLICATIONS are being accepted for the RSNA William R. Eyer Editorial Fellowship and the RSNA William W. Olmsted Editorial Fellowship for Trainees.

Both fellowships offer the opportunity to work with

Radiology Editor Herbert Y. Kressel, M.D., in Boston and *RadioGraphics* Editor Jeffrey S. Klein, M.D., in Burlington, Vt. The Eyer fellowship lasts one month and the Olmsted fellowship lasts one week. Each fellow will also visit the RSNA Publications and Communications Division at RSNA Headquarters in Oak Brook, Ill. The Eyer Fellow will work with the *RadioGraphics* editorial team at RSNA 2013.

The application deadline for the Olmsted fellowship is April 1. The Eyer fellowship application deadline is May 1. Learn more at RSNA.org/Publications/editorial_fellowships.cfm.



Set Up Group Billing for 2013

Practices or academic institutions with large numbers of RSNA members can take advantage of group billing to receive just one invoice during **RSNA Membership** the next membership renewal cycle. To set up this option, contact the RSNA Membership Department at membership@rsna.org or 1-877-776-2636 (630-571-7873 outside the U.S. and Canada).

In Memoriam

RSNA joins the communities of radiation oncology and nuclear medicine in mourning the loss of two renowned physicians: 2005 RSNA Honorary Member **Rolf-Peter Mueller, M.D., Ph.D.**, and 2002 RSNA Honorary Member **Henry N. Wagner Jr., M.D.**

Rolf-Peter Mueller, M.D., Ph.D.

Dr. Mueller died September 19, 2012, at the age of 66. He developed the radiation therapy program in the German Hodgkin Study Group and was a founding member of the German Society for Radiation Oncology. He received the Herrman-Holthusen Ring, the highest award given to young scientists, from the German Roentgen Ray Society. In 1985, Dr. Mueller became the acting head of the Department of Radiation Oncology at the University of Cologne and was appointed director and head of the department in 1987, a position he held until his death.



Henry N. Wagner Jr., M.D.

Dr. Wagner died September 25, 2012, at the age of 85. He was professor emeritus of medicine and radiology at The Johns Hopkins University and founder of the university's PET center. His pioneering work in imaging neuroreceptors paved the way for research in addiction and drug design and increased understanding of the physiology and pathophysiology of the brain. In 1993 he was awarded the first SNM President's Award for Outstanding Contributions to Nuclear Medicine. During his 56-year association with Johns Hopkins, Dr. Wagner trained more than 500 radiologists, internists, physicians and scientists.



RSNA Board of Directors Report

At meetings during RSNA 2012, the RSNA Board of Directors looked forward to an exciting new year of developments for the Society, including new products and collaborations.

RSNA Education Going Mobile

Mid-2013 will see the launch of a new learning management system that will make RSNA education content available on mobile devices, in response to member demand. In addition, in accordance with changes to American Board of Radiology Maintenance of Certification requirements, RSNA education content will qualify as “self-assessment CME.”

Also new in RSNA’s education offerings are two more quality certificates. Practitioners who earn all four quality certificates and complete a capstone project will receive advanced certification in quality. More information about all of RSNA’s science and education programs can be found at RSNA.org/Science_and_Education.aspx.

Image Share Expands

RSNA has signed a second contract with the National Institute of Biomedical Imaging and Bioengineering (NIBIB) to continue developing RSNA Image Share, a secure network that lets patients take control of their medical imaging records and electronically share them with their physicians. Already in use at five sites, RSNA Image Share will be expanded to another 40 sites over the term of the new contract. The new NIBIB contract will also enable development of new features such as data mining for comparative effectiveness research.

Among RSNA’s other informatics efforts is the Integrating the Healthcare Enterprise (IHE®) initiative, which recently held its 15th Connectathon. (See Page 20 for details.) Go to RSNA.org/Informatics.aspx to learn more about RSNA Image Share, IHE and the other ways in which RSNA is helping lead the way in radiologic technology.

Radiology Cares

RSNA’s new campaign to encourage and facilitate radiologists’ meaningful engagement in the patient experience, called Radiology Cares, was launched at RSNA 2012. Join the more than 300 radiology professionals who have taken the Radiology Cares pledge, and watch for the next phase of the campaign at RadiologyCares.org.

Collaborations Fuel Progress

RSNA values the contributions it is able to make to the specialty in partnership with other organizations. Read more on Page 1 about RSNA’s continued commitment, along with the American Association of Physicists in Medicine, to support



Ronald L. Arenson, M.D.
Chairman, 2013 RSNA
Board of Directors

the expansion of imaging physics residencies. Among other collaborations to be continued in 2013 are those with the Interamerican College of Radiology and the European Society of Radiology to offer special content during the RSNA annual meeting.

Partnerships are vital to the mission of the RSNA Research & Education Foundation as well. New this year are two co-sponsored awards—an Education Scholar Grant cosponsored with the Association of University Radiologists (AUR) and a Research Scholar Grant in collaboration with the Foundation of the American Society of Neuroradiology (ASNR). RSNA also thanks Mallinckrodt and Agfa HealthCare for their new multi-year commitments as corporate partners of the Foundation. Find out more at RSNA.org/Foundation.

RSNA 2013: The Power of Partnership

Plans are already under way for RSNA’s 99th Scientific Assembly and Annual Meeting. Among the most significant developments is the relocation of the Lakeside Learning Center to Hall D, Level 3 of the Lakeside Center. As a result, all technical exhibits will be housed in Hall A (South Building) and Hall B (North Building).

I’m pleased to report that RSNA membership now tops 51,000, with members from 136 countries around the globe. I, along with my colleagues on the RSNA Board of Directors, look forward to helping fulfill RSNA’s mission to serve the specialty throughout the coming year.

RONALD L. ARENSON, M.D.
CHAIRMAN, 2013 RSNA BOARD OF DIRECTORS



New developments for RSNA 2013 include the relocation of the Lakeside Learning Center.

My Turn

Coordination=Care for Children Worldwide

The idea of forming a world federation of pediatric radiology came to me while attending a one-off international symposium on pediatric imaging organized in Rio de Janeiro in 2009. Pediatric radiologists gathered from all over the world to share their knowledge with colleagues who often struggle to attend meetings of such caliber. We had the beginnings of a global movement.

Yet between us there were tremendous differences in available practices and resources. We needed to coordinate efforts and advocate together for our subspecialty and the care of children worldwide. While diagnostic imaging services in modern medical settings have evolved enormously, even state-of-the-art healthcare can overlook our patients’ unique needs and the training required is simply out of reach for most lower resource nations who already grapple with multiple challenges. Appropriate diagnostic imaging services are rarely integrated into the health plans of these nations, yet their pediatric populations are huge and these services save lives.

Created in 2011, the World Federation of Pediatric Imaging (WFPI) aims to unite pediatric imaging organizations to form one voice, one message and one network when addressing the global challenges in pediatric imaging. How we will achieve our goals is context-dependent: active participation in global forums, for example, via strong collaboration with the International Atomic Energy Agency, World Health Organization, European

Society of Radiology, American College of Radiology (ACR) and RSNA and sustained pediatric input into the International Society of Radiology. Mindful of the need for concrete deliverables, we are disseminating best practices and educational content through our own and other organizations’ websites; we’re also making recommendations and offering training, research and meetings while advocating for resource allocation and patient safety.

In lower resource settings, we demonstrate by doing. We provide tele-radiology services for Doctors Without Borders and for a new hospital in South Africa. More than 45 WFPI volunteers from all over the world tele-read some 350 radiographs between July and October 2012. We support a cross-border Ethiopia-South Africa training initiative and will participate in ACR’s project in Haiti. Our locally engaged project coordinators ensure the relevance of our input. The WFPI has evolved faster than we ever imagined. Its foundations have been laid and our dreamers are becoming doers, driven by the conviction that

the access to and application of pediatric imaging are essential components of children’s basic healthcare.

The WFPI’s governing Council currently represents the four regional founding societies—Society for Pediatric Radiology (North America), European Society of Pediatric Radiology, Latin American Society of Pediatric Radiology, and Asian and Oceanian Society for Pediatric Radiology—and is open to other regions of the world. National and supranational organizations can also join the WFPI. For more information, visit www.wfpiweb.org or contact wfpi-office@gmail.com.

M. Ines Boechat, M.D., is president and chair of the council of directors for the World Federation of Pediatric Imaging. Dr. Boechat is a professor of radiology and pediatrics and chief of pediatric imaging at the David Geffen School of Medicine at the University of California, Los Angeles (UCLA) and the UCLA Mattel Children’s Hospital.



THIS MONTH IN THE RSNA NEWS TABLET

Access All-new Video Interviews on RSNA News Tablet Edition

Get more of this month’s news with the *RSNA News* Tablet Edition, available for download through the App Store and Google Play.

March features video interviews with RSNA 2012 presenter Alice Ha, M.D., who discusses the role imaging plays in managing the increasing number of patients developing adverse reaction to metal debris (ARMD), as well as a video overview of the IHE North American Connectathon Conference.

Access the *RSNA News* tablet edition from the App Store at itunes.apple.com/us/app/rsna-news/id444083170?mt=8 and Google Play at <https://play.google.com/store/apps/details?id=air.org.rsna.rsnaenews&hl=en>.

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MR Imaging Plays Key Role in Post-Op Metal-on-Metal Hip Arthroplasty

While metal-on-metal hip arthroplasty became quite popular in the 1990s, and initially reported good outcomes, more and more patients are developing what is called adverse reaction to metal debris (ARMD), and imaging is playing an increasingly important role in managing patients, according to research presented at RSNA 2012.

“SECOND GENERATION metal-on-metal implants have been complicated by adverse reaction to metal debris,” said Alice Ha, M.D., assistant professor of radiology at the University of Washington Medical Center in Seattle, who explained that ARMD occurs when implants shed metal particles into the surrounding anatomy. These metal particles have been shown to cause local and system damage, and have led to some high-profile FDA hip replacement device recalls.

One condition that falls under the umbrella of ARMD is the development of soft tissue lesions or pseudotumors. Another presenter, Eric Y. Chang, M.D., assistant clinical professor of radiology at the University of California, San Diego, Medical Center, presented research showing that clinical symptoms do not help determine the presence of these pseudotumors in patients who have undergone metal-on-metal hip replacements.

This underscores the value of MR imaging in post-operative evaluation, Dr. Chang said. Interest in this area of research began after he and his colleagues noticed that with MR imaging they were finding pseudotumors in patients with metal-on-metal hip replacements even though many of these patients were not symptomatic.

One problem with metal-on-metal hip replacements is that the prostheses have been shown to fail earlier than expected, necessitating orthopedic revisions, Dr. Chang said. These revisions are made more difficult, however, because of the presence of these large complex pseudotumors.

Dr. Chang and colleagues performed MR imaging examinations using the metal artifact reduction sequences (MARS) on 192 hips (175 patients) over a 15-month period. Pseudotumors were found in 69 percent of the cases (132 of 192 hips). Researchers also found that while bone marrow edema and tendon tearing were predictors of patient pain, the presence or the size of the pseudotumors was not, indicating that MR imaging is crucial in evaluating these patients.

While imaging is an integral part of patient management, researchers are not sure which patients require revision and which patients will be more difficult to revise based on imaging findings, Dr. Chang said.

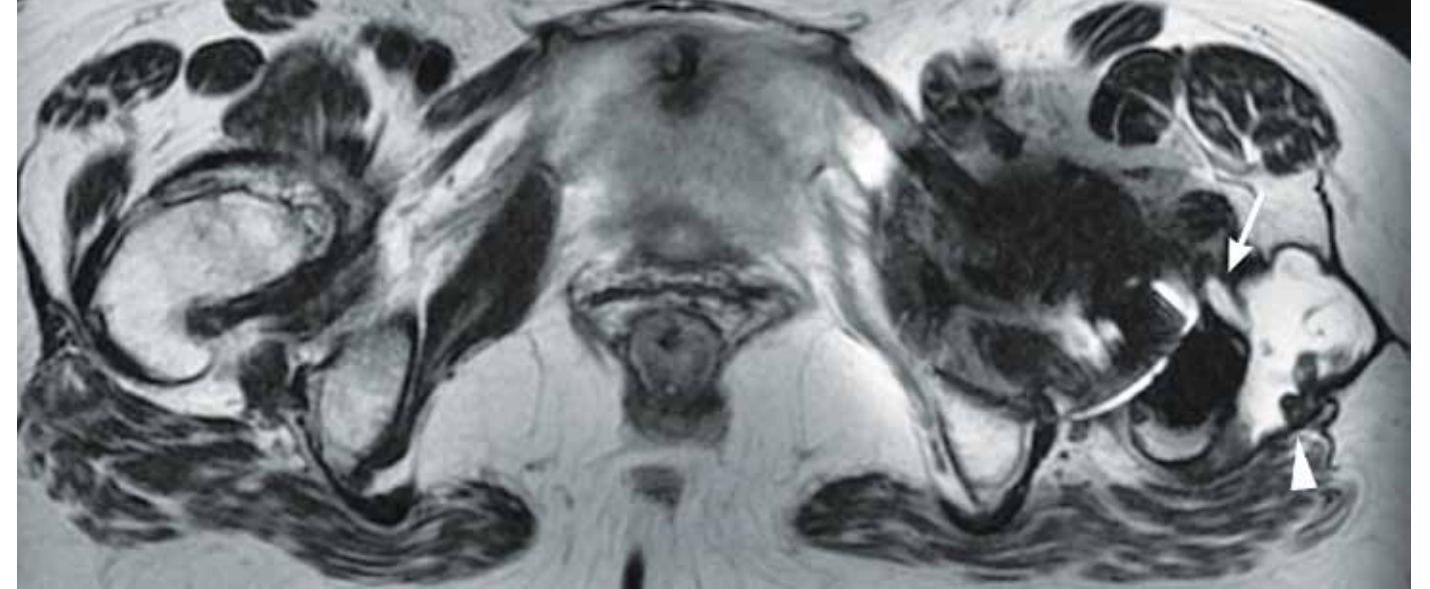
“We also do not know the natural history of asymptomatic patients with pseudotumors,” Dr. Chang said. “Can they improve or do they invariably



Ha



Sabah



MR imaging is playing an increasingly important role in the management of metal-on-metal hip arthroplasty patients who experience adverse reaction to metal debris. (Above) A December 2012 *Radiology* article by Eric Y. Chang, M.D., and colleagues (see sidebar) revealed images of a 72-year-old asymptomatic woman after metal-on-metal total hip arthroplasty. Axial T1-weighted MR image shows pseudotumor eroding into gluteus minimus tendon at anterior facet of greater trochanter (arrow), which was retracted with muscular atrophy (not shown). Synovial hypertrophy is also seen (arrowhead).

(*Radiology* 2012;265(3):848-57) ©RSNA, 2012. All rights reserved. Printed with permission.

worsen? If they can improve, are there imaging findings that can help identify these patients? If they invariably worsen, are there imaging findings that can identify which should go to surgery sooner so the operation can be technically simpler? These are questions that we hope to answer to improve patient care.”

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.

MR Imaging Helps Assess Muscle Atrophy, Guides Revision Surgery

MARS MR imaging is effective for surveillance of metal-on-metal hip arthroplasties and for diagnosing and characterizing pseudotumors and patterns of muscle atrophy, according to another RSNA 2012 presenter.

Shiraz Sabah, M.B.B.S., B.Sc., London, and colleagues performed MARS MR imaging on 179

patients who had undergone metal-on-metal hip arthroplasties and had unexplained hip pain (or, for control purposes, had excellent function) after a diagnostic hip arthrogram. Researchers discovered that pseudotumors were common (40 percent) following hip arthroplasty and can be symptomatic and asymptomatic. In addition, they found, abductor muscle atrophy can indicate poor function.

“We believe that MR imaging permits better planning and timing of revision surgery, with potential for better outcome for patients,” Dr. Sabah said. “MR imaging is particularly useful for assessment of muscle atrophy and can prompt earlier intervention and guide choice of revision prosthesis.” □

WEB EXTRAS

View a video interview of Alice Ha, M.D., discussing her RSNA 2012 research on metal-on-metal hip arthroplasty at rsnanews.RSNA.org.

To access the December 2012 *Radiology* article, Metal-on-Metal Total Hip Arthroplasty: Do Symptoms Correlate with MR Imaging Findings? by Eric Y. Chang, M.D., and colleagues, go to radiology.rsna.org/content/265/3/848.full.

DECT Screens Patients with Retained Ballistic Projectiles

Dual-energy CT (DECT) can be used to distinguish between ferromagnetic and non-ferromagnetic ballistic projectile remnants in patients who have suffered firearm wounds and consequently can determine which patients are suitable candidates for MR imaging, according to research presented at RSNA 2012.

Despite the idea that patients with firearm wounds are unsuitable for MR imaging if they have retained bullet fragments, recent research has shown that most bullets are safe to scan with MR imaging, said Sebastien Winklhofer, M.D., of the Department of Radiology at University Hospital Zurich, and University Zurich, Institute of Forensic Medicine. For example, a study presented at the American Academy of Orthopedic Surgeons Annual Meeting demonstrated that MR imaging can safely scan patients with bullet fragments that are non-ferromagnetic.

“The main problem is that most patients do not know whether their retained projectile has ferromagnetic proper-

ties,” Dr. Winklhofer said. “Conventional radiographs have the potential to detect any metallic object within the patient; however, they are unable to provide any information on the composition of the object.”

DECT, on the other hand, is used in clinical radiology to assess the composition of different objects and materials. Dr. Winklhofer and colleagues investigated whether DECT had the ability to distinguish between ferromagnetic ballistic projectiles and those that consist of different materials, such as brass or lead.

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.

Researchers examined 11 ballistic projectiles (nine bullets and two shotgun pellets, 5 ferromagnetic and 6 non-ferromagnetic) in an anthropomorphic model of the thorax using a 128-section dual-source CT scanner. Tube voltages were set at 80 kVp, 100 kVp, 120 kVp and 140 kVp and two readers independently assessed CT numbers on images reconstructed with an extended CT scale. Dual-energy indices (DEI) were calculated from both 80/140kVp and 100/140 kVp pairs.

According to Dr. Winklhofer, the single-energy analysis showed no significant difference regarding CT numbers in the comparison of ferromagnetic and non-ferromagnetic projectiles at any tube voltage. However, the dual-energy analysis showed that for both 80/140 kVp and 100/140 kVp pairs, DECT was able to discriminate between ferromagnetic and non-ferromagnetic with 100 percent accuracy.

“Dual energy CT appears to have the potential to screen patients with retained ballistic projectiles prior to MRI and distinguish between those who are suitable to undergo MRI and those who are not,” concluded Dr. Winklhofer. He cautioned



Winklhofer

his study was carried out in a model and is not yet ready for clinical application; he and his colleagues plan to scan a larger number of objects in the future. □

Radiologists Urged to Think Beyond Reduction When it Comes to Pediatric Dose

Optimization, not simply reduction, should be the goal when it comes to reducing radiation exposure from CT scans, particularly in pediatric cases, according to new research presented at RSNA 2012.

“WE AS RADIOLOGISTS in conjunction with the technologists and physicists are responsible in determining the appropriate factors for every CT examination,” said Charles Glasier, M.D. “From my view, radiologists need to be in the lead and set the parameters so the technologists have a relatively narrow range of techniques they can use in most patients.”

Overexposure remains an issue across the U.S. and the world as the number of CT examinations in children continues to increase annually. Presenters noted, however, that the number of exams is being reduced at pediatric hospitals. Balancing the risks for a particular patient can be complicated, they added.

Optimization over reduction is the goal of a new protocol presented by David B. Larson, M.D., M.B.A., of Cincinnati Children’s Hospital. He said the CT dose index (CTDI) should be converted to a size-specific dose estimate and used a real-world example to show that the actual dose a patient



CT dose index should be converted to a size-specific dose estimate when imaging children, according to RSNA 2012 presenters.

receives can vary by more than a factor of two if CTDIvol is used without taking into account the patient’s size.

“It’s not about reducing dose; it’s about finding that optimal target,” Dr. Larson said. “In order to do that in practice with the tools we currently have, you have got to measure a size-specific dose. You can’t just take the CTDI.”

CTDI is a metric that doesn’t take into account individual patients and is not meant to be a surrogate for patient dose, said Dianna Cody, Ph.D., a physicist in the Department of Imaging Physics at the University of Texas MD Anderson Cancer Center in Houston. “CTDI is something that can be very standardized and measured in an exact way in many different settings,” she said. “It’s about scanner output. It’s not really about patient absorption.”

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.

Dr. Cody pointed to several factors that influence dose, including kilovoltage peak (kVp), milliamps and scan time, and pitch or table speed, and offered three dose reduction options: tube current modulation, dynamic collimation and iterative reconstruction.

To implement these options, she said, radiologists should make sure CTDIvol is displayed on all CT scanners—sometimes the display is turned off—and make sure dose report pages are sent to PACS. Dr. Cody also urged radiologists to consider joining the American College of Radiology Dose Index Registry.

“If physicians can develop a more intuitive feel for CT radiation dose issues, patients should benefit from that intuition,” Dr. Cody said. “Some sites may have CT scanners with capabilities for reducing radiation dose that are not fully utilized. I hope that after attending courses like these, practitioners will be proactive and will seek out and implement these options on the scanners in their care.” □



Optimization should be the goal when it comes to reducing radiation exposure from CT scans—an objective of Image Gently and Image Wisely campaigns which were promoted at RSNA 2012 (above). Image Gently promotes radiation protection in the imaging of children while Image Wisely focuses on radiation safety in adults.

WEB EXTRAS

To access Image Gently, go to www.imagegently.org

To access Image Wisely, go to www.imagewisely.org

“It’s not about reducing dose; it’s about finding that optimal target.”

David B. Larson, M.D., M.B.A.

Evolving Reconstruction Techniques Preserve Quality, Reduce Dose

An iterative reconstructive method known as prior imaging constrained compressed sensing (PICCS) maintains the diagnostic quality of CT images while reducing dose when imaging for urolithiasis, according to research presented at RSNA 2012.

Jie Tang, Ph.D., found PICCS provided diagnostic image quality with a 19 percent mean radiation dose in sub-mSv CT scans for urolithiasis, while filtered back projection (FBP) images were non-diagnostic.

“Many people are concerned about radiation dose and overexposure from CT examinations,” said Dr. Tang, an associate scientist in the Department of Medical Physics at the University of Wisconsin-Madison. “We have demonstrated that with PICCS we are able to significantly reduce noise in the images and thus we are able to reduce radiation dose.”

An ultra-low dose (ULD) CT scan was performed immediately after standard-dose clinical scans were performed on

13 patients. The ULD images were reconstructed with FBP and PICCS, while the standard scans used only FBP. All 63 of the high-contrast stones smaller than 2 millimeters were detected in standard dose with FBP and ULD using PICCS. The ULD scans reconstructed only with FBP detected 59.

“We have to do real clinical evaluations to establish the true benefit of this new technique,” Dr. Tang said. “We spent a lot of time performing clinical evaluations, but now we ask all radiologists to evaluate many images and make their judgment based on their own clinical observations.”

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.

Dual-energy, Cone-Beam Imaging Maintain Image Quality

In other research presented at RSNA 2012, Wojciech Zbijewski, Ph.D., determined that image quality can also be maintained at reduced dose in dual-energy (DE) and cone-beam (CB) CT exams using advanced iterative decomposition methods. These methods are suitable for applications in musculoskeletal, vascular and interventional imaging, Dr. Zbijewski said.

Researchers were concerned with situations where contrast agents such as iodine must be discriminated from bone, Dr. Zbijewski said. “Dual-energy imaging has an easier way of discriminating them than through single-energy, but it is a very specific imaging task that you want to discriminate,” said Dr. Zbijewski, senior research scientist in the Department of Biomedical Engineering, Johns Hopkins University.

“That means potentially you can actually help yourself in terms of reducing the dose by tailoring your reconstruction methods toward just discriminating tissues and not necessarily being concerned about some other aspect of image quality,” he added.

The group found that they could use dual-energy imaging at doses around 3 to 6 mGy. By using the optimized reconstruction methods, they maintained 95 percent discrimination for



Tang



Zbijewski

contrast for 5 milligrams per meter of iodine. Dr. Zbijewski noted the potential for low-dose DE-CBCT will directly benefit iodine-enhanced arthrography. □

Nanotechnology Holds Potential in Imaging Diagnosis, Treatment of Cancer

Diamonds, gold and other materials are helping to fuel new breakthroughs in medical nanotechnology for the imaging diagnosis and treatment of cancer patients, according to research presented at RSNA 2012.

NANOTECHNOLOGY is based on the use of particles that have one or more dimensions measuring 100 nanometers or less. These nanoparticles have a greater surface area per weight than larger particles and are more reactive to some imaging agents and chemotherapy, making them a valuable asset in the burgeoning field of theranostics, the integration of therapeutic and diagnostic medicine.

For example, gold nanoparticles have the potential to detect individual cancer cells circulating in the blood and destroy them with a laser, said Vladimir Zharov, Ph.D., D.Sc., of the Winthrop P. Rockefeller Cancer Institute at the University of Arkansas for Medical Sciences in Little Rock. Instead of drawing blood to look for cancer cells, clinicians could attach gold nanoparticles to biological molecules specific to cancer cells and inject them into the patient. Once attached to cancer cells, the gold nanoparticles could be seen with a laser beam and ultrasound transducer.

"If one single tumor cell passes the laser beam, it would produce an acoustic wave visible with conventional ultrasound technology," Dr. Zharov said. "The same laser could be used to create transient nanobubbles due to water evaporation around nanoparticles to physically kill the cancer cells."

Additional attachment of conventional drugs to gold nanospheres—now in Phase II clinical trials in humans—provides enhancement of antitumor action of this new so-called photothermal nanodrug whose mechanism is based on synergy of laser-activated thermal, microbubble and biochemical-associated phenomena, Dr. Zharov said.

Nanodiamonds Ideal for Bonding with Imaging Agents

Dr. Zharov is particularly excited about the potential of gold nanoparticles to predict the establishment of metastases—the source of 90 percent of cancer deaths.

ON THE COVER

Gold carbon nanotubes—which are in Phase II clinical trials in humans—resemble artificial DNA, according to researchers.



"Conceivably, the test can be used to determine the aggressiveness of cancer based on the numbers of tumor cells circulating in the blood," he said. "By counting the number of cancer cells, we can also predict treatment and see if drugs work or not in real time."

Researchers are experimenting with various nanoparticles for different imaging applications. At the University of California, Los Angeles, Dean Ho, Ph.D., and colleagues have been studying nanodiamonds—inexpensive, carbon-based particles made from the byproducts of mining and refining. Their multifaceted shape makes them ideal for binding with imaging agents and drugs.

"You can load imaging agents like gadolinium onto nanodiamonds," Dr. Ho said. "Because of the surface facets, nanodiamonds attract water and you get a striking increase in imaging contrast efficiency."

Nanodiamonds could also improve the effectiveness of chemotherapy drugs like doxorubicin.

"Many tumors are resistant to drugs because the cancer cells pump the drug out," Dr. Ho said. "Nanodiamonds bind the drug so tightly, it gets stuck in tumor cells longer."

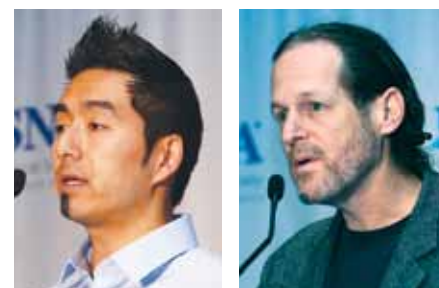
“Many tumors are resistant to drugs because the cancer cells pump the drug out. Nanodiamonds bind the drug so tightly, it gets stuck in tumor cells longer.”

Dean Ho, Ph.D.



Dupuy

Zharov



Ho

Heath

Recent research highlights the potential of nanodiamonds to significantly reduce toxicity associated with chemotherapy. In a recent study on mice published in *Science Translational Medicine*, Dr. Ho's group found that when they bound nanodiamonds to doxorubicin, the mice not only survived what had been a lethal dose, their tumors shrunk as well.

"Nanodiamonds further increase the efficacy of the drug," he said. "This could make it possible to get the same effects from a lower dose."

The research team is studying the technology in larger animal models with a push toward additional pre-clinical studies.

Protein Catalyzed Capture Agents a Potentially Powerful Tool

James R. Heath, Ph.D., from the California Institute of Technology in Pasadena, Calif., and a pioneer in nanotechnology, discussed protein catalyzed capture (PCCs) agents, a class of diagnostic and therapeutic agents that can mimic antibodies by

reacting to surface areas of antigens known as epitopes.

"PCCs are a potentially powerful tool that are easy to manufacture and can be optimized for reaction with specific epitopes," he said.

Session moderator Damian E. Dupuy, M.D., from Rhode Island Hospital and Brown University in Providence, R.I., said that nanotechnology lends itself to collaborative efforts among physicians, engineers and experts from other disciplines—a phenomenon commonly known as translational medicine.

"Lots of big cancer research hospitals are looking for new ways to diagnose and treat cancer and we'll see more and more of these agents in the future," he said. "As radiologists, we are at the forefront of this research."

At the end of the session, Dr. Dupuy asked the researchers if he would see these nanoparticles in clinical use in his lifetime. All three answered "yes." □

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.

Silver Impregnated Central Venous Catheter Lines Reduce Infection Risk in Cancer Patients

Silver line impregnation reduces the incidence of catheter related bloodstream infections (CRBSI) in both single and double lumen long term central venous catheters (CVC), according to presenters at RSNA 2012.

Stavros M. Stivaros, B.Sc.(Hons), M.B.Ch.B., F.R.C.R., Ph.D., a consultant neuroradiologist and clinical scientist at National Institute for Health Research (NIHR) and a lecturer at the University of Manchester, U.K., summarized the study's clinical applications, saying that, "central venous catheter related infections have significant impact on patient morbidity and, at worst, mortality, in cancer patients. In our patient cohort, silver impregnated lines reduced infection risk."

Dr. Stivaros, also a research team member with The Christie, one of Europe's largest cancer hospitals (also in Manchester), said the study was intended to assess whether the use of silver impregnation into the polymer of the CVC reduces CRBSI in the cohort of cancer patients undergoing chemotherapy. Dr. Stivaros, also head of the Biomedical Decision Systems Group at the University of Manchester, collaborated on the research with Hans-Ulrich Laasch, doctor of medicine, M.R.C.P., F.R.C.R., chief of intervention at The Christie and supervisor of the procedure team nurses.

Referred over 15 months for CVC insertion in the specialist cancer center, 1,002 patients were randomized to receive either a standard or silver impregnated catheter. Except for silver contained in the catheter polymer, both catheters were identical. Patient follow-up continued until line removal and all removed lines were sent for microbiological culture.

Of the 1,002 patients randomized, 981 patient follow-ups were evaluated. During the study, specialist nurses from the vascular access team placed 488 standard lines (393 single lumen and 95 double lumen) and 493 silver lines (390 single lumen and 103 double lumen). Of these, 175 catheters were removed for reasons of CRBSI, including 15.8 percent single lumen and 41.1 percent double lumen standard lines. In the silver impregnated group, the frequency of CRBSI fell to 9.7 percent single lumen and 35 percent double lumen.

Daily Bulletin coverage of RSNA 2012 is available at RSNA.org/bulletin.



Stivaros

A stratified log rank test was statistically significant between the silver and non-impregnated lines ($p=0.001$) with a type-specific hazard ratio of 0.6 (95 percent CI, 0.44, 0.81), Dr. Stivaros found. Given the competing risks for line removal, such as primary diagnosis and chemotherapy type, he examined the probability of having the line removed for CRBSI in an environment in which other reasons for line termination are operating using Gray's test, which showed that the cumulative incidence of CRBSI line removal stratified by lumen type was also statistically significant ($p=0.01$), he said.

"Our study has significant impact in terms of patient morbidity and treatment completion," Dr. Stivaros added. "As the additional cost for silver is approximately \$50, extrapolating from this study, 1,000 patients all receiving silver impregnated lines would have had an additional \$50,000 cost, but this would have saved \$200,000 in additional CRBSI related costs, for a savings of \$150,000." □

Radiology Leaders Criticize Congressional Imaging Cuts

While Medicare reimbursement rates are fixed for 2013, radiology leaders say the latest round of Congressional cuts targeting imaging are “Draconian” and could hinder patient access to quality imaging care and stymie research.

IN PASSING the 2012 American Taxpayer Relief Act (ATRA), the so-called “fiscal cliff” legislation, on Jan. 1, Congress bypassed a U.S. Centers for Medicare and Medicaid Services (CMS) proposal to cut overall physician payment rates by 26.5 percent as dictated by the sustainable growth rate (SGR) formula determining Medicare reimbursement rates. Congress has passed such a temporary “doc-stop” fix each year since 2003.

While radiology specialty leaders were pleased cuts were averted and current rates frozen through 2013, they are frustrated that Congress has yet to permanently fix the SGR formula, once again leaving physicians in a state of flux. To help pay for the stop-gap measure, estimated to cost \$25 billion over 10 years, Congress approved \$800 million in Medicare cuts to advanced medical imaging services and \$300 million in cuts to radiation oncology. Both cuts begin on January 1, 2014.

“Extending the deferral of cuts to physician reimbursement was very welcome but does not remove the Sword of Damocles hanging over the heads of practicing physicians in the U.S.,” said James Thrall, M.D., a nationally recognized expert in radiology and economics. “The piecemeal approach is demoralizing and paralyzes the ability to make plans.”

Patients—particularly those in rural areas—could pay the price for the string of imaging cuts that will likely drive imaging services back to hospitals from non-hospital outpatient centers, Dr. Thrall said. Future research, Dr. Thrall and other radiology leaders warn, could be another casualty of the new laws. “It is crucial that these Draconian cuts, in addition to the Medical Device Tax, not be allowed to permanently scuttle the research and development in our specialty that is critical to all major healthcare delivery,” said William T. Thorwarth Jr., M.D., a nationally recognized expert on radiology economics and reimbursement and RSNA Board Liaison for Publications and Communications.

The Medical Device Tax, which went into effect Jan. 1, imposes on all medical devices a 2.3 percent tax—a cost that could trickle down to radiologists. The Medical Imaging and Technology Alliance (MITA) condemned the tax, saying it could hinder the development of medical imaging technologies, and ultimately obstruct research.



Thorwarth



Thrall

Utilization Rate Change Sets Unattainable Threshold

Lawmakers plan to plug the \$800 million Medicare deficit by increasing the technical component (TC) equipment utilization threshold for advanced imaging equipment from 75 to 90 percent, effective Jan. 1, 2014. The cost of medical equipment is one of three “direct inputs” CMS considers in determining TC practice expense reimbursement. As the utilization rate assumption (the percent of time equipment is actually in use) rises, the “expense” per study goes down, reducing TC reimbursement, Dr. Thorwarth said.

“As someone personally involved in managing outpatient imaging facilities, I can say it is almost impossible to use equipment 90 percent of the time.”

James Thrall, M.D.



While pleased that Congress averted proposed Medicare reimbursement rate cuts, radiology leaders are criticizing legislators’ failure to permanently fix the flawed sustainable growth rate (SGR) formula determining those reimbursement rates, once again leaving physicians in a state of flux. “The piecemeal approach is demoralizing and paralyzes the ability to make plans,” said James Thrall, M.D.

Considering ACR’s estimate that typical facilities—especially rural practices—operate imaging equipment closer to 50 percent of the time, the new law sets an unattainable threshold for radiologists, Dr. Thrall said. “As someone personally involved in managing outpatient imaging facilities, I can say it is almost impossible to use equipment 90 percent of the time,” said Dr. Thrall, radiologist-in-chief and chair of the Department of Radiology at Massachusetts General Hospital in Boston.

“Apparently CMS believes we are imaging the track team, who can get on and off the scanner in record time,” said Dr. Thorwarth, a radiologist with Catawba Radiological Associates in Hickory, N.C., where he also serves the Frye Regional Medical Center, Catawba Valley Medical Center and Caldwell Memorial Hospital.

By potentially forcing rural, non-hospital providers out of business, the higher assumption rate will negatively affect the ability of rural communities to access high-quality, advanced medical imaging, Dr. Thorwarth said. In addition, hospital-based imaging is more expensive to the healthcare system overall.

“This is the kind of arbitrary cut that undermines trust and breeds cynicism among physicians towards CMS,” Dr. Thrall added.

Despite fervent ACR backing, the Diagnostic Imaging Services Access Protection Act (H.R. 3269/S. 2347), which would have protected imaging from further Medicare cuts, was not approved by Congress. The bill would have avoided a 25 percent reduction to the professional component of certain diagnostic imaging services for multiple imaging studies administered to the same patient, by physicians in the same practice setting, on the same day.

“We must continue to work at the grass roots level to educate our legislators that the multiple procedure payment reduction has no basis in the ‘resource-based’ reimbursement system that they mandated in 1988,” Dr. Thorwarth said.

“Doc-Stop” Fix Needs Permanent Solution

Drs. Thrall and Thorwarth stress the urgency in finding a permanent solution to the flawed SGR formula that is already having negative repercussions throughout healthcare.

Dr. Thrall said that passage of proposed CMS cuts could exacerbate “a mass protest and substantial exodus of doctors away from providing services to Medicare patients” that is already happening on a small scale without the cuts, according to the American Medical Association (AMA). In a 2010 survey of more than

9,000 doctors who care for Medicare patients, the AMA found that one in five physicians overall are restricting the number of Medicare patients in their practice and one in three primary care doctors are restricting those patients. The top two reasons: 85 percent said Medicare payment rates were too low and 78 percent cited ongoing threat of future payment cuts.

In the face of ardent opposition from ACR and the AMA, legislators have chosen the annual stop-gap fix rather than the \$300 billion cost of permanently repealing the flawed formula. But without a permanent solution, a similar scenario will undoubtedly unfold on Capitol Hill in 2014.

“It is critical that all physicians, including radiologists, understand that these one-year patches do not avoid impending reimbursement reductions that have been compounding annually for the past decade based on a faulty model—namely, the SGR formula,” Dr. Thorwarth said. “The cost of permanently resolving this issue continues to rise and, in these times of a rising deficit, creates a huge problem.”

Changing Perception Could Aid Imaging

The perception that radiology is a huge driver of healthcare costs is the primary driver of the seemingly never-ending string of imaging-related cuts. Radiology has experienced \$6 billion in Medicare cuts for imaging services since 2006, according to ACR.

However, a comprehensive analysis that draws on Medicare’s own data shows that imaging use is down nearly 5 percent since 2006, and spending on imaging is down 21 percent over the same time period. The research by Richard Duszak, M.D., and Jonathan W. Berlin, M.D., appears in the October 2012 issue of the *Journal of the American College of Radiology (JACR)*. (See sidebar.)

Such data could begin to change the perception that imaging is responsible for rapidly rising healthcare costs, experts say. “One might argue that imaging was growing too fast a decade ago and some of the initiatives such as imaging reimbursement cuts in the Deficit Reduction Act of 2005 were inevitable, but imaging costs are no longer growing faster compared to other Medicare services,” Dr. Thrall said. □

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☑ To access the JACR study, “Utilization Management in Radiology, Part 1: Rationale, History, and Current Status,” go to [jacr.org/article/S1546-1440\(12\)00335-3/abstract](http://jacr.org/article/S1546-1440(12)00335-3/abstract).

☑ To access the JACR study, “Utilization Management in Radiology, Part 2: Perspectives and Future Directions,” go to [jacr.org/article/S1546-1440\(12\)00334-1/abstract](http://jacr.org/article/S1546-1440(12)00334-1/abstract).

RSNA Journals Use Software to Fight Plagiarism

Editors of prominent science journals, including RSNA's *Radiology* and *RadioGraphics*, are relying on plagiarism-detecting software and increased awareness to stem the rising incidence of misconduct such as plagiarism and falsification of data.

RADIOGRAPHICS EDITOR Jeffrey S. Klein, M.D., has seen the problem firsthand since taking the helm of RSNA's peer-reviewed bimonthly education journal in January of 2012.

"In the year I've served as editor, I've dealt with various aspects of misconduct or plagiarism on six or seven occasions, which is more than I had anticipated," said Dr. Klein, the A. Bradley Soule and John P. Tampas Green and Gold Professor of Radiology at the University of Vermont (UVM) College of Medicine and Fletcher Allen Health Care in Burlington, Vt.

Dr. Klein recounted one case in which a *RadioGraphics* reviewer noticed a familiar aspect to one of the submissions. "The reviewer recognized the images from an article that had been published 11 years earlier," Dr. Klein said. "The images had been repurposed without attribution for the new research paper."

Journal Retractions Steadily Rising

Dr. Klein's experience is not unusual. According to an Oct. 24, 2012, study published in *PLoS ONE*, the number of articles retracted per year in major scholarly fields increased by a factor of more than 19 between the years 2001 and 2010. Almost half of the retractions were due to alleged publishing misconduct, defined by the National Institutes of Health (NIH) as fabrication, falsification or plagiarism in research.

A study published in the Oct. 16, 2012, issue of the *Proceedings of the National Academy of Sciences (PNAS)* cited misconduct as the reason for three-quarters of the 2,047 retracted papers in the biomedical and life sciences dating back to 1977.

"The literature suggests that the number of retractions has been going up exponentially," said Herbert Y. Kressel, M.D., the Miriam H. Stoneman Professor of Radiology at Harvard Medical School in Boston, who has served as editor of *Radiology*, RSNA's peer-reviewed science journal, since 2007 and on the journal's editorial board from 1985 to 1991.

Misconduct appears to be less common in radiology publications than in those focusing on other specialties. The *PNAS* study did not include any radiology journals among the top 10 journals with the most retractions and a search of the misconduct-tracking blog Retraction Watch (retractionwatch.wordpress.com) yields just one radiology case:



Kressel



Klein

a 2011 study in the journal *Acta Radiologica* that was retracted for likely plagiarism.

Still, misconduct remains a concern for editors like Drs. Klein and Kressel. Plagiarism is easier than ever in the cut-and-paste world of the Internet when time constraints and the pressure to publish can lead authors to succumb to the temptation to self-plagiarize.

"The pressure to publish is such that authors will tend to stretch what they've already produced and present it as original material," Dr. Klein said. "Some misconduct stems from the pressure to get pub-

“The pressure to publish is such that authors will tend to stretch what they've already produced and present it as original material.”

Jeffrey S. Klein, M.D.



Plagiarism-detection software is an additional tool to help editorial staff guard against misconduct. RSNA's *Radiology* and *RadioGraphics* staff recently began using the plagiarism-detecting software iThenticate, above, to comb through their nearly 3,300 annual submissions. Once uploaded, iThenticate compares each document with the millions of scholarly articles in the database and provides a report highlighting any matches in less than one minute.

lished in scientific journals, while other instances involve junior scientists who don't have the best level of supervision."

Editors rely heavily on expert reviewers to detect plagiarism and fraud before an issue goes to press. At *Radiology*, Dr. Kressel has added another safeguard: sending a query asking authors if any of the patients, research subjects or test animals described in their research have been reported in other submissions.

"If the person answers 'yes,' we ask him or her to submit a PDF of each publication with a letter explaining why the submission is original," Dr. Kressel said. "Just adding this question and asking authors to justify their papers has made researchers rethink submitting."

Software Analyzes Text for Plagiarism

Plagiarism-detection software is an additional tool to help editorial staff guard against misconduct. *Radiology* and *RadioGraphics* recently began using the plagiarism-detecting software iThenticate to comb through their nearly 3,300 annual submissions. Once uploaded, iThenticate compares each document with the millions of scholarly articles in the database and provides a report highlighting any matches in less than one minute.

"You can click on any of the matches and see if it's something in common usage or something even more concerning," said Chris Harrick, vice-president of marketing at iThenticate's publisher, Turnitin in Oakland, Calif. "The software enables you to exclude small matches, such as those of less than five words, and matches found in quotations and the bibliography."

Even with the software, the judgment and experience of reviewers plays a central role. "Word matches don't always equate to misconduct," Dr. Kressel noted. "For instance, there's only so many ways to describe a CT protocol. What most journals do is set their own thresholds for duplicate words."

Misconduct is Often a Repeat Offense

Despite advances in finding plagiarism, fraud detection remains a significant challenge. Reviewers who suspect fraud—for instance, results that show an unusual level of consistency—may ask authors to provide the original data files.

"A few years ago one of our readers questioned the validity of the data in a paper, and we had the author send us the files containing original data so a statistician could reanalyze it," Dr. Kressel recalled. "It turned out that it wasn't fraud; the author had just neglected to include some information that was important to understanding the data."

If misconduct is suspected, editors like Dr. Kressel inform both the authors and representatives of the institutions associated with the research.

Disciplinary measures vary. In 2000, NIH blocked noted glaucoma researcher Evan Dreyer, M.D., Ph.D., from receiving federal grants for 10 years after he admitted to falsifying data. In another prominent case, Eric Poehlman, Ph.D., a researcher at the University of Vermont in Burlington, was sentenced to one year in jail in 2006 for making a false statement on a federal grant application.

Stiff penalties appear to be the exception, however, as evidenced by the significant number of repeat offenders. The *PNAS* study found that 38 research groups with five or more retractions accounted for 44 percent of articles linked to fraud or suspected fraud. "Clearly, deterrence is not working, because we're still having misconduct," Dr. Kressel said.

With improved software, growing awareness of the problem and the continued diligence of reviewers, editors like Dr. Kressel remain hopeful that they will be able to focus more on science and less on misconduct.

"The whole system is designed to promote scientific integrity and prevent bias," Dr. Kressel said. "The last thing I want to be is the scientific police." □

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☑ To access the article, "A Comprehensive Survey of Retracted Articles from the Scholarly Literature," in the Oct. 24, 2012 edition of *PLoS ONE*, go to www.plosone.org/article/info:doi/10.1371/journal.pone.0044118.

☑ To access an abstract of the article, "Misconduct Accounts for the Majority of Retracted Scientific Publications," in the Oct. 16 edition of the *Proceedings of the National Academy of Sciences of the United States of America*, go to www.pnas.org/content/109/42/17028.

☑ For more information on iThenticate plagiarism detection and prevention technology, go to www.ithenticate.com. To view a demonstration of the iThenticate software, go to RSNA.org/NewsLandingPage.aspx.

☑ Access Retraction Watch, a blog that reports on retractions of scientific papers, at retractionwatch.wordpress.com.

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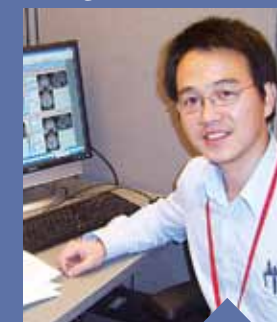
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With a grant from the RSNA R&E Foundation, **Hongwu Zeng, M.D.**, a radiologist at Shenzhen Children's Hospital in China, is leading a collaborative effort with the University of Wisconsin-Madison. The project utilizes a multi-modal approach to investigate differences in language lateralization and structural and resting-state functional connectivity patterns in children with benign epilepsy with centrotemporal spikes (BECTS) and healthy controls. The project will allow for the collection of pilot data and could lay the groundwork for additional international research collaborations between China and the U.S. with the smallest patients as the ultimate beneficiaries of these efforts.



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Journal Highlights

The following are highlights from the current issues of RSNA's two peer-reviewed journals.

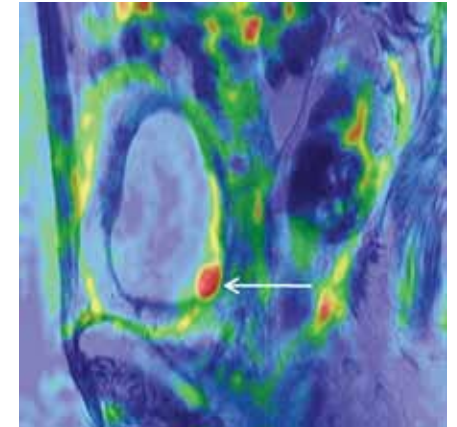
The Added Role of MR Imaging in Treatment Stratification of Patients with Gynecologic Malignancies: What the Radiologist Needs to Know

In patients with gynecologic malignancies, MR imaging plays an important role in the journey from initial evaluation of the extent of the disease to appropriate treatment selection and follow-up.

In a State-of-the-Art article in the March issue of *Radiology* (RSNA.org/Radiology), Evis Sala, M.D., Ph.D., of the Addenbrooke Hospital and University of Cambridge, England, and colleagues highlight the added role MR imaging plays in treatment stratification and overall care of patients with endometrial, cervical or ovarian cancer. The authors specifically describe MR imaging techniques used in evaluation of these patients, including:

- Anatomic MR imaging sequences (T1- and T2-weighted sequences)
- Pulse sequences that characterize tissue on the basis of physiologic features (diffusion-weighted MR imaging)
- Dynamic contrast agent-enhanced MR imaging
- MR spectroscopy

MR imaging findings corresponding to the 2009 revised International Federation of Gynecology and Obstetrics staging of gynecologic malignancies are also described in detail, highlighting possible pearls and pitfalls of staging. "Advances in MR imaging techniques, along with the growing role of the radiologist as part of a multidisciplinary treatment-planning team, have become central in tailoring treatment options and frequently lead to modifications in the therapeutic approach in patients with gynecologic malignancies," the authors write.



Tumor recurrence after chemo- and radiation therapy for cervical cancer in a 37-year-old woman. Lesion (arrow) is better appreciated as an area of high signal intensity on fused T2-weighted and DWI images.

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MR Imaging for Acute Nontraumatic Abdominopelvic Pain: Practical, Methodologic, and Interpretive Considerations

While MR imaging holds promise as an alternative to evaluate acute abdominopelvic pain, current understanding of its diagnostic utility warrants continued study and increased use in the evaluation of emergency department (ED) patients with this condition.

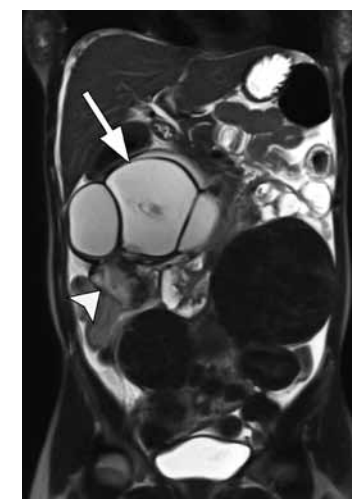
In an article in the March-April issue of *RadioGraphics* (RSNA.org/RadioGraphics), Michael Lubarsky, M.D., of the Emory University School of Medicine, and colleagues discuss MR imaging of abdominopelvic

RadioGraphics

pain in the ED in terms of rationale, imaging techniques, clinical applications, evolving indications and limitations. Specifically, the authors discuss:

- Use of different MR imaging sequences in the ED
- Importance of T2-weighted imaging with optimal fat suppression for the evaluation of ED patients with abdominopelvic pain
- MR imaging appearance of various abdominal and pelvic disease processes encountered in the ED

Accurate non-radiation-based techniques would be helpful in providing alternatives to CT, especially in younger patients or in patients who require repeated imaging, according to the authors. "MR imaging can provide rapid assessment of nearly all causes of acute abdominopelvic pain, plays an evolving role in the evaluation of vascular disease and right upper quadrant pain, and may be the optimal diagnostic test for many of these disease processes," the authors write.



Ovarian torsion secondary to serous cystadenoma in a 37-year-old woman. Coronal single-shot T2-weighted MR images demonstrate a large, complex cyst in the RUQ (arrow). The cyst arises from an enlarged, edematous right ovary (arrowhead) with small peripheral follicles. Note that the enlarged, fibroid uterus has pushed the right ovary into the upper abdomen, making this case potentially difficult to diagnose at pelvic US. Results of surgical exploration confirmed a twisted right ovary secondary to a large ovarian serous cystadenoma.

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Nominations are being accepted for the RSNA Roentgen Resident/Fellow Research Award, recognizing residents and fellows who have contributed significantly to advancing their departments through research as evidenced by presentations and publications of scientific papers, receipt of research grants or other contributions. Only one resident or fellow per program can be nominated by the program director or department chair.

The RSNA Research & Education (R&E) Foundation provides an award plaque for the department to display and a personalized award to present to the selected resident or fellow. The nomination deadline is April 1. Learn about the nomination process and see a list of past recipients at RSNA.org/Foundation/Roentgen.cfm.



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RSNA Assists with New MOC Self-Assessment CME Requirement

Along with hundreds of education activities specifically designed to help physicians meet American Board of Radiology (ABR) Maintenance of Certification (MOC) needs, RSNA also helps members fulfill a new Self-Assessment CME (SA-CME) requirement for Part II of the MOC program.

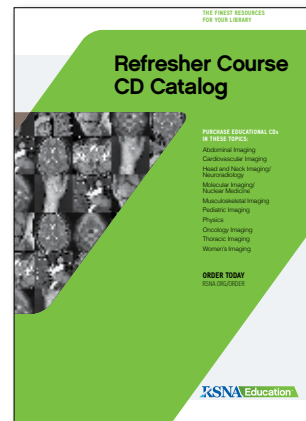
Part II of MOC for Lifelong Learning and Self-Assessment for diagnostic radiologists requires physicians to earn 75 AMA PRA Category 1 Credits™ every three years. At least 70 percent of earned CME credit must be in diagnostic radiology or related areas, with the remaining 30 percent in clinically relevant areas of learning.

As of January 1, Part II of the MOC program for diagnostic radiologists requires physicians to earn SA-CME in addition to regular CME credits. SA-CME is designed to enhance a physician's knowledge and skills as well as provide continuous opportunity for improvement. At least 25 of the 75 CME credits must be qualified as SA-CME to meet requirements for Part II of MOC for diagnostic radiologists.

RSNA activities that fulfill SA-CME requirements include *RadioGraphics* and *Radiology* CME tests, online refresher courses, Cases of the Day and self-assessment modules (SAMs).

SA-CME credits earned by members through RSNA will be recorded and tracked in the RSNA CME Repository and automatically transferred to the CME Gateway for those with accounts. (See Page 24 for more details.)

To access RSNA's wide selection of online CME and SA-CME activities, visit RSNA.org/order. For information about SA-CME, contact ABR at abrmocp@theabr.org or call 1-520-519-2152.



Residents & Fellows Corner

APDR Issues Position on Resident Duties during Core Exam Prep

The Association of Program Directors in Radiology (APDR) has recommended that radiology residents not be given time off from clinical service to study before the American Board of Radiology (ABR) core qualifying examination administered after the third year of residency.

In an article published in the November 2012 issue of the *Journal of the American College of Radiology*, Kristen DeStigter, M.D., Martha Mainiero, M.D., Murray Janower, M.D., and Charles Resnik, M.D., note that the practice of giving residents as much as six months off from clinical duties before the oral board examinations resulted in a disruptive period at many radiology residency programs known as "board frenzy." Attempts to curtail the practice failed, they added.

With the new core examination schedule, programs now have just three years to

fulfill Accreditation Council for Graduate Medical Education (ACGME) requirements for clinical rotations and formal instruction in diagnostic radiology, the authors note. "Time off for studying during this time is at odds with the necessary clinical experience required for the examination," they state.

Programs should follow the guidelines of the Diagnostic Radiology Residency Review Committee of the ACGME in granting residents brief absences from call to attend conferences targeted to the core curriculum, the authors state.

Residents must embrace the concept of "lifelong learning" from the beginning and learn to engage in continuous self-study, the authors add. "It is our responsibility to ensure that our residents are trained with the skill set to be successful in their careers, including the ability to achieve a balance between work, study and home life, an important competency that will obviate the necessity for "board frenzy," they conclude.

Access the article at www.jacr.org/article/S1546-1440%2812%2900275-X/fulltext.

Technology Forum

2013 IHE® Connectathon Reflects Growing Need for Interoperability

As the benefits of interoperability become ever more apparent, the annual Integrating the Healthcare Enterprise (IHE®) North American Connectathon Conference has expanded its appeal to a wider spectrum of participants from across the globe.

Held Jan. 30 in Chicago, the 15th annual event offered users and developers of health information technology (HIT) systems the opportunity to learn about achieving interoperability and making more effective use of electronic health records (EHRs). Topics covered the unique goals required to achieve meaningful use and IHE's role in their development, including:

- Connecting clinicians, patients and their families with the tools and resources needed to enable care in a seamless, meaningful, transparent way
- Achieving quality and efficiency of data as related to the delivery of care
- Empowering patients at home and beyond
- The mHealth ecosystem that extends access and connectivity to individuals delivering care

The IHE North American Connectathon Conference attracted more than 100 attendees from a wide range of healthcare settings. The conference is the cornerstone of the annual IHE North American Connectathon, health IT's largest interoperability testing event, held Jan. 28-Feb. 2, in Chicago.

IHE began as an initiative sponsored by RSNA and the Healthcare Information Management and Systems Society (HIMSS) and now includes more than two dozen sponsoring organizations worldwide.

To view a video overview of the IHE North American Connectathon Conference, go to www.youtube.com/watch?v=64ajL4mG6dM.



Radiology in Public Focus

Media Coverage of RSNA

In December, media outlets carried 3,593 RSNA-related news stories. These stories reached an estimated 2 billion people.

Print coverage included *USA Today*, *The Wall Street Journal*, *The Boston Globe*, *Chicago Sun-Times*, *The Globe and Mail* and *The Plain Dealer*.

Broadcast coverage included *NBC Nightly News with Brian Williams*, CNN Headline News, NPR, TBS Superstation, WGN-AM (Chicago), WOR-AM (New York), WBZ-TV (Boston), KNTV-TV (San Francisco), KDKA-TV (Pittsburgh), WFSB-TV (Hartford, Conn.), KUTV-TV (Salt Lake City) and WRAL-TV (Raleigh, N.C.).

Online coverage included Yahoo! News, *The Huffington Post*, MSNBC, *The Wall Street Journal*, *U.S. News & World Report*, NPR Blogs, Bloomberg News, TIME, Reuters, *Boston Globe*, *Houston Chronicle*, *San Francisco Chronicle* and *Examiner.com*.

Coverage of RSNA 2012 will be highlighted in a future issue.

New on *RadiologyInfo.org*

Visit *RadiologyInfo.org*, RSNA and ACR's jointly-sponsored public information website, to read the latest additions to the Diseases and Conditions portion of the site:

- Abdominal Aortic Aneurysm (AAA)
- Carotid Artery Stenosis

March Public Information Activities Focus on Colorectal Cancer

To highlight National Colorectal Cancer Awareness Month in March, RSNA is distributing radio public service announcements (PSAs) encouraging listeners to be screened for colorectal cancer.

In addition, RSNA is distributing the "60-Second Checkup" audio program to nearly 100 radio stations across the U.S. The segments focus on colorectal cancer and screening topics, including CT colonography and standard colonoscopy in patients age 65 and older.

Education and Funding Opportunities



Each year, radiologists from countries outside North America participate in the Introduction to Research for International Young Academics (IRIYA) program, consisting of a special four-day seminar held during the RSNA Scientific Assembly and Annual Meeting. Above: an IRIYA session under way at RSNA 2012.

RSNA Introduction to Research for International Young Academics

Deadline for nominations—April 15, 2013 THE RSNA COMMITTEE on International Radiology Education (CIRE) seeks nominations for this program that encourages young radiologists from countries outside North America to pursue careers in academic radiology by:

- Introducing residents and fellows to research early in their training
- Demonstrating the importance of research to the practice and future of radiology
- Sharing the excitement and satisfaction of research careers in radiology
- Introducing residents to successful radiology researchers, future colleagues and potential mentors

The program consists of a special four-day seminar held during the RSNA Scientific Assembly and Annual Meeting. CIRE recommends 15 international young academics for consideration by

the RSNA Board of Directors each year. Complimentary registration, shared hotel accommodation for the duration of the program, and a stipend to help defray travel expenses are awarded to successful candidates.

Eligible candidates are residents and fellows currently in radiology training programs or radiologists not more than two years out of training who are beginning or considering an academic career. Nominations must be made by the candidate's department chairperson or training director. Fluency in English is required.

Nomination forms are available at RSNA.org/IRIYA.

2013 CORE Workshop

Registration opens—April 1, 2013 THE 2013 Creating and Optimizing the Research Enterprise (CORE) workshop will be held Friday and Saturday, Oct. 25 and 26, 2013 in Oak Brook, Ill. The workshop will focus on strategies for developing and/or expanding research programs in radiology, radiation oncology and nuclear medicine departments. The CORE program features a combination of presentations, case studies and group discussions.

More information and registration is available at RSNA.org/CORE.



World Conference on Interventional Oncology

May 16-19, 2013
New York

WCIO 2013 is the leading interventional oncology conference, featuring innovative interventional oncology experts, discussions on current interventional oncology topics, unique live case presentations and the latest scientific advances. WCIO focuses on highlighting a multidisciplinary approach, providing conference participants the opportunity to observe real-world techniques and learn cutting-edge best practices. WCIO 2013 will deliver focused sessions for medical students, residents and fellows, and both interventional oncology expert and less experienced operators and thought leaders, providing a truly dynamic learning and networking experience.

Learn more at www.wcio2013.org.



ARLM-approved Courses Offered in 2013

TAKE ADVANTAGE of the opportunity to enhance your career and develop as a professional by taking practical leadership courses approved by the Academy of Radiology Leadership and Management (ARLM) throughout the year.

ARLM is sponsored by five participating radiology education societies, including RSNA, which continues to offer courses either online or in-person at meetings throughout 2013.

Medical imaging professionals can earn

a Certificate of Achievement from ARLM by earning 50 education credits—at least 30 credits in person—across a spectrum of core learning domains, including Financial Skills, Human Resources, Professionalism, Legal/Contracting, Academic Mission and General Management. A minimum of three credits in each domain is required.

There are no fees beyond costs associated with CME activities, and many of those are free to members of the respective sponsoring societies.

Upcoming in-person meetings featuring ARLM-approved courses:

- Association of University Radiologists (AUR) 2013 Annual Meeting, April 9-12, Los Angeles, www.aur.org
- American Roentgen Ray Society (ARRS) 2013 Annual Meeting, April 14-19, Washington, D.C., www.rrs.org.

For more information on ARLM, go to www.radleaders.org.

Medical Meetings April 2013

APRIL 2-6
International Diagnostic Course Davos (IDKD), 45th IDKD 2013 Davos, Musculoskeletal Diseases, Convention Center Davos, Switzerland
• www.idkd.org

APRIL 6-9
Society of Breast Imaging, 11th Postgraduate Course, Hyatt Regency Century Plaza, Los Angeles
• www.sbi-online.org

APRIL 6-10
American Institute of Ultrasound

in Medicine (AIUM), Annual Convention, New York Marriott Marquis Hotel
• www.aium.org

APRIL 9-12
Association of University Radiologists (AUR), 61st Annual Meeting, JW Marriott Los Angeles at L.A. Live
• www.aur.org

APRIL 11-14
Japan Radiological Society (JRS), 72nd Annual Meeting, Pacifico Yokohama, Japan
• www.radiology.jp

APRIL 11-15
Australian and New Zealand Society of Nuclear Medicine (ANZSNM), 43rd Annual Scientific Meeting, Perth Convention and Exhibition Centre, Australia
• anzsnm2013.com.au

APRIL 13
American Physical Society (APS), April Meeting, Sheraton Denver Downtown Hotel
• www.aps.org

APRIL 13-18
Society of Interventional Radiology (SIR), 38th Annual Scientific

Meeting, New Orleans
• www.sirweb.org

APRIL 14-19
American Roentgen Ray Society (ARRS), 2013 Annual Meeting, Washington Marriott Wardman Park Hotel, Wash. D.C.
• www.rrs.org

APRIL 18-20
American Brachytherapy Society (ABS), Annual Meeting, Hyatt Regency New Orleans
• www.americanbrachytherapy.org

FIND MORE EVENTS AT RSNA.org/calendar.aspx.

Annual Meeting Watch

Submit Abstracts by April 10

The online system to submit abstracts for RSNA 2013 is now active. The submission deadline is 12 p.m. Central Time on Wednesday, April 10, 2013. Abstracts are required for scientific presentations, education exhibits, applied science, quality storyboards and quantitative imaging reading room showcase applications.

To submit an abstract online, go to RSNA.org/abstracts.

The easy-to-use online system helps the Scientific Program Committee and Education Exhibits Committee evaluate submissions more efficiently. For more information about the abstract submission process, contact the RSNA Program Services Department at 1-877-776-2227 within the U.S. or 1-630-590-7774 outside the U.S.



December 1-6 | McCormick Place | Chicago

RSNA.org

Online Tools Help Members Obtain, Track CME Credits

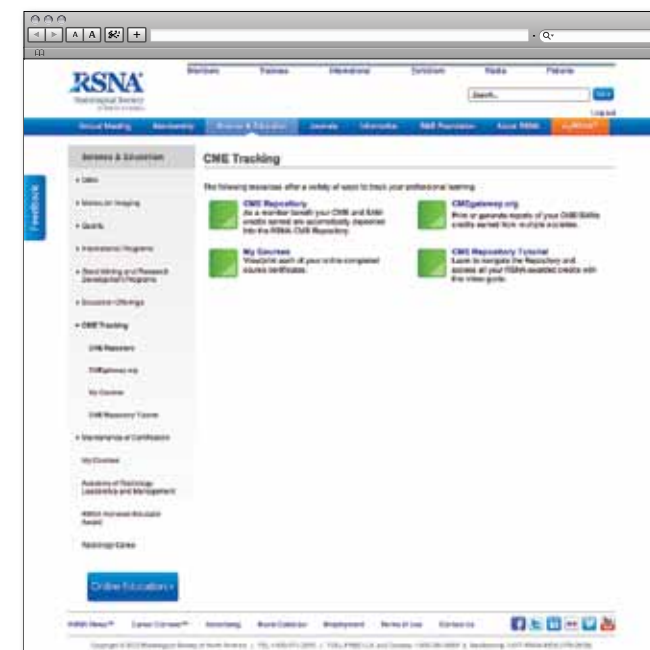
Because tracking CME credits can be just as important as completing the courses, RSNA offers tools to aid members with both.

On the Science & Education page of RSNA.org, members can access an extensive library of opportunities to earn CME and self-assessment module (SAM) credit, including more than 270 corresponding tests for *RadioGraphics* CME feature articles. All CME articles/tests are approved for *AMA PRA Category 1 Credit*™.

New to the page: RSNA offers a full roster of activities that fulfill a new self-assessment CME (SA-CME) requirement for Part II of the American Board of Radiology Maintenance of Certification (MOC) program. Access the materials under Things to Know.

Click CME Tracking on the left-hand side of the page to access these tools:

- ▶ **CME Repository:** Your SA-CME and SAM credits earned are automatically deposited into the RSNA CME Repository. View a comprehensive list of your credits—free to members.
- ▶ **CMEGateway.org:** Print or generate reports of your SA-CME/SAM credits earned from multiple societies.
- ▶ **CME Repository Tutorial:** Learn to navigate the repository and access all your RSNA-awarded credits.



Access Highlights of RSNA 2012

Relive high points of RSNA 2012 and access post-meeting content on the Annual Meeting Page on RSNA.org.

- Select content, including Cases of the Day and refresher courses are being transformed into online CME activities and will be posted in the Online Education library.
- Access the *Daily Bulletin*, RSNA's official online newspaper.
- Revisit footage of the RSNA 2012 Opening Session: President's Address by George S. Bisset III, M.D.

RSNA 2013 Registration

Registration Fees

BY NOV. 8 AFTER NOV. 8

BY NOV. 8	AFTER NOV. 8	
\$ 0	\$100	RSNA/AAPM Member
0	0	RSNA/AAPM Member Presenter
0	0	RSNA Member-in-Training, RSNA Student Member and Non-Member Student
0	0	Non-Member Presenter
180	280	Non-Member Resident/Trainee
180	280	Radiology Support Personnel
825	925	Non-Member Radiologist, Physicist or Physician
825	950	Hospital or Facility Executive, Commercial Research and Development Personnel, Healthcare Consultant and Industry Personnel
325	325	One-day registration to view only the Technical Exhibits

Deadlines

April 10	Call for Abstracts deadline
May 8	Member registration and housing opens
June 5	Non-member registration and housing opens
July 10	Course enrollment opens
October 25	International deadline to have full conference badge mailed
November 8	Final housing and discounted registration deadline
November 27	Deadline to guarantee seats for all ticketed courses
December 1-6	RSNA 99th Scientific Assembly & Annual Meeting



For more information about registering for RSNA 2013, visit RSNA2013.RSNA.org, e-mail reginfo@rsna.org or call 1-800-381-6660 x7862.

COMING NEXT MONTH

Radiology residents offer perspective on the potential impact of the new American Board of Radiology (ABR) core and certifying examinations in next month's *RSNA News*.



Patients are the primary focus



of radiologic care.

The Radiology Cares campaign helps radiologists

- Align their radiology practices with patients' needs and best interests.
- Provide optimal patients experiences throughout the continuum of their radiologic care.
- Communicate more effectively with patients and other healthcare providers.

Visit RadiologyCares.org to learn how to become more patient-centered in your practice, then join your colleagues in the radiology community who have committed to putting patients first when you **Take the Pledge**.



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THE ART OF PATIENT-CENTERED PRACTICE