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## Radiology's Critical Role in Treating Head Injuries

### ALSO INSIDE:

- LOOK AHEAD: *The Next 100 Years of Radiology Education*
- The Role of Imaging in Understanding Cigarette Addiction
- MITA Standard For Optimizing Radiation Dose
- Technology Improves Radiology Reports



A NEW  
CENTURY  
BEGINS

100<sup>RSNA</sup> 2015

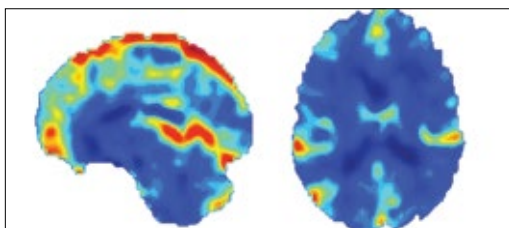
INNOVATION  
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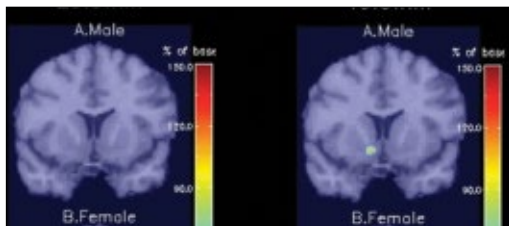
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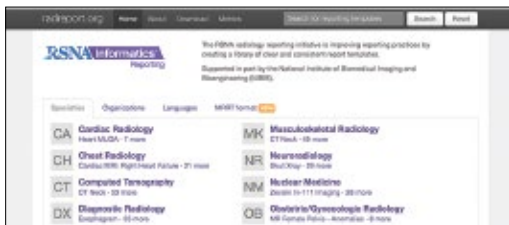
**4** Look Ahead: The Next 100 Years of Radiology Education



**7** Radiology's Critical Role in Treating Head Injuries



**9** The Role of Imaging in Understanding Cigarette Addiction



**11** Technology Improves Radiology Reports



**13** MITA Standard Optimizes Radiation Dose

**UP FRONT**

- 1** First Impression
- 1** Numbers in the News
- 3** Letter to the Editor

**RADIOLOGY'S FUTURE**

- 15** R&E Foundation Donors

**NEWS YOU CAN USE**

- 17** Residents & Fellows Corner
- 17** Value of Membership
- 19** Journal Highlights
- 20** Radiology in Public Focus
- 21** Education and Funding Opportunities
- 23** Annual Meeting Watch
- 24** *RSNA.org*

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## SIR bestows highest honor to Lammer, Roberts, Neiman

The Society of Interventional Radiology awarded its gold medal to **Johannes Lammer, M.D., Anne C. Roberts, M.D.,** and the late **Harvey L. Neiman, M.D.,** during its recent annual meeting in Atlanta.

Dr. Lammer, professor emeritus of the Medical University Vienna, Austria, served until last year as chair of its Department of Cardiovascular and Interventional Radiology. His research interests include vascular interventions such as endovascular aneurysm repair and oncologic interventions, such as transcatheter arterial chemoembolization and biliary interventions.

A past president of SIR, Dr. Roberts is chief of vascular and interventional radiology at the University of California at San Diego Thornton Hospital and the San Diego VA Hospital. Dr. Roberts' clinical interests include pelvic congestion syndrome, invasive placenta of the uterus and inferior vena cava filters as well as the treatment of uterine fibroids with uterine fibroid embolization and MR-guided focused ultrasound.

Dr. Neiman led the American College of Radiology (ACR) as chair of the Board of Chancellors and later as chief executive officer, retiring in 2014 after more than 20 years. He was awarded the gold medal posthumously. Along with working to bring the message of interventional radiology to the broader radiology and medical community, Dr. Neiman pioneered the application of health services research to interventional and radiology practice. The Harvey L. Neiman Health Policy Institute, established by ACR in 2012, researches the role of radiology in new healthcare delivery and payment models.



Lammer



Roberts



Neiman

## Segall Named First Gold Medalist by WNRS



Segall

**Hervey D. Segall, M.D.,** a pioneer of pediatric neuroradiology, was awarded the first gold medal by the Western Neuroradiological Society at its annual meeting recently in San Francisco.

A former associate editor of *Radiology*, Dr. Segall served as chief of neuroradiology at the Keck School of Medicine, University of Southern California, for over 20 years and established one of the first ACGME-accredited neuroradiology training programs. Dr. Segall was designated professor emeritus of radiology at Keck in 2009.

Dr. Segall and his colleagues established neuroradiology services and academic and training programs at the Children's Hospital of Los Angeles, the Pediatric Pavilion at the LAC+USC Medical Center and at the Children's Hospital/Medical College of Wisconsin.

## Numbers in the News

# 5

Percentage by which reimbursement for CT scans performed on machines not compliant with the XR-29/MITA Smart Dose standard will be reduced, starting in 2016. Turn to [Page 13](#) to learn more about the groundbreaking standard by the National Electrical Manufacturers Association (NEMA) and its Medical Imaging & Technology Alliance (MITA) division.

# 333

Percentage increase in cerebrovascular reactivity in concussed athletes, versus controls, in a study using functional MRI during a hypercarbia challenge. Imaging is playing an increasing role in diagnosing mild traumatic brain injury and predicting outcomes for patients who have suffered concussions. Learn more on [Page 7](#).

# 70

Percentage of rectal cancer staging reports that were optimal or satisfactory after structured reports were implemented, up from just 38 percent before the reports were implemented, in a study conducted at Brigham and Women's Hospital. Read more on [Page 11](#).

# 289

Annual cost, in billions of dollars, of smoking-related illness in the U.S. Turn to [Page 9](#) to read how imaging may help to develop personalized therapies for people addicted to smoking.

## RSNA 2015 DISTINGUISHED HONOREES

The RSNA Board of Directors has announced the distinguished award recipients to whom the Society will pay tribute at the 101st Scientific Assembly and Annual Meeting. They are:



Hricak



Novelline



Seltzer

### Gold Medalists

Hedvig Hricak, M.D., Ph.D., Dr. h.c.  
*New York*

Robert A. Novelline, M.D.  
*Boston*

Steven E. Seltzer, M.D.  
*Brookline, Mass.*



Bonomo



Chuapetcharasopon



Im

### Honorary Members

Lorenzo Bonomo, M.D.  
*Rome*

Chamaree Chuapetcharasopon, M.D.  
*Bangkok*

Jung-Gi Im, M.D.  
*Seoul, Korea*



## Haughton Earns 2015 Gold Medal from ASSR

Victor M. Haughton, M.D., received the 2015 gold medal from the American Society of Spine Radiology (ASSR) during the ASSR annual meeting held recently in Las Vegas.

Dr. Haughton, from the University of Wisconsin Hospitals and Clinics in Madison, established an exchange program which brought European radiologists from many countries such as Norway, Sweden, France, Czechoslovakia and Switzerland to the Medical College of Wisconsin.

Dr. Haughton's research interests include the lumbar intervertebral disc, MR contrast agents, functional MRI and cerebrospinal fluid dynamics.



### IN MEMORIAM

#### Deborah MacAdam Forrester, M.D.



Deborah MacAdam Forrester M.D., an accomplished teacher renowned for publishing a standard textbook in musculoskeletal radiology teaching, died in January 2015 in Malibu, California. She was 77.

Dr. Forrester was the first author of "The Radiology of Joint Disease" textbook, with editions published in the 1970s, 1980s and 1990s. The textbook was also published in German and Spanish.

A native of Portland, Maine, Dr. Forrester graduated with honors from Swarthmore College before earning her master's degree in biology from the University of California, San Francisco (UCSF). She earned her medical degree at the University of Pennsylvania in 1960. After an internship at UCLA-Harbor General Hospital, she entered radiology residency at UCSF and completed her training at Massachusetts

General Hospital before joining its full-time faculty.

In 1969 she joined the faculty in the Department of Radiology at the UCSF School of Medicine and rose to the rank of associate professor in radiology, medicine and orthopedic surgery. She was director of the radiology residency training program from 1979 until 2003. During her 45-year career at UCSF, Dr. Forrester trained approximately 500 radiology residents and musculoskeletal radiology fellows and was presented with the UCSF annual Award for Excellence in Teaching four times and the Outstanding Teacher Award three times. In 1999, she received the Lifetime Achievement Award for Excellence in Teaching.

In addition to her seminal textbook, Dr. Forrester contributed chapters to 20 textbooks in radiology, orthopedic surgery, rheumatology and neurosurgery literature. She also authored 44 articles for radiology, rheumatology and orthopedic surgery journals. She presented 175 guest lectures at a wide variety of academic institutions and professional societies.

## Letter to the Editor

### New Federal X-ray Guidance Published

A sharp increase in imaging studies has resulted in a doubling of the average annual radiation dose to the U.S. population from diagnostic and interventional X-ray procedures over the past 20 years. As a result, the federal Interagency Steering Committee on Radiation Standards asked the U.S. Environmental Protection Agency (EPA) to revise Federal Guidance Report No. 9 (FGR-9), which was published in 1976. The updated information became available on January 15, 2015, when EPA Administrator Gina McCarthy signed Federal Guidance Report No. 14: Radiation Protection Guidance for Diagnostic and Interventional X-Ray Procedures (FGR-14).

FGR-14 includes facility guidance for radiography, CT, interventional fluoroscopy and bone densitometry and covers important matters such as radiation shielding, training and credentialing. Some key aspects include:

- Agencies should promote the development of national diagnostic reference levels for use as quality assurance and quality improvement tools in each type of examination.
- Facilities should use the dose information from individual patient imaging procedures that is provided by imaging equipment as part of the quality assurance program for identifying opportunities to reduce dose.
- Facilities should ensure that advances in techniques and technology that reduce radiation dose are used, and used properly.
- Facilities should establish infrastructure for collecting, storing, reporting and analyzing dosimetry data from patient examinations.

While FGR-14 is not binding on any agency or facility, incorporating the best practices defined in it will improve the safety of diagnostic and interventional imaging. FGR-14 and supporting information are available at [Epa.gov/radiation/federal/fgr-14.html](http://Epa.gov/radiation/federal/fgr-14.html).

**Mike Boyd**  
U.S. EPA

**Sam Keith, M.S., C.H.P.**  
U.S. Agency for Toxic Substances and Disease Registry (ATSDR)

**Donald L. Miller, M.D.**  
U.S. FDA

### EDITOR'S NOTE

Dr. Miller, et al:

I thank you for this submission on a topic important to all our readers. I have invited William Mayo-Smith, M.D., RSNA co-chair of Image Wisely, to respond.

~David M. Hovsepian, M.D.  
Editor, *RSNA News*

Thank you, Dr. Hovsepian, for the opportunity to add to the message submitted by Dr. Miller, et al.

As the current RSNA co-chair of Image Wisely I have the privilege of working with many experts who are dedicated to providing the most accurate information promoting safety for our patients and radiology personnel. Image Wisely is co-sponsored by RSNA, ACR, AAPM and ASRT with goals to raise awareness in the medical community to choose the best imaging exam for a particular clinical indication, and to optimize the imaging technique to provide diagnostic images using the lowest radiation dose possible.

Founded in 2010, Image Wisely has recruited experts to create the Image Wisely website with information, guidelines and tools to help medical imaging professionals and facilities provide optimal and safe patient care. The site has robust sections on CT, nuclear medicine and fluoroscopy. Having collected more than 30,000 individual pledges to the campaign's goals, Image Wisely also encourages practices to advance patient safety by earning accreditation and participating in a dose index registry. To this end, we applaud the initiatives you propose.

As your readers visit the EPA's FGR-14 website, I would suggest that they also visit [ImageWisely.org](http://ImageWisely.org) to discover tools that address some of the issues covered in FGR-14.

It is to all of our benefit—as physicians, caregivers and patients—that radiation safety and protection are uppermost in our goals to provide patient-centered care. Please contact us at [ImageWisely@acr.org](mailto:ImageWisely@acr.org) with your thoughts, concerns and ideas.

Sincerely,  
**William W. Mayo-Smith, M.D.**  
RSNA co-chair Image Wisely



**IMAGE WISELY**  
Radiation Safety in  
Adult Medical Imaging

### THIS MONTH IN THE RSNA NEWS ONLINE VERSION

Get more of this month's news online at [RSNA.org/News](http://RSNA.org/News). Enjoy interactive features including video, audio, slide presentations and more. Go online to leave us a comment and easily share stories via social media as well.

As part of this month's story on the role of advanced imaging in understanding cigarette addiction, visitors can go to [RSNA.org/News](http://RSNA.org/News) to view a "dopamine" movie capturing PET images that show patterns of dopamine activations during smoking. Readers can also access RSNA's Radiology Reporting website featured in this month's story on improving the value of radiology reports.

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#### LETTERS TO THE EDITOR

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# LOOK AHEAD

## The Next 100 Years of Radiology Education

BY RICHARD B. GUNDERMAN, M.D., PH.D.

Looking forward to the next 100 years of radiology education—and giving in to a wave of optimism that is in all likelihood at least partly unfounded—I foresee our priorities changing in ways that will affect many dimensions of educational activity; specifically, transitions in the “who, what, when, where, how, and why” of education that will impact the educational mission of radiology in myriad ways.

### Who is Educating

I anticipate that the locus of authority over radiology education will shift away from the people who compose and administer tests and accredit educational programs and toward the learners and educators actually doing the work. There are already signs that people throughout the field of education have begun to reassess the costs and benefits of a centralized, one-size fits-all approach.

Those who understand best what quality education looks like are the people on the front lines of teaching and learning, who devote substantial time and effort to such activities every day. To them, the limitations of crude educational outcomes indicators as such as standardized, multiple-choice tests and checklist-based assessments of educational quality become readily apparent.

Instead, their attention will focus more on the distinctive interests, abilities and resources of individual learners and educators, asking them less to conform to a monolithic standard and instead contribute distinctively to the educational enterprise. In response to naysayers who may object to the time and cost of overseeing such a complex educational enterprise, it need only be said that oversight should serve education and not the reverse.

### What Education Is

A second important transition will arise from a reassessment of the real meaning of education—that is, what are teachers and learners really doing? A deeper understanding of the true mission of education should prompt a shift away from a model of education as simply transferring knowledge—an approach that merely perpetuates the past—and towards cultivating more effective learning habits.

For far too long, innovation in how individual students learn has been discouraged. Today the imperative of education, powerfully reinforced by accrediting agencies, is this: Don't get caught not knowing something. So we assess learners' fund of knowledge and skills—which usually means their ability to imitate their teachers. Assessing their problem-solving skills too often merely means posing challenges for which teachers already know the answers. In the future, we will be interested less in memorization and more on whether learners pose good questions and show the potential to solve puzzles that their teachers have not yet imagined.

### When Education Occurs

The third coming sea change is about knowing when education takes place.

*Continued on next page*



Gunderman

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### EDITOR'S NOTE

As RSNA continues to observe the 100th year of its founding, RSNA News is joining the celebration by taking a “Look Ahead” at the next 100 years of radiology. Each month, we will present an expanded feature written by some of the most visionary minds in the specialty—in May, renowned radiology educator Richard Gunderman, M.D., Ph.D., launches the series with a thought-provoking assessment of the next 100 years of radiology education. We invite readers to return to these pages each month for more unique insight into the future of this ever-evolving specialty. Because we'd like to know *your* thoughts on radiology's next 100 years as well, we hope you'll keep the conversation going by commenting at [tellus@rsna.org](mailto:tellus@rsna.org).

*“We will finally realize that we need to temper our mania for novelty with a deeper appreciation of the educational geniuses of the past.”*

RICHARD B. GUNDERMAN, M.D., PH.D.

*Continued from previous page*

Today we assume that learning occurs when a teacher is most active. In the coming decades we will appreciate that learners learn best when they are most active. We need to pay less attention to critiquing the process of educator activity, such as the quality of their lesson plans and tests, and focus more on what learners are actually doing.

For example, there is often more to know about the care of patients with particular medical conditions, such as congestive heart failure and stroke, than can be gained from textbooks or lectures. If we can foster in learners the curiosity and dedication to continuous learning that are requisite to excellence, we will be poised to realize William Osler’s ideal that medical education should begin, continue and end with the patient.

In short, we will recognize that learners gain more when they are actively inquiring—and especially when they are teaching—than when they are watching and listening to someone else. When we assess and enhance our educational programs, we will be less concerned with the frequency and duration of teaching sessions and focus instead on what learners are contributing, both to their own education and that of others.

### **Where Education Occurs**

A corollary transition takes shape as we begin to recognize that the only truly meaningful locus of education is the minds and hearts of learners, not boardrooms where people design curricula, develop new instructional technologies and produce new educational assessment methods. Just as many who attempt to control healthcare have little experience caring for patients, too many people who want to oversee education have little direct contact with students.

Learners should not be viewed as sources of tuition revenue, educational performance data or clinical productivity. Nor do they exist to provide steady employment or professional purpose to those charged with overseeing their education. Quite the reverse—learners are the reason the entire educational enterprise exists. To paraphrase Osler’s advice: great education must begin, continue and end with the learner.

In the future, we will grasp that in order to teach effectively, educators must get to know their learners. Those who do not regularly work face-to-face with learners cannot know them well enough to responsibly direct their educational experiences. With this recognition will come a shift in authority back to local educational programs.

### **How Education Happens**

One of the most counterintuitive future developments in education will be a growing understanding of the limitations of technology as the solution to the challenges faced by learners and educators. I expect our successors will look back condescendingly on our current excitement over the transformative power of smartphones, tablets and computers to change education, much as we smile when we contemplate the raptures that accompanied the introduction of the carousel slide projector.

From an anthropological point of view, the successive waves of enthusiasm that have accompanied the importation of new information technologies into the educational sphere can only be described as a form of fetishism. Most such new technologies turn out to be little more than flashes in the pan, sometimes actually doing more harm than good, by distracting teachers and learners from directly tackling essential educational opportunities.

Old ideas are continually being repackaged into supposedly new concepts such as problem-based and team-based learning, but until the human organism changes in some fundamental way, it will remain impossible to introduce any genuine improvement over the educational insights sketched out by great teachers thousands of years ago. We will finally realize that we need to temper our mania for novelty with a deeper appreciation of the educational geniuses of the past.

### **Why We Educate**

Most importantly, the next 100 years will bring into focus the most critical educational interrogative of all: Why?

To answer this question, what is needed is fundamental insight into what radiologists actually contribute to patient care, the advancement of medical knowledge, and the education of future generations of healthcare professionals. Helping learners tap into these wellsprings of meaning and fulfillment in their personal and professional lives will do more to prepare them for productive and valuable careers than anything else we can offer them.

In words often attributed to Antoine de Saint-Exupéry, “When you want to build a ship, do not begin by gathering





wood, cutting boards and distributing work, but awaken within the heart of human beings the desire for the vast and endless sea." Whatever response we offer to the ultimate question concerning education's purpose, we must never fail to attend to the hopes and dreams of learners and educators, around whom the entire educational apparatus should revolve. □

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**RICHARD B. GUNDERMAN, M.D., PH.D.**, is chancellor's professor of radiology, pediatrics, medical education, philosophy, liberal arts, philanthropy and medical humanities and health studies at Indiana University, Indianapolis. Dr. Gunderman received the RSNA Outstanding Educator Award in 2008 and delivered the RSNA Annual Oration in Diagnostic Radiology in 2012. He received a 2000-2002 RSNA Education Scholar Grant for the project, "Two-Year Program for Leadership Development in Education." He is a member of the RSNA Public Information Advisors Network (PIAN).



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# Studies Point to Quantitative, Prognostic Role for Imaging in Head Injury

BY PAUL LATOUR

**Radiology can play an integral role in diagnosing mild traumatic brain injury (mTBI) and predicting outcomes for patients who have suffered concussions, according to studies presented at RSNA 2014.**

FOR CONCUSSION VICTIMS, imaging is largely used as a tool to exclude more serious injuries. “But in reality, injuries occur in a continuum of severity, with subtle diagnostic differences that imaging might be able to detect,” said Lea M. Alhilali, M.D., assistant professor of radiology at the University of Pittsburgh Medical Center. “Ideally, I’d like to see radiology used not only as a diagnostic tool in the evaluation of concussions, but also as a prognostic tool.”

Dr. Alhilali was lead author on a retrospective study that identified a central axonal injury component in patients with mTBI and vestibulopathy, who were imaged with diffusion-tensor imaging (DTI). The findings suggest a role for DTI in mTBI diagnosis, with a quantitative biomarker to aid in that diagnosis. The results were published in the July 2014 issue of *Radiology*.

Researchers reviewed 30 patients with mTBI and vestibular symptoms and 25 patients with mTBI and ocular convergence insufficiency. Fractional anisotropy (FA) maps were generated as a measure of white matter integrity and analyzed with tract-based statistics regression analysis using a general linear model. DTI abnormalities were correlated with symptom severity, neurocognitive test scores and time to recovery.

Dr. Alhilali and colleagues found that patients with vestibular symptoms had decreased neurocognitive test scores and FA values in the cerebellum and fusiform gyri. Patients suffering from convergence insufficiency also exhibited diminished neurocognitive test scores with FA values in the right anterior thalamic radiation and right geniculate nucleus optic tracks.

Previously no specific brain regions had been linked to the prognosis of patients with vestibulopathy. “Clinical tests rely on patient cooperation and can very easily be undermined. There has not been a lot of success accurately predicting outcomes in these patients,” Dr. Alhilali said.

Physicians currently view all patients with concussions as a whole, Dr. Alhilali said, and don’t consider differences that could occur between them as individuals. Focusing on the differences between patients could lead to more accurately prescribed treatments.

“For instance, our results show that you can detect specific injuries in patients with specific symptoms, indicating that perhaps an objective, measurable injury can be quantified that will improve the diagnosis,” Dr. Alhilali added.

“The more we tease out what’s different, the more we will find out about the actual pathophysiology and the better we will be able to treat individual patients,” she said.

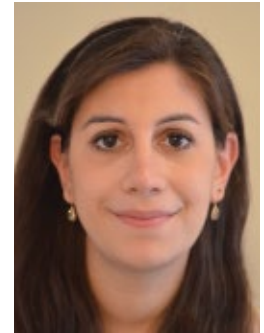
## Hypercarbia Challenge May Show Abnormal Brain Physiology in Concussed Athletes

Increased cerebrovascular reactivity (CVR) in college athletes following a sports-related concussion may be related to recurring headache symptoms and could be an indicator of acute injury, according to a separate study presented at RSNA 2014 by Adam R. Militana, M.D., and colleagues.

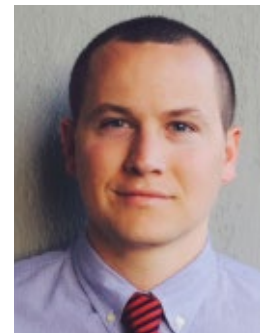
“We hope that the ability to image pathophysiology following concussion will one day inform clinical decision making,” said Dr. Militana, a third-year resident at Vanderbilt University School of Medicine.

Researchers studied four male and three female athletes (ages 18-22) three to six days following sports-related concussions diagnosed by a sports medicine physician. They had no history of prior concussion and only one noted a prior migraine condition.

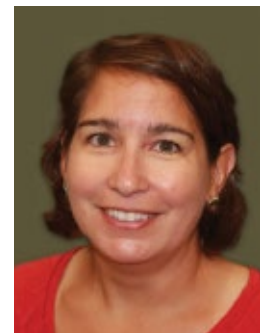
Using functional MRI with a hypercarbia challenge—increased levels of carbon dioxide closely simulate the physiologic challenge that an athlete will encounter during physical activity—researchers found CVR increased approximately 33 percent across all regions of interest in the concussed athletes, compared with control patients.



Alhilali



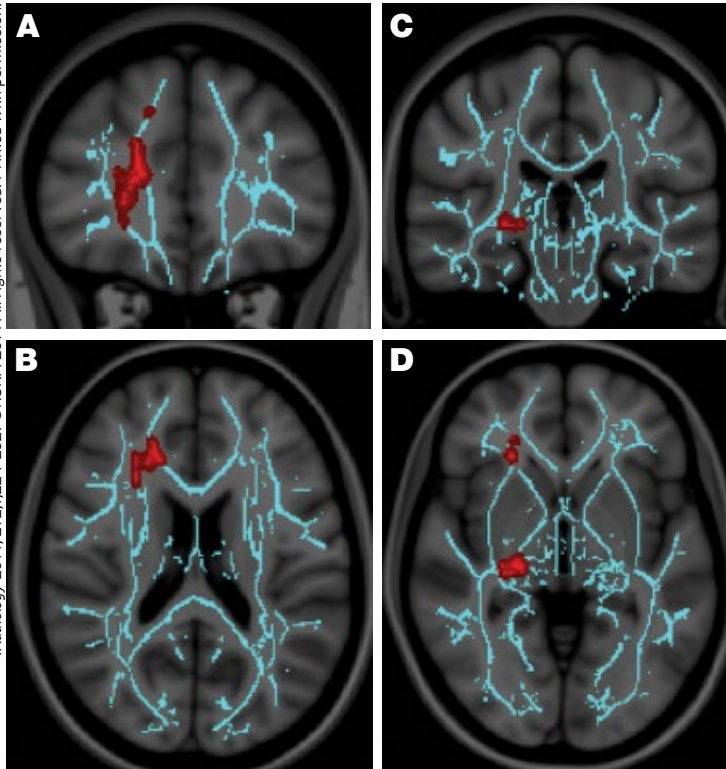
Militana



Morgan

*“Ideally, I’d like to see radiology used not only as a diagnostic tool in the evaluation of concussions, but also as a prognostic tool.”*

LEA M. ALHILALI, M.D.



Recent research in *Radiology* suggests a role for diffusion tensor imaging (DTI) in mild traumatic brain injury (mTBI) diagnosis, with a quantitative biomarker to aid in that diagnosis. *Left:* Convergence insufficiency correlates with increased FA in right anterior thalamic radiation, which is central to processing speed, and right geniculate nucleus optic radiations, the major relay station for the accommodation circuit central to oculomotor convergence. Asymmetric involvement of the right is not unexpected, as the corresponding left visual field is dominant for spatial processing as compared with the right visual field, which is dominant for nonspatial and/or temporal processing. Images derived from TBSS results and rendered on T1-weighted images from Montreal Neurologic Institute atlas show that significant white matter differences in patients with mild TBI and convergence insufficiency involve right anterior thalamic radiation, as shown in (a) coronal and (b) axial planes, and right geniculate nucleus optic radiations; as shown in (c) coronal and (d) axial planes. Significant voxels ( $P < .05$ , corrected for multiple comparisons) were thickened by using TBSS fill function into local tracts (red) and overlaid on white matter skeleton (blue).

CVR increase was associated with more recent injury and in one region was also associated with increased headache symptoms.

“Some regions were more elevated than others, but all were increased much more than the controls,” Dr. Militana said. “This is unusual in CVR work.”

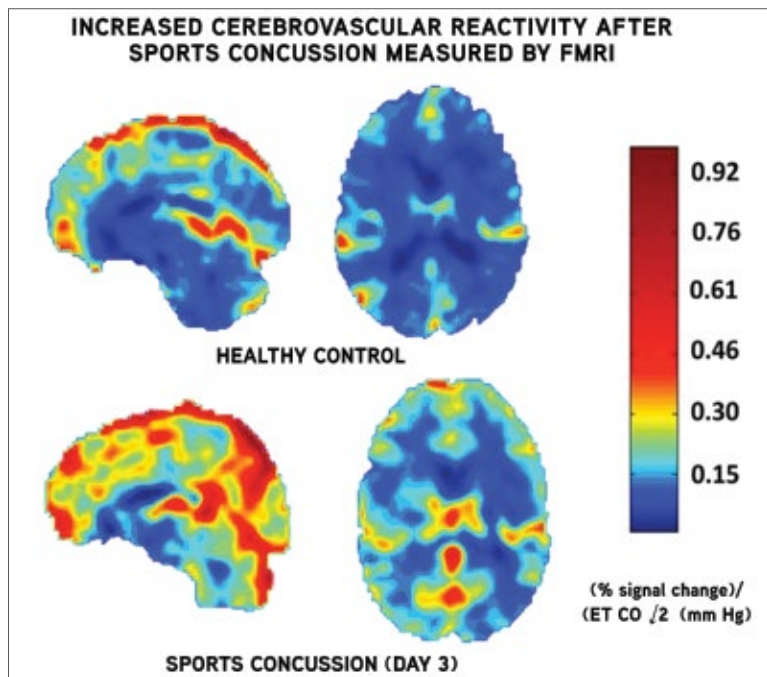
Increased CVR may be an objective measure that could be a future role for imaging in assessing return-to-play symptoms after concussion, Dr. Militana said.

“The relationship between symptoms and CVR is an area to explore as we design studies to investigate the physiological mechanism behind concussion symptoms at rest and during physical exertion,” added lead investigator Victoria L. Morgan, Ph.D., associate professor of radiology at the Vanderbilt University Institute of Imaging Science.

The research could ultimately affect patients in two ways, including assessment of the small percentage of patients who have persistent concussion symptoms well beyond impact, Dr. Morgan said.

“Moreover, if longitudinal studies can determine the typical time frame at which CVR can be expected to return to normal levels and whether this correlates with resolution of symptoms, then we will know whether symptom resolution is an accurate indicator of brain recovery,” Dr. Morgan added. □

PAUL LaTOUR is an *RSNA News* staff writer.



In research presented at RSNA 2014, authors demonstrated that cerebrovascular reactivity (CVR) measured by functional MRI (fMRI) was increased in the first few days after sports concussion compared to healthy, age-matched control subjects. Parametric maps where voxel intensity is equal to CVR measured as percent fMRI signal change per end-tidal CO<sub>2</sub> expired were computed for each subject. Sagittal and axial views of the parametric maps of two subjects are shown: (top) a healthy control subject, and (bottom) a concussed athlete.

# Brain Imaging Improves Understanding of Cigarette Addiction

BY RICHARD S. DARGAN

*New studies using advanced imaging have shown how the brains of men and women respond differently to cigarette smoking and why some former smokers are more likely to relapse. The results suggest a role for imaging in helping develop personalized therapies for people addicted to smoking, researchers said.*

DESPITE A RECENT DECLINE in the smoking rate, tobacco use remains the single largest preventable cause of death and disease in the U.S., according to the Centers for Disease Control and Prevention. Cigarette smoking kills more than 480,000 Americans each year, and smoking-related illness in the U.S. costs more than \$289 billion annually. In 2012, the most recent year for which statistics were available, an estimated 42.1 million U.S. adults were current cigarette smokers.

Smoking elicits brief bursts of dopamine, a neurotransmitter that plays a major role in addiction and is difficult to measure with standard imaging models, according to Evan D. Morris, Ph.D., an associate professor of diagnostic radiology, biomedical engineering and psychiatry at the Yale School of Medicine in New Haven, Conn., and senior author of the study published in the Dec. 10, 2014, online issue of the *Journal of Neuroscience*.

"Most techniques have been designed to look for a long-lasting, almost constant effect," Dr. Morris said. "Clearly, what happens in smoking is brief and a new technique is needed to observe that activity."

Working with his Yale colleague Kelly Cosgrove, Ph.D., associate professor of psychiatry, diagnostic radiology and neurobiology, Dr. Morris developed a technique that captures PET images once every three minutes and combines them in a kind of movie that shows the patterns of dopamine activation in the brain over time.

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*"The PET 'movie' is a signature of addiction."*

EVAN D. MORRIS, PH.D.

observational studies, women and men report that they smoke for different reasons.

"Men are more sensitive to the nicotine level, while women tend to smoke out of habit and for mood stabilization and social reasons," Dr. Morris said. "It stands to reason that their brains are doing something different."

The subjects smoked cigarettes in the PET machine to capture what Dr. Morris called "quasi-naturalistic behavior." "It was important to have the subjects smoking in the scanner, smoking their own brand of cigarette and smoking at their own pace," he

Yale researchers used the technique to examine the brains of eight male and eight female nicotine-dependent smokers. In

said. "In this case, we wanted to capture the behavior that was addictive to each individual."

## Study Reports Gender Differences

Once the subjects began smoking, stark differences emerged between the men and women. Smoking-induced dopamine activation occurred faster in the men and was most noticeable in an area of the brain called the right ventral striatum.

"The right ventral striatum is believed to be specifically involved in drug reinforcement and explains why people want to seek more drugs, distinct of other aspects of addiction like sight and smell," Dr. Morris said.

A similarly rapid dopamine response was found only in women in a part of the dorsal striatum, a brain region important for habit formation. The findings provide paths for developing and testing gender-sensitive medications and other approaches for quitting smoking, Dr. Morris said.

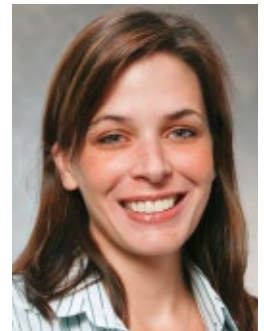
"If our hypothesis pans out, then dopamine movies may help explain why nicotine-replacement therapies, such as nicotine patches, appear to be more effective for male smokers than for females," he said.

The researchers hope to validate the results in a larger group of patients and also use the technique to study the effects of medications on individuals. "The PET 'movie' is a signature of addiction," Dr. Morris said. "We might be able to use it study the effects of medications, and see how the movie changes when people use medications that enable them to stop smoking."

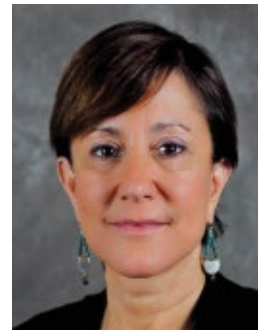
Because the technique is ideally suited to study drugs that cause a brief response, it could have applications beyond smoking, Dr. Morris added.



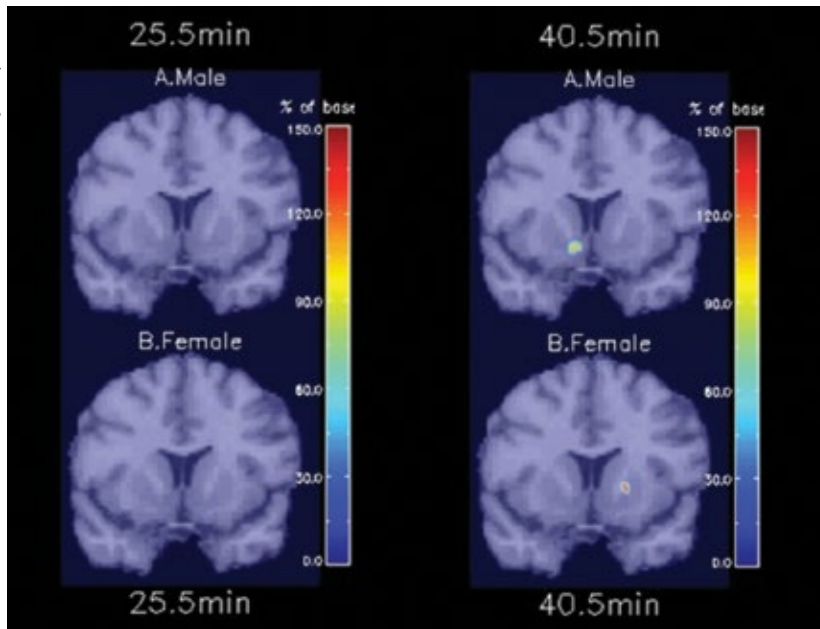
Morris



Cosgrove



Lerman



**New research from Yale University shows that men and women respond to cigarettes differently, demonstrating that smoking-induced dopamine activation occurs in a different brain region and much faster in nicotine-dependent men than women. *Left:* The same four contiguous brain slices are shown for the male and the female. The dopamine level that changes over time is color-coded to represent the percentage elevation above the baseline level (prior to smoking). Researchers detected a prominent activation in the male in the right ventral striatum which is absent in the female.**

### fMRI Sheds Light on Brief Smoking Abstinence

Advanced imaging also played a central role in a recent study of smoking from the Perelman School of Medicine at the University of Pennsylvania in Philadelphia. The study, published in the January 7 online edition of *Neuropsychopharmacology*, explored the effects of brief abstinence from smoking on the brains of 80 smokers seeking treatment. Participants reported smoking more than 10 cigarettes a day for more than six months.

The researchers performed functional MRI (fMRI) immediately after a subject smoked and another 24 hours after abstinence began. They measured changes in the blood oxygen level-dependent (BOLD) signal, an MRI measure of regional differences in blood flow, from various areas of interest in the brain.

The participants set a future target quit date after receiving smoking cessation counseling. Seven days after the target quit date participants underwent a follow-up visit that included a smoking behavior assessment and a urine test.

Of 80 subjects, 61 relapsed and 19 quit successfully. The fMRI images showed that relapse was associated with abstinence-induced decreases in left dorsolateral prefrontal cortex (DLPFC) activation.

“Increased DLPFC activity is important for attentional focus, goal-directed behavior and problem solving,” said Caryn Lerman, Ph.D., a professor of psychiatry and director of the university’s

Center for Interdisciplinary Research on Nicotine Addiction.

“Therefore, less activity in DLPFC reduces these cognitive operations, making relapse more likely.”

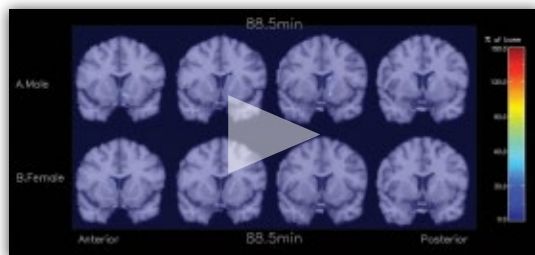
People in the relapse group also had reduced suppression of activation in the posterior cingulate cortex (PCC), a central part of the brain’s default mode network, which is active when a person is not focused on a specific task.

“PCC is part of the default mode network and is activated in response to task-irrelevant thoughts, so reduced suppression of activity in PCC would lead to relapse,” Dr. Lerman said.

As a prognostic marker for early smoking relapse, the combination of abstinence-induced decreases in left DLPFC activation and reduced suppression of PCC may represent an improvement over today’s clinical or behavioral tools, Dr. Lerman said. Examinations of this brain activity also could lead to improved personalized intervention strategies for smokers.

“These results help us to understand where to target new interventions designed for neuromodulation; that is, interventions like cognitive exercise training or brain stimulation that can alter regional brain activity,” Dr. Lerman said. □

**RICHARD S. DARGAN** is writer based in Albuquerque, N.M., specializing in healthcare issues.



### WEB EXTRAS

■ Evan D. Morris, Ph.D., and colleagues developed a technique that captures PET images once every three minutes and combines them in a kind of movie that shows the patterns of dopamine activation in the brain over time. Go to [RSNA.org/News](http://RSNA.org/News) to view a dopamine movie (*left*) of one male smoker and one female smoker who both started smoking 45 minutes into the scan.

- Access an abstract of research by Dr. Morris and colleagues at [jneurosci.org](http://jneurosci.org).
- Access an abstract of research by Caryn Lerman, Ph.D., and colleagues at [nature.com/npp](http://nature.com/npp).

# Technology Makes Radiology Reports Easier to Create While Increasing Value

BY MIKE BASSETT

**Technological advancements are making it ever easier for radiologists to create high-quality, value-added reports without sacrificing efficiency.**

“THESE DAYS, RADIOLOGY REPORTS must be many things—evidence-based, compliant and accurate, as well as clear, concise, consistent, safe and timely,” said V. Anik Sahni, M.D., associate director of Abdominal Imaging and Intervention and director of Abdominal and Pelvic MRI in the Department of Radiology at Brigham and Women’s Hospital, Boston. Dr. Sahni is also one of the department’s Quality and Patient Safety officers. Dr. Sahni presented “Improving Value of Radiology Reports” at RSNA 2014.

“At Brigham and Women’s, we try to define the features of a high-quality report, then we use IT tools to enable changes and use metrics to try to measure the success of those changes,” Dr. Sahni said.

For example, to improve safety and critical results reporting, personnel at Brigham and Women’s developed a system called Alert Notification of Critical Results, or ANCR.

Integrated with the radiology department’s PACS, the system allows a radiologist to alert a referring physician on a timely basis that an imaging study contains new or unexpected findings which could result in mortality or significant morbidity.

When it comes to improving timeliness, integrating speech recognition software has yielded reports that are signed off well within radiology department guidelines, Dr. Sahni said. “In fact, it’s been progressively faster, to the point where it is difficult to make improvements,” he said.

Also during RSNA 2014, Gelareh Sadigh, M.D., a radiology resident at Emory University in Atlanta, and colleagues presented research demonstrating that multimedia reports—those with hyperlinks, graphs, data, key images and relevant comparison images—offer referring physicians more detail, which drives physician satisfaction and referral probability.

## Radiology Embraces RSNA Structured Reporting Templates

To achieve high quality reports, more and more radiology departments have adopted structured reporting, Dr. Sahni said.

In 2008, RSNA launched its Reporting Initiative to improve reporting practices by creating a library of clear and consistent reporting templates. “The initiative was not intended as a stan-

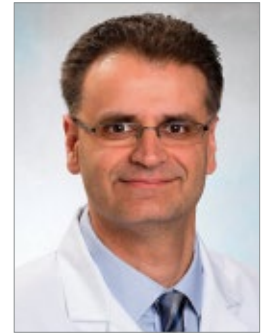
dard, but was intended to provide best practice examples of how we can use structured reporting to improve communication of information for better patient care,” said Charles E. Kahn, M.D., M.S., vice-chair of radiology at the University of Pennsylvania and chair of RSNA’s Structured Reporting Subcommittee.

Since RSNA created the library at *RadReport.org*, the number of templates has grown to nearly 300. Templates have been viewed or downloaded 1.8 million times, Dr. Kahn said. “It’s been quite remarkable to see the level of interest in this topic,” he said. “Over the past year, 18 radiology publications have published literature that focuses in some way on structured reporting, and almost all identified benefits.”

Those benefits extend to both radiologists and reporting physicians. For instance, Dr. Kahn worked with a pancreatic biliary surgeon and radiology colleagues at the Medical College of Wisconsin to develop a reporting template that captured all necessary features in the exquisite detail required to make an assessment whether a patient with pancreatic cancer was a surgical candidate.

“Structured reporting enumerates features radiologists might not otherwise have remarked upon,” Dr. Kahn said. “And a structured report ensures that those features appear in a consistent order or place and that the vocabulary is used in a way that is understood by everyone.”

For example, structured reporting can aid the radiologist after a pancreatic cancer patient’s initial CT scan, as well as when the patient has undergone chemotherapy and radiation before surgery. “After that, it becomes very easy to run through a checklist of findings and generate a new report that corresponds to the order in which findings appeared in the prior report,” Dr.



Sahni

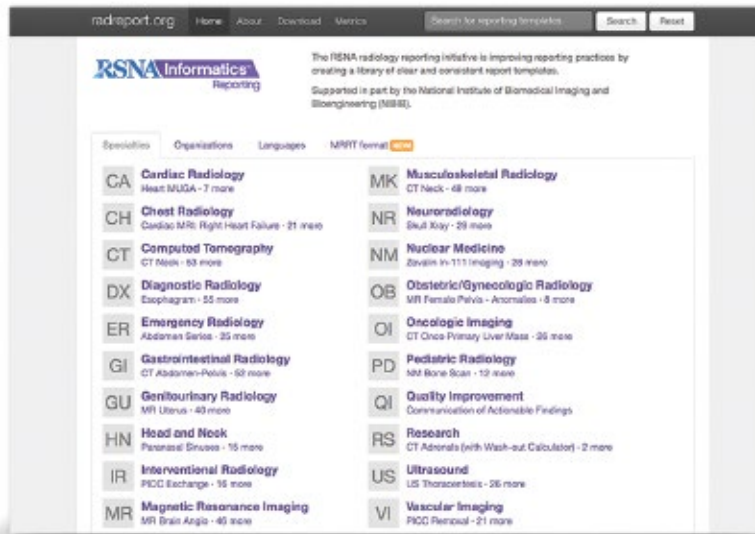


Kahn



*“A key goal of structured reporting is to help radiologists enter reports in a consistent fashion that doesn’t prove detrimental to their radiologist’s workflow.”*

CHARLES E. KAHN, M.D., M.S.



Since it was created in 2008, the number of templates in RSNA's reporting initiative has grown to nearly 300 covering a wide range of specialties. The templates have been viewed or downloaded 1.8 million times since the initiative was launched.

Kahn said. "Then we can make a reasoned comparison to see whether the patient is a suitable candidate for surgery."

### Research Underscores Value of Structured Reporting

At Brigham and Women's, Dr. Sahni and his colleagues recently investigated how structured reporting affects report quality in rectal cancer staging. "Rectal cancer studies are fairly complex," Dr. Sahni noted, "and surgeons require specific information to make management decisions."

After establishing the parameters they considered necessary for an optimal or satisfactory report, Dr. Sahni and colleagues compared the quality of radiology reports in the 12 months prior to the implementation of structured reporting and the 12 months following.

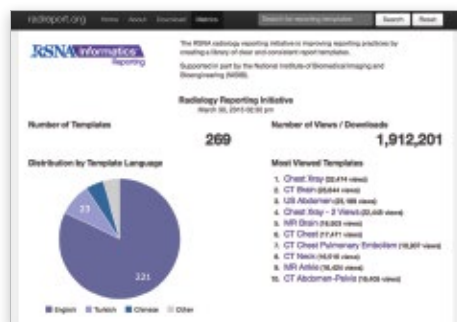
Results indicated that about 38 percent of rectal cancer staging reports were optimal or satisfactory before structured reports were implemented. That percentage almost doubled, to 70 percent, once structured reports were introduced.

"Including these structured reporting fields does prompt radiologists to document necessary, discrete data elements in reports," Dr. Sahni said. Study results are to be published in an upcoming issue of the *American Journal of Roentgenology*.

Structured reports also offer the advantage of being more readily searchable for data mining. "We can capture information and store it in the electronic health record in a form that's structured," Dr. Kahn said. "Not as strings of text, but in a way that allows radiologists, other physicians and health services researchers to extract information in a useful way."

Producing quality reports, however, shouldn't come at the cost of efficiency, Dr. Kahn said. "A key goal of structured reporting is to help radiologists enter reports in a consistent fashion that doesn't prove detrimental to their workflow." □

MIKE BASSETT is a writer based in Holliston, Mass., specializing in health and medicine.



## Explore RSNA's Radiology Reporting Website

The RSNA radiology reporting initiative—supported in part by the National Institute of Biomedical Imaging and Bioengineering (NIBIB)—is improving reporting practices by creating a free library of clear and consistent report templates. Access the reporting library at [RadReport.org](http://RadReport.org) and take a tour of the site at [RadReport.org/tour](http://RadReport.org/tour).

## ESR JOINS RSNA STRUCTURED REPORTING INITIATIVE

The European Society of Radiology (ESR) is collaborating with RSNA on the Structured Reporting Initiative (*RadReport.org*) to establish and promote development and maintenance of a library of templates for structured radiology reports. ESR gave attendees of the March 2015 European Congress of Radiology an update on the collaboration.

RSNA and ESR signed a Memorandum of Understanding in 2014 to formalize the collaboration and created a joint Template Library Advisory Panel, charged with working under the RSNA Structured Reporting Subcommittee of the Radiology Informatics Committee to develop and maintain the library of templates.

"I'm very pleased that the ESR has joined RSNA in this initiative," said Charles E. Kahn, M.D., M.S., chair of RSNA's Structured Reporting Subcommittee. "From the beginning, the RSNA template library included the ability to incorporate templates in any language, and our collaboration with ESR offers the opportunity to see our templates translated into a variety of European languages."

# New MITA Standard Ensures Optimal Radiation Dose, Prevents Medicare Cuts

BY MARY HENDERSON

*Beginning January 1, 2016, the nation's healthcare providers will be required to ensure their CT scanners comply with a new radiation dose optimization standard—the XR-29/MITA Smart Dose—in order to avoid a cut in Medicare reimbursement for certain CT scanners.*

XR-29 IS A GROUNDBREAKING new standard published by the National Electrical Manufacturers Association (NEMA) and its Medical Imaging & Technology Alliance (MITA) division, the collective voice of medical imaging equipment, radiation therapy and radiopharmaceutical manufacturers, innovators and product developers. To develop the new standard, MITA's CT Group worked with stakeholders, including physicians, radiologic technologists and physicists.

"We received a lot of help and great advice in developing these standards and policies," said Gail Rodriguez, MITA Executive Director. "It's gratifying to see the traction these standards are getting and that regulatory and accrediting bodies are behind the standard."

The new standard is integral to MITA's ongoing effort to enhance patient safety through increased dose optimization and transparency.

"MITA is a standards developing organization and safety standards are really important to us," Rodriguez said. "An important extension of our work is to drive adoption of these standards. Working with the American Association of Physicists in Medicine, the U.S. Food and Drug Administration, Image Wisely and Image Gently, we are trying as a community to help providers manage and reduce radiation dose."

Congress incorporated the new CT safety standard into the Protecting Access to Medicare Act (the sustainable growth rate [SGR] Patch) signed into law in 2014. Beginning in 2016, diagnostic



Rodriguez



Rao

CT studies performed on machines not compliant with XR-29 will receive a 5 percent reduction in reimbursement. In 2017, the reduction for non-compliant CT will increase to 15 percent. The law covers diagnostic CT performed in hospital outpatient departments and freestanding imaging centers, but does not apply to inpatient settings.

Vijay M. Rao, M.D., chair of RSNA's Corporate Relations Committee and a member of the RSNA Board of Directors, applauds the efforts of NEMA and MITA

in developing the standards that she says are critical to patient safety.

"The XR-29 standard helps ensure that patients are imaged using optimal radiation dose and that dose is being tracked and reported in a standardized manner," said Dr. Rao, the David C. Levin Professor and Chair of Radiology at Jefferson Medical College of Thomas Jefferson University, Phil-

*"The XR-29 standard helps ensure that patients are imaged using optimal radiation dose and that dose is being tracked and reported in a standardized manner."*

VIJAY M. RAO, M.D.







Healthcare providers must ensure their CT scanners comply with a new radiation dose optimization standard—the XR-29/ MITA Smart Dose—to avoid a 5 percent cut in Medicare reimbursement for certain CT scanners starting January 1, 2016. Reference protocols and automatic exposure controls are among the features incorporated into the scanners, facilitating quality imaging at an optimized dose for each patient.

adelphia. “A number of features such as reference protocols and automatic exposure control are being incorporated into the scanners, facilitating quality imaging at an optimized dose for each patient.”

### Understanding XR-29 Compliance

With Medicare’s differential payment policy just months from taking effect, providers are beginning to reach out to MITA and medical device vendors for direction.

“We’re getting several questions a week from radiologists who want to understand the standard itself or the law,” Rodriguez said.

XR-29 includes two previously published standards, DICOM Radiation Dose Structured Reporting (RDSR) and XR-25 CT Dose Check, along with the two newer CT features: Reference Protocols and Automatic Exposure Control (AEC):

- DICOM Radiation Dose Structured Reporting enables post-exam dose information to be recorded in a standardized, interoperable report that is added to the patient’s medical record and can be used by the provider in dose management and quality assurance efforts.
- Prior to a scan, CT Dose Check technology informs the CT operator when equipment settings would likely exceed dose threshold levels established by the provider.
- Pediatric and Reference Protocols are pre-loaded on a CT system to provide operators with pre-determined parameters for a variety of clinical tasks.

- Automatic Exposure Control is a CT equipment feature that modulates patient dose in real time, automatically adjusting radiation based on a patient’s size, shape and composition to achieve a specified level of image quality.

### Becoming Smart Dose Compliant

According to Rodriguez, most CT equipment now on the market is XR-29/MITA Smart Dose compliant. About 65 percent of the installed CT scanners are compliant or can achieve compliance through an upgrade, according to NEMA. Approximately one-third of existing CT scanners are non-compliant and unable to be upgraded.

To determine whether a CT scanner is XR-29 compliant, Rodriguez said providers should contact the manufacturer.

“Companies are working hard to do everything they can to get all upgradeable CT scanners up to standard,” she said.

In the meantime, MITA is looking at the next technologies to add to XR-29, which was designed as a basic standard. “This isn’t the end of the road,” Rodriguez said. “There are other CT technologies coming down the pike that will have an impact on radiation dose.” □

**MARY HENDERSON** is a writer based in Bloomington, Ind., specializing in health and medicine

### WEB EXTRAS

For more information on the MITA Smart Dose standard, go to [medicalimaging.org](http://medicalimaging.org).

To access a summary of the Protecting Access to Medicare Act of 2014 (H.R.4302), go to [Congress.gov](http://Congress.gov).

Access Image Wisely at [Imagewisely.org](http://Imagewisely.org).



Access Image Gently at [Imagegently.org](http://Imagegently.org).



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*Educational Simulation Technology Promotes Safe, Efficient Use of CT*



**Anders Persson, M.D., Ph.D. (left) and far right with colleagues in the CMIV theater.**

With a Derek Harwood-Nash Education Scholar Grant funded by the RSNA R&E Foundation, **Anders Persson, M.D., Ph.D.**, launched the educational project, “RadSim: Simulation Based Training Program for CT Protocol, Iterative Reconstruction and Dual Energy Applications.”

“We propose to develop, verify, and employ a novel educational simulation technology, RadSim, to document baseline understanding of CT scanning parameters, to undertake simulation based training exercise and assess post-simulation knowledge assessment for radiology personnel in CT protocols, iterative reconstruction and dual energy CT applications,” said Dr. Persson, a professor, director and senior physician at Linköping University, Sweden, and an associate professor, director, at the university’s Center for Medical Science and Visualization (CMIV). “We strongly believe that Rad-Sim will provide ‘real-life’ scanning experience and training opportunity to promote safe and efficient use of CT technology.”

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**INVEST**



The RSNA R&E Foundation provides the research and development that keeps radiology in the forefront of medicine. Support your future—donate today at [RSNA.org/Donate](https://www.rsna.org/Donate).

## Residents & Fellows Corner

### Don't Miss Out: Keep Your RSNA Profile Up-to-Date

Residents and fellows who will be moving to a new position in the coming months are encouraged to update their contact information with RSNA.

Log in at [myRSNA.org](http://myRSNA.org) and click Account Tools in the left-hand sidebar to update your personal information. Having current street and personal email addresses on file with RSNA means you will continue to receive:

- Subscriptions to *Radiology*, *RadioGraphics* and *RSNA News*
- Special membership rates for members transitioning from residency or fellowship to practice
- E-mail news bulletins, including RSNA Insider and RSNA Weekly
- Annual meeting announcements

RSNA members transitioning to practice after residency or fellowship pay just \$100 their first year and \$200 their second year. Full dues are not required until the third year. If you have questions or wish to update your information by phone, call 1-877-RSNA-MEM (776-2636) or 1-630-571-7873 (outside the U.S. or Canada).



## Value of Membership



### Receive Free Registration to World's Premier Medical Meeting

An RSNA membership entitles members to free advance registration for 2015—a \$900 value—as well as early hotel reservations and free self-assessment module (SAM) credits.

Register by Nov. 6 to receive a discounted registration fee and full conference materials mailed in advance. International members must register by Oct. 16 to receive these materials in advance. After Nov. 6, registration will be processed at the increased fee and conference materials must be picked up at McCormick Place.

Not an RSNA member? Join the RSNA community and attend the most important medical meeting in the world—for free. Apply or renew at [RSNA.org/Membership](http://RSNA.org/Membership). For more information, contact [membership@rsna.org](mailto:membership@rsna.org) or 1-877-RSNA-MEM (1-877-776-2636) or 1-630-571-7873 outside the U.S. and Canada.

## RSNA Staff Retirements

Earlier this year, RSNA said goodbye to two employees who saw the RSNA journals *Radiology* and *RadioGraphics* through many significant changes during their combined 57 years of service to the Society.

### Roberta E. Arnold, M.A., M.H.P.E., 30 years



Arnold

Arnold was hired in August 1984 to establish the RSNA Publications Department. Beginning with professional copyediting and production work, the department grew to encompass the business aspects of journal publishing. In 1990 she assumed the role of director of publications and since 1994 has served as assistant executive director of publications and communications.

Arnold served under five executive directors and worked closely with four editors of *Radiology* and three editors of *RadioGraphics*, overseeing rapid growth in not only the number of pages and topics covered in each issue of the print journals, but also expansion to online and eventually mobile versions.

Always innovative, RSNA has experimented with a variety of communications and publications media. Arnold's part in these initiatives included overseeing production of RSNA Today Video, the Society's video news magazine, and RSNA EJ, the Society's online-only journal—later supplanted by the online versions of *Radiology* and *RadioGraphics*. Arnold would go on to establish RSNA Link in 1994, the Society's first website and precursor to *RSNA.org*, and to help RSNA build a comprehensive communications program addressing members, patients and fellow physicians. In 1991, she helped President Carl J. Zylak, M.D., begin publishing *RSNA News*; in 2000 she worked with committees and staff of

RSNA and the American College of Radiology to launch *RadiologyInfo.org*, a patient information website now attracting more than 7.2 million visitors a year.

Having transitioned RSNA's media relations program from an outside vendor to an RSNA staff function, Arnold has overseen the media relations team, which promotes research findings from *Radiology* to the trade and mainstream press and also organizes coverage of the RSNA annual meeting by hundreds of journalists. In addition, she has served as an RSNA liaison to numerous public information collaborations with other societies, including Image Wisely.

"Roberta Arnold has been synonymous with RSNA publications for over 30 years," said Jeffrey S. Klein, M.D., editor of *RadioGraphics*. "She has provided incredible support to me during my four years with the journal. Her vision, wisdom, knowledge of all things related to scholarly publishing, her dedication to this society and her exceedingly high standards will serve as an inspiration to all of us at *RadioGraphics* for many years to come."

"It has been a pleasure working with Roberta this past seven years," said *Radiology* Editor Herbert Y. Kressel, M.D. "I have benefitted from her wisdom and insight into the worlds of communications and scholarly publication. She is the ultimate professional and has been a valuable resource to many. Indeed the RSNA, and all of radiology, owe a great debt to Roberta in developing and providing communications vehicles for this burgeoning field and ensuring that these were of the highest quality."

*"Roberta is the ultimate professional and has been a valuable resource to many. Indeed the RSNA, and all of radiology, owe a great debt to Roberta in developing and providing communications vehicles for this burgeoning field and ensuring that these were of the highest quality."*

HERBERT Y. KRESSEL, M.D.

### Kathy Rosewell, 27 years

Kathy Rosewell began working for RSNA as a production assistant in April 1987. Soon she was focusing her attention primarily on preparing images for the journals, which led to the position of production assistant: imaging services in July 2001 and a promotion to senior production assistant: imaging management in March 2002.

Rosewell's work to optimize the reproduction of images submitted by article authors was particularly critical to the success of journals intended to showcase the latest in radiologic science and education. Rosewell was known not only for her ability to keep up with the latest in file formats and image processing software but also for her eye for detail, paired with an easygoing nature. As the RSNA journals evolved from being print-only to offering robust digital versions during her tenure, Rosewell gladly shared her experience with her fellow staff and several journal editors, as well as numerous recipients of journal fellowships.

"As a proofreader, Kathy demonstrated a very keen eye for detail, which led us to try her skills on radiologic images," said Roberta E. Arnold, M.A., M.H.P.E., who recently retired after 30 years with RSNA (see above) and oversaw Rosewell's work as part of the publications team. "She did a splendid job and expanded her responsibilities to constructing image arrays, for which RSNA journals are noted. In addition, she won the trust of the editors and authors and helped build the RSNA journals' reputation for high quality."



Rosewell

## Journal Highlights

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

### Radiology Preparedness in Ebola Virus Disease: Guidelines and Challenges for Disinfection of Medical Imaging Equipment for the Protection of Staff and Patients

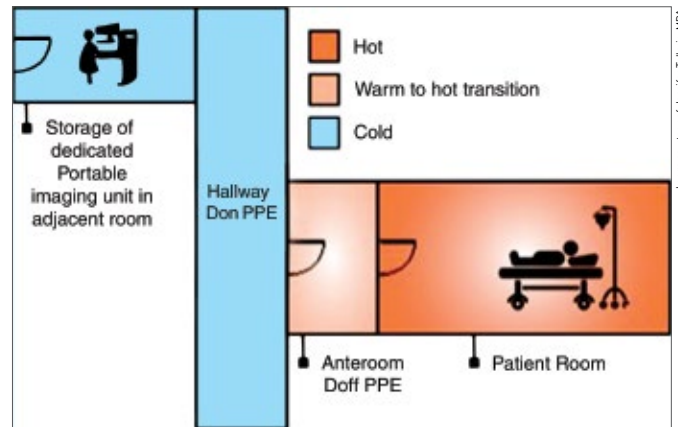
In preparing for Ebola virus disease (EVD), radiology departments at U.S healthcare institutions should consider policies for and approaches to decontamination of expensive and potentially easily damaged radiology equipment.

According to a Special Report in the May issue of *Radiology* ([RSNA.org/Radiology](http://RSNA.org/Radiology)), Daniel J. Mollura, M.D., of the Center for Infectious Disease Imaging, and colleagues identify training staff and ensuring that appropriate facilities, policies and equipment are in place as key components of preparedness. Medical imaging does not provide diagnosis of EVD but may serve to help triage patients and assess complications of the disease.

The overlap of early EVD symptoms (for example, fever, abdominal pain, diarrhea, emesis and fatigue) with symptoms of other more common travel-related diseases (such as malaria, typhoid fever, pneumonia and meningococemia) could result in delayed diagnosis of EVD before isolation of infected patients. Therefore, radiology departments should consider policies and approaches to decontamination of expensive and potentially easily damaged radiology equipment with complex and sometimes exposed circuits and electronics.

"With a comprehensive approach to radiology preparedness, medical imaging can effectively join the battle against the current and future outbreaks of EVD," the authors write.

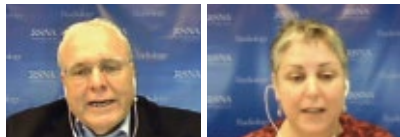
**Radiology**



**Definition of hot, warm, and cold zones for isolation units.** Floor plan includes a "hot room," where the infected patient is located, a "cold area," where no personal protective equipment (PPE) is needed, and a "warm" anteroom that separates the hot and cold areas, where lower-level PPE is needed. Two doors in these compartments are never open at the same time as a means of sealing off the hot room from the cold area.

(*Radiology* 2015;275:2;InPress) ©RSNA 2015 All rights reserved. Printed with permission.

This article meets the criteria for *AMA PRA Category 1 Credit*.  
SA-CME is available online only.



**Radiology**  
EXTRA  
PODCASTS

Listen to *Radiology* Editor Herbert Y. Kressel, M.D., deputy editors and authors discuss the following articles in the March issue of *Radiology* at [RSNA.org/Radiology-Podcasts](http://RSNA.org/Radiology-Podcasts).

- ▶ "Comparative Effectiveness of Combined Digital Mammography and Tomosynthesis Screening for Women with Dense Breasts," Christoph I. Lee, M.D., and colleagues.
- ▶ "Reporting Diagnostic Accuracy Studies: Some Improvements after 10 Years of STARD," Daniël A. Korevaar, M.D., and colleagues.

## "Golden Oldies" Spotlighted in May *Radiology* Issue

As part of the RSNA Centennial celebration, *Radiology* is featuring 15 articles each month based on their significance to the advancement in the field of radiology in a special supplement, "Golden Oldies." The May issue spotlights advancements in ultrasound, obstetrics and pediatrics, including:

- "Nephrosonography: Ultrasound differentiation of renal masses," 1968
- "Normal maturation of the neonatal and infant brain: MR imaging at 1.5 T," 1988
- "Grey Scale Ultrasonography in the Diagnosis of Ectopic Pregnancy," 1978

The online-only articles will be available to RSNA members and *Radiology* subscribers. For more information, and to view a video of *Radiology* Editor Herbert Y. Kressel, M.D., and Senior Deputy Editor Deborah Levine, M.D., discussing the series, go to [RSNA.org/Golden-Oldies](http://RSNA.org/Golden-Oldies).

**Radiology**  
GOLDEN OLDIES

## MR Imaging–Transrectal US Fusion for Targeted Prostate Biopsies: Implications for Diagnosis and Clinical Management

MRI–transrectal ultrasonography (US) fusion biopsy of the prostate has the potential to increase detection of clinically significant prostate cancer and allow more reliable risk stratification in patients with known cancer while reducing detection of insignificant disease.

In an article in the May–June issue of *RadioGraphics* ([RSNA.org/RadioGraphics](http://RSNA.org/RadioGraphics)), Daniel N. Costa, M.D., of the University of Texas Southwestern Medical Center in Dallas, and colleagues state that MRI–transrectal US fusion combines the superior diagnostic accuracy of MRI for suspicious lesions in the prostate with the cost effectiveness and familiarity of transrectal US biopsy.

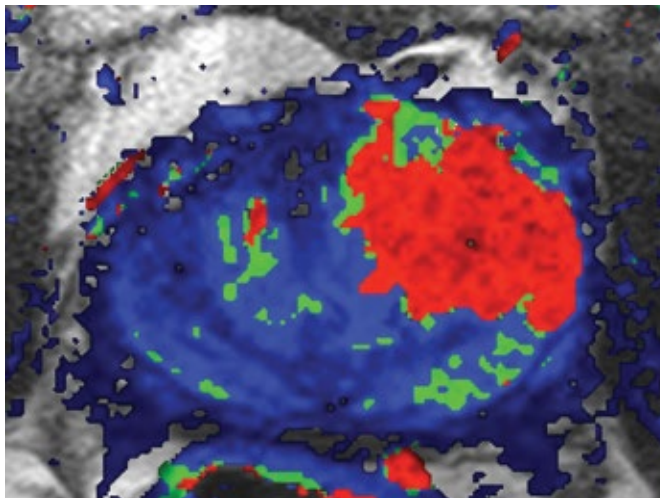
### RadioGraphics

The authors present data showing a benefit in patients with suspected cancer and previous negative biopsy, patients with known cancer before active surveillance, patients with known cancer with suspected disease progression during active surveillance and candidates for focal therapy.

The potential utility of MRI–transrectal US fusion biopsies depends on the quality of multiparametric MRI of the prostate. Therefore, optimization of MRI protocol, rigorous radiology training and report standardization (e.g., PI-RADS) are crucial for success.

“Also, the success of MR imaging–transrectal US fusion biopsy will depend on the criteria used to define targets at MR imaging, and benchmarks for sensitivity and specificity similar to what exist for breast cancer are still lacking,” the authors write.

This article meets the criteria for AMA PRA Category 1 Credit™. SA-CME is available online only.



**Prostate cancer in a 72-year-old man with elevated and increasing PSA level (most recently, 42.0 ng/mL) and three previous negative biopsies. Dynamic contrast-enhanced MR image shows a 3-cm anterior mass in the left midgland. The mass is ill-defined with early wash-in and late washout (red area), findings highly suspicious for malignancy.**

(*RadioGraphics* 2015;35;InPress) ©RSNA 2015 All rights reserved. Printed with permission.

## Nominate *Radiology* Articles for the 2015 Margulis Award

The Nominating Committee for the Margulis Award for Scientific Excellence is accepting nominations from readers for *Radiology* articles published between July 2014 and June 2015. The main selection criteria are scientific quality and originality. Please send your nomination, including the article citation and a brief note highlighting the reasons for the nomination, to Pamela Lepkowski, assistant to the editor, [plepkowski@rsna.org](mailto:plepkowski@rsna.org). The deadline for nominations is June 10, 2015.

## Radiology in Public Focus

### New on *RadiologyInfo.org*

Visit [RadiologyInfo.org](http://RadiologyInfo.org), the RSNA/American College of Radiology public information website, to read the latest content posted to the Ultrasound- and MRI-Guided Prostate Biopsy section.

- **Ultrasound- and MR-Guided Prostate Biopsy:**  
[RadiologyInfo.org/en/info.cfm?pg=prostate-biopsy](http://RadiologyInfo.org/en/info.cfm?pg=prostate-biopsy)

**RadiologyInfo.org**  
For patients

## MAY PUBLIC INFORMATION OUTREACH ACTIVITIES FOCUS ON STROKE AWARENESS MONTH

In recognition of American Stroke Month in May, RSNA is distributing public service announcements (PSAs) focusing on stroke imaging, interventional treatments for stroke and the importance of immediate stroke treatment.

## Education and Funding Opportunities

### Review the Essential Areas of Radiology

New this year, take home the Essentials of Radiology Collection on flash drive. Previously available only at the RSNA annual meeting, this popular broad-spectrum review is perfect for general radiologists, residents and subspecialists.

The collection consists of video presentations spanning nine subspecialties—breast, cardiac, chest, genitourinary, musculoskeletal, neuro, pediatric, postoperative gastrointestinal and ultrasound imaging—and also includes non-interpretive skills courses which provide a look at topics of general importance to radiologists.

Each presentation gives viewers an overview of the essentials of each area, with topics such as “Evaluation of Adult Congenital Heart Disease with CT,” “The Mediastinum: A Case-Based Approach,” “Pattern-based Approach to White

Matter Disease” and “Pediatric Ingested Foreign Objects: Recognition and Triage.”

Along with clinical and diagnostic essentials, users can also access content surrounding trending non-interpretive skills for radiologists such as “What Every Radiologist Needs to Know about Medicare” and “Quality—What It is and How to Improve It.”

Conveniently packaged on one flash drive, the Mac- and Windows-compatible collection features over 14 hours of review and is an ideal addition to a personal learning library. The fee is \$175 for members; \$250 for non-members. To view all content or to order, visit [RSNA.org/Essentials-Collection](http://RSNA.org/Essentials-Collection).



### RSNA/AUR/ARRS Introduction to Academic Radiology Program

**Applications due July 15, 2015** Sponsored by RSNA, the American Roentgen Ray Society (ARRS) and Association of University Radiologists (AUR), the Introduction to Academic Radiology program:

- Exposes second-year residents to academic radiology
- Demonstrates the importance of research in diagnostic radiology
- Illustrates the excitement of research careers
- Introduces residents to successful clinical radiology researchers

Successful applicants will be assigned to either a seminar held during the RSNA Scientific Assembly in Chicago, November 29–December 3, 2015, or the ARRS Scientific meeting in Los Angeles, April 17-22, 2016. More information and application/nomination forms are available at [RSNA.org/ITAR](http://RSNA.org/ITAR).



### RSNA CLINICAL TRIALS METHODOLOGY WORKSHOP

**January 8-15, 2016**  
Applications due **June 15, 2015**

Over the course of this 6 ½– day workshop, participants will learn how to develop protocols for the clinical evaluation of imaging modalities. Each trainee will be expected to develop a protocol for a clinical study, ready to include in an application for external funding.

Applicants should be junior faculty members engaged in clinical research in radiology, radiation oncology or nuclear medicine academic departments. Familiarity with basic concepts and techniques of statistics and study design is required. Applications will undergo a competitive selection process. Attendees will participate in group and individual learning, including preparative readings, didactic sessions, one-on-one mentoring, small group discussions, self-study and individual protocol development.

A dynamic and experienced faculty will cover topics including:

- Principles of clinical study design
- Statistical methods for imaging studies
- Design and conduct of multi-institutional studies
- Sponsorship and economics of imaging trials
- Regulatory processes

“The Clinical Trials Methodology Workshop is one of the best one-week experiences I have had in my entire medical training. It is well worth the time and effort to attend, and I would happily recommend it to all academicians (especially in radiology),” said Jalal Andre, M.D., of the University of Washington.

More information and application/nomination forms are available at [RSNA.org/CTMW](http://RSNA.org/CTMW). Direct questions to Rachel Nelson at 1-630-368-3742 or [rnelson@rsna.org](mailto:rnelson@rsna.org).



## Applicants Sought for RSNA Derek Harwood-Nash International Fellowship

Application deadline for 2016  
July 1, 2015

Without her experience as an RSNA Derek Harwood-Nash Fellowship recipient, Callen Onyambu,

M.B.Ch.B., would not have gained valuable advanced training in musculoskeletal (MSK) imaging—knowledge she now shares with students at the University of Nairobi in her native Kenya.

“Since coming back I have been able to set the protocols for MR imaging of the MSK system, an area that had been problematic before,” said Dr. Onyambu, a 2014 fellow at the University of Maryland Medical Center. “With knowledge gained from the fellowship, I am better able to guide our students through MSK imaging. I have also prepared a series of lectures that I will present in my department and at an upcoming international conference.”

The Derek Harwood-Nash Fellowship program supports international scholars pursuing a career in academic radiology to study at North American institutions. Accepted participants

will receive a stipend of up to \$10,000 from RSNA to be used toward travel, living expenses and educational materials for the six- to 12-week fellowship period.

Interested candidates must be promising international radiology scholars who have completed their radiology training, are embarking on a career in academic radiology (i.e., have held a faculty position for three to 10 years), and who demonstrate that their specific educational goals can be met most appropriately by a course of study in a North American institution.

“I would recommend the fellowship to others because you get to learn from highly trained and experienced radiologists. The U.S. departments are also better equipped and organized so you get exposure that is not available in our home country,” Dr. Onyambu said.

Applications for the 2016 RSNA Derek Harwood-Nash Fellowship are available at [RSNA.org/DHN](http://RSNA.org/DHN). For more information, e-mail [CIRE@rsna.org](mailto:CIRE@rsna.org).

## RSNA Advanced Course in Grant Writing

Applications due  
July 1, 2015

Applications are now being accepted for this course designed to assist participants—generally junior faculty members in radiology, radiation oncology or nuclear medicine programs—prepare and submit a National Institutes of Health, National Sciences Foundation or equivalent grant application. The course, held at RSNA Headquarters in Oak Brook, Ill., will consist of four two-day sessions

**Session I:** September 25-26, 2015

**Session II:** January 22-23, 2016

**Session III:** March 18-19, 2016

**Session IV:** May 6-7, 2016

For more information and to download an application, go to [RSNA.org/AGW](http://RSNA.org/AGW).

### For Your Calendar

#### JUNE 6, 2015

American Medical Association—Medical Student Section Medical Specialty Showcase  
Hyatt Regency Chicago  
[Visit the RSNA Booth](#)  
• [www.ama-assn.org](http://www.ama-assn.org)

#### JULY 20-23, 2015

The Association for Medical Imaging Management (AHRA), Las Vegas  
[Visit the RSNA Booth](#)  
• [www.ahraonline.org](http://www.ahraonline.org)

#### SEPTEMBER 22, 2015

Faculty Skills Update  
Westin O'Hare, Chicago  
Registration Opens Soon  
• [RSNA.org/Faculty-Skills-Update](http://RSNA.org/Faculty-Skills-Update)

#### SEPTEMBER 25-26, 2015

Advanced Course in Grant Writing: Session I  
RSNA Headquarters, Oak Brook, Illinois  
Application Deadline is July 1  
• [RSNA.org/AGW](http://RSNA.org/AGW)

#### OCTOBER 2-3, 2015

Creating and Optimizing the Research Enterprise (CORE) Workshop  
RSNA Headquarters, Oak Brook, Illinois  
Registration Now Open  
• [RSNA.org/CORE](http://RSNA.org/CORE)

#### OCTOBER 18-21, 2015

American Society for Radiation Oncology (ASTRO), San Antonio  
[Visit the RSNA Booth](#)  
• [www.astro.org](http://www.astro.org)

#### NOVEMBER 28, 2015

NIH Grantsmanship Workshop and RSNA/ARR Study Section Reviewers Workshop  
McCormick Place, Chicago  
• [RSNA.org/Register](http://RSNA.org/Register)

#### NOVEMBER 29-DECEMBER 4, 2015

101st RSNA Annual Meeting and Scientific Assembly (includes RSNA/AUR/ARRS Introduction to Academic Radiology session)  
McCormick Place, Chicago  
Advance Registration for RSNA 2015 Opens April 29  
• [RSNA.org/Register](http://RSNA.org/Register)

#### JANUARY 9-15, 2016

Clinical Trials Methodology Workshop  
La Jolla, California  
Application Deadline is June 15, 2015  
• [RSNA.org/CTMW](http://RSNA.org/CTMW)

#### JANUARY 22-23, 2016

Advanced Course in Grant Writing: Session II  
RSNA Headquarters, Oak Brook, Illinois  
Application Deadline is July 1, 2015  
• [RSNA.org/AGW](http://RSNA.org/AGW)

#### MARCH 18-19, 2016

Advanced Course in Grant Writing: Session III  
RSNA Headquarters, Oak Brook, Illinois  
Application Deadline is July 1, 2015  
• [RSNA.org/AGW](http://RSNA.org/AGW)

#### MAY 6-7, 2016

Advanced Course in Grant Writing: Session IV  
RSNA Headquarters, Oak Brook, Illinois  
Application Deadline is July 1, 2015  
• [RSNA.org/AGW](http://RSNA.org/AGW)

FIND MORE EVENTS AT  
[RSNA.org/Calendar.aspx](http://RSNA.org/Calendar.aspx)

## Annual Meeting Watch

### News about RSNA 2015



#### Advance Registration and Housing Open April 29

RSNA 2015 advance registration and housing opens April 29 for RSNA and AAPM members. Non-member registration and housing open June 3. Advance Registration and Housing information is available at [RSNA.org/Register](http://RSNA.org/Register).

#### RSNA 2015 Registration

There are four ways to register for RSNA 2015:

##### 1. Internet

**Fastest way to register!**  
Go to [RSNA.org/Register](http://RSNA.org/Register)

##### 2. Telephone (Monday-Friday)

8:00 a.m.-5:00 p.m. CT  
1-800-650-7018  
1-847-996-5876

##### 3. Fax (24 hours)

1-888-772-1888  
1-301-694-5124

##### 4. Mail

Experient/RSNA 2015  
PO Box 4088  
Frederick, MD 21705 USA

#### Registration Fees - Valid Until Nov. 6

McCORMICK PLACE	VIRTUAL	COMBO	
0	\$100	\$100	RSNA/AAPM Member
0	25	25	RSNA Member-in-Training, RSNA Student Member
0	300	300	Non-Member Student
200	300	500	Non-Member Resident/Trainee
200	300	500	Radiology Support Personnel
900	300	1,200	Non-Member Radiologist, Physicist or Physician
900	300	1,200	Hospital or Facility Executive, Commercial Research and Development Personnel, Healthcare Consultant and Industry Personnel
325	300	625	One-day registration to view only the Technical Exhibits

#### Important Dates for RSNA 2015

<b>April 29</b>	Member registration and housing open at 10:30 a.m. CT
<b>June 3</b>	Non-member registration and housing open at 10:30 a.m. CT
<b>July 8</b>	Preliminary meeting program available
<b>October 16</b>	Deadline for international badge mailing
<b>November 6</b>	Final housing and discounted registration deadline at 5 p.m. CT
<b>Nov. 29 - Dec. 4</b>	101st Scientific Assembly & Annual Meeting

#### Housing Deposits

A first night room and tax deposit is required to secure your hotel reservation. Reservations may be secured with a major credit card at the time of booking. The credit card must be valid through December 2015 and will be charged by the hotel approximately two weeks before the annual meeting. Registrants can also send a check, money order or wire transfer (payable to RSNA) for the hotel deposit. (Guests are responsible for all wire transfer fees).

Hotel reservations may be canceled without charge up to 72 hours prior to a guest's scheduled arrival date.



#### International Visitors

##### International Letters Available—Act Now for Visa

Personalized letters of invitation to RSNA 2015 are available for request during online registration. In addition, the International Visitors section of [RSNA.org/Register](http://RSNA.org/Register) includes important information about the visa application process. Visa applicants are advised to apply as soon as they decide to travel to the U.S. and at least three to four months in advance of their travel date. International visitors are advised to begin the visa process now.

#### Exclusive Airline Discounts *No online service fees – No blackout dates*

##### United Airlines

[United.com](http://United.com) offers a 2 to 10 percent discount off published fares and class of service. Save an additional 3 percent if booked online. Use promotional code ZTFH673353 when booking your reservation on [United.com](http://United.com). You can also call United (1-800-426-1122) or your personal travel agent and mention the United agreement code 673353 and Z code ZTFH to be eligible for discounted fares. Service fees may apply. International attendees should contact their local United Airlines reservations office, book online or email [groupmeetings@united.com](mailto:groupmeetings@united.com).



## Patient-focused RSNA Image Share Network Continues to Expand

Using CDs to give patients copies of the medical images and reports can be a cumbersome and frustrating process for radiology staff and patients alike.

Since 2011, a growing number of patients have been turning to a more efficient option: RSNA Image Share—a network that enables radiologists to share medical images with patients using personal health record (PHR) accounts—giving patients control over their records.

A pilot funded by the National Institute for Biomedical Imaging and Bioengineering (NIBIB) and administered by RSNA, Image Share is now used by more than 16,500 patients at 11 medical centers across the U.S.

RSNA Image Share provides the tools to link radiology systems (PACS and RIS) at any site to the network. A device called the Edge Server gathers images and reports and places them in secure digital package. Patients receive a unique security key to add this information to their PHR accounts.

To learn more about RSNA Image Share or to view an online demonstration, go to [RSNA.org/Image\\_Share.aspx](http://RSNA.org/Image_Share.aspx).



# RSNA® Image Share

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## COMING NEXT MONTH

RSNA News reports on a recent *Radiology* study showing that diffusion-tensor MRI offers new insight into the toll that long-distance races take on the human body not detected by conventional T2-weighted MRI.



**RSNA SUPPORTS  
STROKE  
AWARENESS  
MONTH**

**MAY IS STROKE AWARENESS MONTH.** Radiology plays a crucial role in the detection and treatment of stroke, and RSNA strives to advance the care of stroke patients through education and research. **Discover the products and resources RSNA provides to educate you and your patients.**

► Visit [RSNA.org/Stroke-Awareness](https://www.rsna.org/Stroke-Awareness)

**100** YEARS  
**RSNA**<sup>®</sup>