



First FDA-approved Mobile Radiology App Poised for Daily Use

ALSO INSIDE:

Tumor-tracking Technique Minimizes
Healthy Tissue Damage

Surge in Emergency CT, MR Shows
No Sign of Waning

Research Fuels Debate Over
Bismuth Breast Shields

Getting Published in *Radiology*:
What Every Author Should Know

Advance Registration and Housing Now Open
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For more than 20 years, *RSNA News* has provided high-quality, timely coverage of radiology research and education and critical issues facing the specialty, along with comprehensive information about RSNA programs, products and other member benefits.

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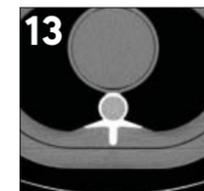
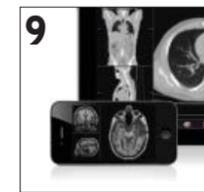
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Ralph Weissleder, M.D., Ph.D., (center) received the European Society of Radiology (ESR) gold medal from 2011 European Congress of Radiology President Yves Menu, M.D. (left), and 2011 ESR President Maximilian F. Reiser, M.D. (right).

ESR HONORS DIGNITARIES

2010 RSNA President **Hedvig Hricak, M.D., Ph.D., Dr. h.c.**, was named an honorary member of the European Society of Radiology (ESR) at the European Congress of Radiology (ECR) in Vienna, Austria, in March. Dr. Hricak is chair of the Department of Radiology at Memorial Sloan-Kettering Cancer Center, a professor of radiology at Cornell University Medical College and an attending radiologist at Memorial Hospital, all in New York City.

Also receiving honorary ESR membership were **Byung Ihn Choi, M.D.**, a professor at the Department of Radiology of Seoul National University, College of Medicine, in Korea, and **Jian-Ping Dai, M.D.**, a professor in the Department of Radiology at the Beijing Neurosurgical Institute and Beijing Tiantan Hospital, Capital University of Medical Sciences, where he also serves as department chair. Dr. Dai was awarded RSNA Honorary Membership in 2009, and Dr. Choi in 2007.

Gold medals were also bestowed at ECR 2011:

- **Borut Marincek, M.D.**, a professor emeritus of radiology at the University of Zurich,

Switzerland, where he has served as chair of the Institute of Diagnostic Radiology at the University Hospital since 1997. Dr. Marincek received RSNA Honorary Membership in 2009.

- **Martine Rémy-Jardin, M.D., Ph.D.**, a professor of radiology and head of the Department of Cardiothoracic Imaging at the University Centre of Lille, France.
- **Ralph Weissleder, M.D., Ph.D.**, a professor of radiology and systems biology at Harvard Medical School in Boston. Dr. Weissleder was named RSNA Outstanding Researcher in 2008.

Latest CIBR Newsletter Spotlights RSNA Meeting

THE LATEST ISSUE of *CIBR Advocate*, the newsletter published by the Coalition for Imaging and Bioengineering Research (CIBR), takes a look at the RSNA annual meeting through the eyes of a patient advocate.

"I greatly appreciated the opportunity to meet with so many hardworking scientists and researchers from various industry groups who were passionate about their advancements to help patients," writes Mar-

tha Nolan, J.D., vice-president for public policy with the Society for Women's Health Research.

Created by the Academy of Radiology Research in 2006, CIBR is a partnership of academic research departments, scientific societies, patient advocacy organizations and imaging equipment manufacturers that seeks to raise the profile of imaging through education and advocacy. CIBR activities link the benefits of imaging to the improvement

of patient care and show the potential cost savings of advanced imaging technologies.

Nolan focuses on patients as stakeholders in imaging. "More and more often, especially with the amount of information available online, patients and their loved ones are able to educate themselves about their disease and possible treatment options," Nolan notes.

Find the latest issue of *CIBR Advocate* at the CIBR website, www.imagingcoalition.org.

Numbers in the News

20

Percent of all emergency department visits this year predicted to involve a CT exam, according to the study published in the January 2011 issue of *Radiology*. [Read more about the factors driving increases in emergency CT and MR on Page 11.](#)

74

Estimated skin dose, in mGy, delivered by an 1896 X-ray system, compared to 0.05 mGy delivered by a modern system. [Read more about the *Radiology* study, "Characteristics of a First-Generation X-Ray System," on Page 18.](#)

2,400

Approximate number of manuscripts submitted each year to *Radiology*. [Turn to Page 5 to learn how to maximize the chances of having your manuscript accepted.](#)

3,828

Number, as of the end of March, of RSNA members opting to receive *RSNA News* online only. Online-only readers of *Radiology* and *RadioGraphics* also number in the thousands. [Turn to Page 16 to read more about the "online-only" promotion to reduce the RSNA's carbon footprint and encourage use of online-only publication features.](#)

Population Change, Cultural and Linguistic Appropriateness among Topics for Associated Sciences Symposium

A discussion of the effects of population shifts—particularly when it comes to aging—on healthcare will kick off the Associated Sciences Symposium at RSNA 2011. Also scheduled during the 2½-day symposium are sessions on understanding new standards for culturally and linguistically appropriate services and marketing creatively. Associated Sciences sessions for RSNA 2011 are:

Monday, November 28

- Implications of the Changing Face of Health Care: Aging and the Shift of Population
- Implications of the Changing Face of Health Care: Delivery and Regulatory Impacts
- Changes in the Scope of Practice: Gaps and Overlaps
- Medical Imaging Radiation Exposure Origins, Consequences, and Control: Optimization of Radiation Dose

Tuesday, November 29

- Ethics in the Era of Health Care Reform
- Understanding Health Literacy and the New Joint Commission CLAS Standards for Culturally and Linguistically Appropriate Services
- Impacts of Emerging Practice Models
- Picking Up the Pieces: Forensic Radiography Following Mass Disasters

Wednesday, November 30

- Imaging Facility Design in an Age of Diminishing Resources
- Creative Strategies for Marketing: Keeping It Legal



November 27–December 2 | McCormick Place, Chicago

For more information about the Associated Sciences Symposium and ASRT@RSNA 2011 and to enroll, go to RSNA2011.RSNA.org.

ASRT@RSNA 2011 to Explore Cancer Detection, Communication with Patients

The 1½-day education program for radiologic technologists at this year's annual meeting, ASRT@RSNA 2011 will feature discussions of such wide-ranging topics as new strategies for earlier detection of cancer and approaches to gaining patient trust. Technologists may earn continuing education credit through ASRT@RSNA 2011. Sessions are:

Wednesday, November 30

- Strategies for the Earlier Detection of Cancer
- Tales of Alleged Radiology Fraud and Abuse
- Computer Navigation in Neurosurgery: A Perspective on Imaging
- Breast Imaging: Advanced Practice in the United Kingdom

Thursday, December 1

- Talking with Patients: Ways to Gain Their Trust
- Understanding Practice Standards in a Changing Health Care Environment
- Digital Radiography: Exposure Factor Selection and ALARA
- The PACS and Quality Improvement for the Technologist
- Cultural Competence
- Situational Awareness

SIR Honors 2011 Gold Medalists

The Society of Interventional Radiology (SIR) presented gold medals to **Andrew B. Crummy, M.D.**, and **Gordon K. McLean, M.D.**, at its annual meeting held in March in Chicago. A gold medal was also presented posthumously to **Peter B. Lauer, CAE**.

An interventional radiology pioneer, Dr. Crummy is perhaps best known for his role in developing digital subtraction angiography while at the University of Wisconsin. Elected SIR president in 1981, Dr. Crummy has authored or co-authored more than 180 journal publications as well as 38 book chapters.

A SIR past-president, Dr. McLean is an original innovator of hepatobiliary and gastrointestinal interventional procedures and aided the development of original techniques and devices for the past three decades. Dr. McLean, who practices interventional, vascular and diagnostic radiology at Western Pennsylvania Hospital in Pittsburgh, has published nearly 100 scientific papers.

As SIR executive director for more than seven years before his 2010 death, Lauer focused on developing the society infrastructure to support the explosive growth of the interventional radiology specialty. Lauer contributed to advancing the science, clinical practice, public awareness, patient care and business aspects of interventional radiology.

Jeanne M. LaBerge, M.D., a clinician researcher and professor for more than 20 years at the University of California, San Francisco, delivered the 2011 Dr. Charles T. Dotter Lecture during the SIR meeting.



Crummy



McLean



LaBerge



Lauer

RSNA Board of Directors Report

At meetings in January and March, the RSNA Board of Directors revamped the Society's strategic plan, continued preparations for RSNA 2011 and approved new collaborations with other radiologic organizations.

New Strategic Plan Updates Society Goals

RSNA's revamped strategic plan clarifies the Society's vision as the premier professional association dedicated to patient care through science and education in radiology and sets forth updated goals such as: fostering development of imaging technologies; diversifying educational offerings; improving healthcare efficiency and effectiveness through radiology informatics and serving as a worldwide leader in radiology. Read the new RSNA Strategic Plan at RSNA.org/About.

RSNA 2011 Promises New Content

RSNA is hard at work on this year's annual meeting, with its theme of "Celebrate the Image." New programs at RSNA 2011 include special sessions targeted to residents and fellows and to hospital administrators. A new live competition program will also give attendees the opportunity to read cases and submit answers via laptop, tablet or other digital device.

New this year is a one-day educational program in Spanish organized by the Interamerican College of Radiology (CIR). The CIR@RSNA 2011 program is scheduled for Saturday, Nov. 26, one day before the annual meeting officially opens.

RSNA 2011 will see the debut of "clustered" content. This pilot in the

pediatric subspecialty will feature refresher courses and scientific and education presentations all offered in one specific area of McCormick Place.

RSNA will award a certificate of completion to RSNA 2011 attendees who successfully participate in a basic quality training course during the annual meeting. In addition, a training workshop on how to be a study section reviewer, sponsored by RSNA and the Academy of Radiology Research, will be offered during RSNA 2011.

Focus Continues on Radiology's Critical Issues

RSNA will convene a comparative effectiveness research workshop later this year. The workshop, a follow up to an inaugural meeting held in early 2010, will once again bring together experts to discuss the latest in patient-centered outcomes research.

Collaborations Focus on Molecular Imaging, CT Dose

RSNA is a co-sponsor of the 2011 World Molecular Imaging Congress, to be held



Sarah S. Donaldson, M.D.
Chairman, 2011 RSNA Board of Directors

Sept. 7–10 in San Diego. Other sponsors are the Academy of Molecular Imaging, Society for Molecular Imaging, European Society for Molecular Imaging, Federation of Asian Societies for Molecular Imaging, International Society for Magnetic Resonance in Medicine and SNM.

RSNA will co-sponsor a "CT dose summit" with the American Association of Physicists in Medicine, Oct. 7–8 in Denver. In 2012, RSNA will co-sponsor with the American Society of Clinical Oncology a

genitourinary cancer symposium and with SNM a cardiovascular molecular imaging symposium.

Century Mark is on the Horizon

It's not too early to mark your calendar for the RSNA Centennial Celebration, set to launch at RSNA 2014. Expect a commemorative logo, special plenary topics, historical videos and more at the 100th Scientific Assembly and Annual Meeting.

Sarah S. Donaldson, M.D.
Chairman, 2011 RSNA BOARD OF DIRECTORS

Shiels Receives AOCR Award

Pediatric radiologist, researcher, educator, inventor and author **William E. Shiels II, D.O.**, was awarded the American Osteopathic College of Radiology's (AOCR) 2011 Dr. Floyd J. Trener Memorial Medal at the organization's annual meeting. Dr. Shiels served as chief of pediatric radiology at Walter Reed Army Medical Center from 1990 to 1996 and continues to serve as a consultant to the U.S. Food and Drug Administration. Dr. Shiels is chair of the Department of Radiology at Nationwide Children's Hospital in Columbus, Ohio, and president of The Children's Radiological Institute. He is a contributor to *Radiology*.



My Turn

Fellowship was Unique Opportunity to Catapult Academic Career

The RSNA William R. Eyler Editorial Fellowship, established in 1998, offers a unique learning opportunity for radiologists early in their academic careers to significantly deepen their understanding of the workings of radiologic journalism. Each year, one fellow is fortunate to be selected for this tremendous experience.

The one-month fellowship provides a rare insight into what goes on "behind the scenes" at two major radiology journals: *Radiology* and *RadioGraphics*. The program is perfectly balanced between observation and active participation, both at the editorial offices of the two journals and the publications office at RSNA headquarters in Oak Brook, Ill.

At the journal offices, the editorial fellow is integrated into the editorial team and interacts directly with the editors, associate editors and staff members. Activities include checking received manuscripts for correct format and required materials, making reviewer assignments, and doing a variety of editorial tasks that involve real

decision-making. The experience is carefully organized, concentrated and intense, but most of all enjoyable.

At the publications headquarters, the editorial fellow has a firsthand view of the entire production process of transforming accepted articles into publications. I found myself directly interacting with many seasoned specialists—managing editors, copy editors, graphic artists and experts in online publishing, finance, marketing and sales. The level of professionalism and the finished product were inspiring.

In my view, the RSNA Editorial Fellowship provides a once-in-a-lifetime, high-impact opportunity to see what goes on behind the editorial processes of two of

our premier radiology journals. It was only a brief glimpse, but it has energized my academic career in many ways and will for years to come.

Edward Y. Lee, M.D., M.P.H., was the 2010 RSNA William R. Eyler Editorial Fellow. Dr. Lee is chief of the Division of Thoracic Imaging and an assistant professor of radiology at Children's Hospital Boston and Harvard Medical School. He serves on the *RSNA News* Editorial Board.



Learn more about the RSNA William R. Eyler Editorial Fellowship at RSNA.org/Publications/editorial_fellowships.cfm.

"Learner/Observer" Worldview Essential to Grantsmanship Success

AS SHE RETIRES from seven years as instructor of the RSNA Advanced Course in Grant Writing, Janet S. Rasey, Ph.D., has had time to reflect on what she feels are the critical ingredients for success as a researcher.

"You need to have the 'learner/observer' worldview, as in, 'it's my job to get to know the people around me and what's expected of me to succeed, and to act on this knowledge,'" said Dr. Rasey, a professor in the Department of Radiology at the University of Washington. "As opposed to the conspiracy theory worldview of 'everyone is out to get me, and I have to grab and stab first to succeed.'"

Offerings like the Advanced Course in Grant Writing are important, Dr. Rasey said, because they not only teach essential skills and qualities—persistence, willingness to accept advice, seeing the big picture of one's research while putting boundaries around the project at hand—but also give participants a network of colleagues to rely upon and build confidence, she said.

"Students realize the big job of writing a



Janet S. Rasey, Ph.D., (right) is retiring after teaching the RSNA Advanced Course in Grant Writing for seven years.

grant is possible when they break it down into smaller pieces and work on them one by one," she said.

Would-be researchers these days, she said, face a challenge she didn't when she was in the junior faculty phase of her career. "There is less time to think," she said. "It is easier to 'do' than to 'think,' and the pace at which we are expected to work

in a world of 24/7 invasive communication makes thinking a luxury."

In return for the immeasurable knowledge students have received from Dr. Rasey over the years, they have taught her a thing or two as well, particularly when it comes to reminders of the importance of work/life balance.

"Your career can't love you back and your family is very important," she said. "My evidence is this—typically for the last class of the year I ask each student to send me one photo that says something important about him/her, so I can put together a slide show or a DVD. Nearly every photo provided is a wedding photo, family portrait, or family vacation snapshot. No one has ever sent his graduation photo from medical school."

Applications are being accepted through July 31 for the 2011-2012 RSNA Advanced Course in Grant Writing. Learn more at RSNA.org/Research/Educational_courses.cfm.

IN MEMORIAM:

Melvin L. Griem, M.D.

Radiation therapy pioneer **Melvin L. Griem, M.D.**, died Feb. 7, 2011. He was 85.

Dr. Griem was professor emeritus in radiation and cellular oncology at the University of Chicago (UChicago), where he helped create the neutron therapy unit in the 1970s. Dr. Griem served as a professor and section chief of radiation therapy at UChicago and director of the Chicago Tumor Institute.

Dr. Griem's influential work spanned more than 40 years, from his 1950s studies of how various drugs enhance the effects of radiation therapy for certain types of cancer to a 1994 study in which he showed that use of gastric irradiation to decrease stomach acid in patients with recurrent stomach ulcers could increase the risk of death from cancers of the stomach, lung and pancreas decades after therapy.

Dr. Griem was among the Chicago radiologists who successfully lobbied for a separate journal, specialty board and professional society for the emerging field of radiation oncology, culminating in formation of the American Society of Therapeutic Radiation Oncology (now the American Society for Radiation Oncology).

Dr. Griem received the Paul C. Hodges Alumni Excellence Award from the UChicago Department of Radiology in 2010.



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Getting Published in *Radiology*: What Every Author Should Know

Authors who submit a manuscript to RSNA's peer-reviewed science journal *Radiology* should keep in mind that reviewers are seeking novel, practical research in a specified format with a clear question in mind, editors say.

"AUTHORS SHOULD BE very clear and crisp about the question they're trying to ask," said Herbert Y. Kressel, M.D., *Radiology* editor and the Miriam H. Stoneman Professor of Radiology at Harvard Medical School in Boston. "It's not infrequent that we'll see a statement of purpose that is vague, or one that changes in different portions of the manuscript. If you put effort into really understanding your purpose, then your methods, results and discussion should directly relate to that purpose."

Despite the variety in subject and content, many manuscripts share common problems in research design, description and style, said Dr. Kressel, who became *Radiology* editor in January 2008 and served on the journal's editorial board from 1985 to 1991.

Common author pitfalls were among the topics covered in the RSNA 2010 refresher course, "Publishing in *Radiology*: What You Always Wanted to Know and Never Asked," presented by Dr. Kressel, Senior Deputy Editor Deborah Levine, M.D., and deputy editors Alexander Bankier, M.D. and David Kallmes, M.D., and statistical consultant Elkan Halpern, Ph.D. Slides from the course that also covered manuscript writing, preparing images for publication, statistical issues, authorship and redundant publications are now available at rsna.org/publications/rad/PIA/index.html.

"We're looking for research that is novel, informative and important—that affects the way physicians practice, that introduces new concepts, new technologies."

Herbert Y. Kressel, M.D.

The presentation offered insight on how editors select manuscripts from more than 2,400 pieces of original research *Radiology* receives each year.

"We're looking for research that is novel, informative and important—that affects the way physicians practice, that introduces new concepts, new technologies—and we're always cognizant of the need to provide practical, useful information," Dr. Kressel said.

Editors strongly urge researchers to consult *Radiology's* Publication Information for Authors section, accessible online and in every print issue, before preparing and submitting a manuscript.

Editors are "Author Advocates"

With those points in mind, Dr. Levine also urges authors to take advantage of the Institutional Review Board (IRB) process used by investigators working with human subjects.

"That process compels the researcher to ask questions about the number of patient records, whether the study is prospective or retrospective, to talk about informed consent—those processes you work through when submitting an IRB can actually help in writing a good research paper," said Dr. Levine, a radiology professor at Beth Israel Deaconess Medical Center in Boston.

Dr. Levine also offered advice for authors whose native language is not English, which can hinder the review process.

"Authors are at a disadvantage if reviewers get stuck trying to understand what's being said, versus dealing with the principles of science," Dr. Levine said. "Those authors should get help with their manuscript from a native English speaker to make sure their manuscript reads well."

Ultimately *Radiology* editors—authors themselves—stand firmly in the writer's corner, Dr. Kressel said.

"We try to be author advocates," Dr. Kressel said. "If the ideas are good and have the data to support their analysis and conclusions, we'll work with authors. Editors sometimes spend hours clarifying the language and, more importantly, making sure readers can understand exactly what was done, the data obtained and the importance of the research."

Concurred Dr. Levine, "Authors should describe their methods in enough detail so that somebody else could perform their experiment."



Levine

Novel, informative and important research is sought by *Radiology* editors who receive more than 2,400 original pieces of research each year. Right: *Radiology* Editor Herbert Y. Kressel, M.D., (far right) discusses the journal with *RadioGraphics* Editor William W. Olmsted, M.D., (left) and David Levine, M.D., Ph.D., at the RSNA 2010 Meet the Editors session.



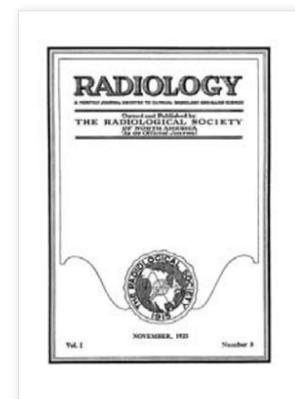
Online Submission is Streamlined

Communication among authors, editors and reviewers has been dramatically streamlined since the all-online submission system was implemented in 2004, Dr. Levine said. "It eliminated the mailing time back and forth and the mailing expenses," she said. "It enabled more rapid communication when questions arose—every step of the process was shortened."

All accepted original scientific manuscripts are sent out for statistical review; currently, the first response, on average, is about six weeks.

Radiology online has become more dynamic, with website-only features including articles published ahead of print, podcasts, videos, interactive poll questions and virtually unlimited space for supplemental materials that won't fit in the print journal.

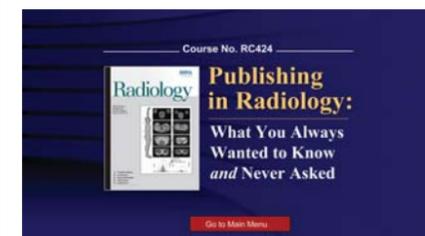
"An online appendix is a wonderful way of making details about the experiments available for other researchers," Dr. Levine said. "Also, if someone has multiple images showing different pathologies, we can include those online."



November 1923 cover

JUST THE RADIOLOGY FACTS

- First issue: September 1923
- First editor: Maximilian J. Hubeny, M.D.
- Impact Factor: 6.341
- Original pieces of research received each year: more than 2,400
- Number of *Radiology* subscribers: 48,408
- Number 1 cited journal in the field
- All-online subscription system adopted in 2004
- Online-only features include, "Hear What We Think" (podcast), "See How It's Done," "Tell Us What You Think" (poll question), and "Diagnosis Please."
- All articles since 1923 are available online



RSNA 2010 RADIOLOGY PRESENTATION AVAILABLE ONLINE

The RSNA 2010 Power Point presentation, "Publishing in *Radiology*: What You Always Wanted to Know and Never Asked," is available at rsna.org/publications/rad/PIA/index.html.

Continued on Page 8

Tumor-tracking Technique Minimizes Healthy Tissue Damage

Researchers have developed a dynamic, real-time tumor motion and tracking technique that they say can help minimize the amount of radiation delivered to surrounding healthy tissue while maximizing the dose the tumor receives.

MEDICAL RESEARCHERS at Thomas Jefferson University (TJU) in Philadelphia have developed an active tracking and dynamic delivery method that predicts tumor position. Simulations of the robotic system—using their programmed algorithms—were able to continuously track the tumor during radiation treatments, allowing precise dose delivery to a moving target and reducing dose to nearby critical organs. The tumor tracking method was simulated for two couches, HexaPOD™ and the ELEKTA Precise Table. The research was published in the online February 1 issue of *Physics in Medicine and Biology* journal.

“We wanted to coordinate control of the linear accelerator and the couch, so that from a beam’s-eye-view, the tumor appears to be stationary,” said study co-author Yan Yu, Ph.D., director of medical physics at TJU. “We were able to show that we might irradiate 20 to 30 percent less of a normal lung with tumor tracking.”

The linear accelerator and couch generally have latent time from 200 milliseconds to one-third of a second, Dr. Yu said. Their algorithm predicts where the tumor will be given the latent time. The efficacy of the proposed method was investigated by extensive computer simulation, researchers said.

“When we control relatively heavy parts of the machine, it actually takes a fraction of a second to move something, for the signal to be transmitted to the controller and for the motors to get to the right location,” Dr. Yu said. “If we do not attempt to predict ahead of time, we will always be lagging behind.”

The technique was shown to reduce damage to the critical organs such as the spinal cord when a lung tumor is present. Researchers examined 15 patients who had tumor motion from 1.5 to 2.5 cm and found the spinal cord received from 0.5 to 11 Gy less than when the current tumor-tracking technique was used.

“This technique can potentially improve dose distribution of the tumor volume,” said study author Ivan Buzurovic, Ph.D., medical physics resident and researcher in the Department of Radiation Oncology at TJU. “In turn, that will improve a patient’s treatment by minimizing radiation to healthy tissue and critical organs and possibly lowering toxicity.”



Buzurovic

Yu

Movement, Increased Dose Raise Concern

Currently technology is available for gating the radiation beam to turn on when the tumor comes into a predefined window and turn off when the tumor exits at the other end. This method prolongs the treatment for the same dose.

“We really want to complete the delivery quickly before there is any movement or any type of small shifts in the patient,” Dr. Yu said.

This technique could increase the dose delivered, Dr. Buzurovic said, because the radiation is more specifically targeted to the tumor and not as much to the surrounding healthy tissue.

“At this point, any potential dose increases are theoretical,” Dr. Buzurovic said. “We are still investigating that. Right now we are working on tumor-control probability and normal tissue complication probability.”

Bruce G. Haffty, M.D., co-chair of the RSNA Oncologic Imaging and Therapies Task Force, questions whether mechanisms would be in place

“We were able to show that we might irradiate 20 to 30 percent less of a normal lung with tumor tracking.”

Yan Yu, Ph.D.



to stop the process if the technique starts tracking improperly—such as when a patient suddenly moves or coughs.

“The system must be able to respond and either shut off or readjust itself,” said Dr. Haffty, a professor and chair in the Department of Radiation Oncology at the University of Medicine and Dentistry of New Jersey’s Robert Wood Johnson Medical School and a member of the *RSNA News* Editorial Board.

Nevertheless, Dr. Haffty said he believes this research moves radiation oncology in the right

direction. “It certainly helps us to the point where we can track a tumor accurately and modify the delivery of radiation in real time,” he said.

“While more research is necessary, a technique like this could become routine in several years,” Dr. Haffty added.

Dr. Buzurovic concurred, adding: “I would be conservative about this until we prove the concept.” □

LEARN MORE

For more information on the study cited in this article, go to rsnanews.RSNA.org.

The tumor tracking method researchers say can minimize the amount of radiation delivered to surrounding healthy tissue while maximizing the dose the tumor receives was simulated for two couches, the ELEKTA HexaPOD™ (above) and Precise Table.

Image courtesy of Elekta.

Getting Published in *Radiology*: What Every Author Should Know

Continued from Page 6

Good Manuscripts Not Always Accepted

Authors whose manuscripts are not accepted should understand the decision doesn’t necessarily mean the work wasn’t high quality, Dr. Kressel said. “We accept less than 15 percent of submissions,” Dr. Kressel explained. “It’s not at all uncommon that we receive perfectly good manuscript that we’re not able to take.”

When a manuscript isn’t accepted, *Radiology* reviewers offer constructive comments that authors can use to strengthen the manuscript if they choose to submit it elsewhere. Even manuscripts that are accepted are often returned with multiple comments and suggestions for revision.

“Authors may find this overwhelming,

but my advice is to take a deep breath—literally—and answer questions one at a time,” Dr. Levine said. Many suggested changes are relatively simple—such as rewording statements or reexamining references, she noted.

“Radiology Rush” Never Gets Old

As far as his own background, Dr. Kressel has authored or coauthored nearly 200 peer-reviewed scientific reports, books, book chapters, and invited papers and has published more than 60 articles in *Radiology* over the past 30 years.

Dr. Levine’s research was first published in *Radiology* as a resident when she took over a research project from an attending physician. Her publications include a study funded in part by a 1995 RSNA Research

& Education Foundation seed grant. Despite her status as a veteran investigator, Dr. Levine said she has never gotten over the “*Radiology* rush” common to many authors.

“It doesn’t matter how much research you’ve done—it’s always a real thrill to get that letter from *Radiology* saying, ‘I’m delighted to tell you that this manuscript has been accepted.’ Now that I’m on the other side and I tend to have my papers published elsewhere to avoid conflicts of interest, I miss that thrill. It’s the pre-eminent research journal for radiologists. It’s prestigious to be published in *Radiology*—it means your peers appreciate your research.” □

First FDA-approved Mobile Radiology App Poised for Daily Use

The clearance process took more than two years, but the first U.S. Food and Drug Administration (FDA)-approved mobile diagnostic radiology application for the iPhone®/iPad® could quickly become part of the daily work routine for radiologists in remote locations.

"I SEE THESE DEVICES being a mainstay for radiologists on call away from a clinical workstation," said Keith Dreyer, D.O., Ph.D., vice-chair of Radiology Computing & Information Sciences at Massachusetts General Hospital (MGH) and an associate professor of radiology at Harvard Medical School in Boston. "The devices may currently be too limited in functionality and screen size to provide adequate throughput for a heavy case load, but for answering an immediate question, they will be quite adequate for many examination types."

Approved by the FDA in February, the application—the Mobile MIM from Cleveland-based MIM Software™—can be used to view results of CT, MR imaging and PET exams on mobile devices and use those images to make diagnoses. The application is indicated for use only when there is no access to a workstation, according to the FDA.

Made for use with Apple products, the new application allows radiology images taken in a hospital or physician's office to be "compressed for secure network transfer then sent to the appropriate portable wireless device," according to the FDA statement.

Although individual facilities have developed similar applications for their own use, the FDA has been hesitant to approve such applications intended for primary diagnosis rather than secondary viewing, according to David Hirschorn, M.D., director of radiology informatics at New York's Staten Island University Hospital. FDA clearance of Mobile MIM should open the floodgates for approval of similar devices from other companies, he said.

"This is the first company to get the FDA's blessing, but there is nothing in this product that is magic," he said. "Other companies are following right behind."

Research Presented at RSNA 2010 Impacts FDA Decision

One of the first medical applications to debut in Apple's AppStore in 2008, Mobile MIM was quickly pulled from the store due to regulatory concerns. In its subsequent evaluation, the FDA tested Mobile MIM's performance on a number of devices, measuring resolution, noise and luminance against international standards and guidelines. After a lengthy review process, the FDA determined that Mobile MIM provided adequate resolution quality to be used for medical diagnostics when a full workstation was not available.



Dreyer

Hirschorn

Research validating the efficacy of the mobile app, presented by Dr. Dreyer and other experts at RSNA 2010, was also shared with FDA during its evaluation process, paving the way for approval. "Engineers have done an excellent job of working with the FDA to clear several hurdles around calibration, environmental lighting and security," said Dr. Dreyer, a member of RSNA's RadLex Steering Committee and chair of the American College of Radiology IT and Informatics Committee-Government Relations Subcommittee.

Approved only for CT, MR imaging and PET, the application could easily apply to other radiology modalities including ultrasound, angiography and fluoroscopy, Dr. Hirschorn said. Radiographs, however, are not app-friendly simply because the devices are too small to achieve the contrast and resolution needed to view an X-ray, Dr. Hirschorn said. "Even if the device had a larger screen—which would

“I see these devices being a mainstay for radiologists on call away from a clinical workstation.”

Keith Dreyer, D.O., Ph.D.



The first FDA-approved mobile diagnostic radiology application for the iPhone®/iPad®, the Mobile MIM from Cleveland-based MIM Software™, can be used to view results of CT, MR imaging and PET exams on mobile devices and use those images to make diagnoses. The approval is expected to open the floodgates for approval of similar devices from other companies.

defeat the purpose entirely—you would still not be able to control the calibration capability," he said.

While calibration and surrounding light are factors with any display device, variables can change more rapidly with handheld devices. For that reason, the app includes an interactive contrast test in which small parts of the screen are a slightly different shade than the rest of the screen in sequence. If the physician can identify and tap these targets on the screen, the lighting conditions won't interfere with the physician's ability to discern subtle differences in contrast, Dr. Hirschorn said. "It's a simple idea but very effective," he said. "If you are able to see the contrast, you know the display is functioning within normal parameters."

FDA approval of the Mobile MIM hinged largely on the effectiveness of this test, Drs. Dreyer and Hirschorn said.

Enormous Potential Tempered by Unknowns

In terms of day-to-day use, the mobile app has considerable potential for clinicians as well as radiologists. That is the case at MGH, where clinicians have embraced the internally developed iPad/iPhone-based mobile electronic health record application that includes access to all medical images with full fidelity, Dr. Dreyer said.

"I see these devices being used extensively, but not exclusively, by ordering clinicians on the move throughout the hospital, clinic and office settings," he said.

Although the app will be useful for remote con-

sultation overall, the technology will be especially beneficial for accessing subspecialty expertise not otherwise available, said Dr. Hirschorn, who also envisions the app enhancing the resident/radiologist on-call partnership. "Off-site radiologists previously had to access a computer in case a resident called," he said. "With this app, the resident can consult the on-call radiologist at any location."

While the app undoubtedly offers benefits, it also plunges the industry into uncharted territory, creating unknowns on a number of fronts, including liability. Problems could arise, for example, if a physician makes a remote diagnosis from a state in which he is not licensed. "Is a lawyer going to make the argument that I rendered care in a state I'm not licensed in?" Dr. Hirschorn asked. "This is all untested."

The application's novel approach to hardware/software integration also breaks new ground, Dr. Dreyer said. "Never before was there a portable device offering a multi-touch user interface system with medical grade display capabilities," Dr. Dreyer said. "It is a new territory for us all, including the FDA, RSNA and ACR."

Nevertheless, Drs. Dreyer and Hirschorn said the application is essentially the tip of the iceberg in terms of technology's evolving role in radiology.

"I feel quite strongly, however, that in the coming years we will see advances to our industry never before possible, due in large part to these devices and their upcoming competitors," Dr. Dreyer said. □

MOBILE MIM AVAILABLE AS FREE DOWNLOAD

The Mobile MIM from Cleveland-based MIM Software is a remote diagnostic imaging tool for the iPhone, iPad and iPod Touch. To download the App, including sample images to demonstrate its functionality, for free, go to the App Store at www.mimsoftware.com.

Surge in Emergency CT, MR Shows No Sign of Waning

Two recent studies that reveal steady increases in CT and MR use in emergency departments (ED) over roughly the past decade underscore the need for more in-depth research into developing evidence-based decision models for imaging appropriateness, authors said.

USING DATA FROM the 1995–2007 National Hospital Ambulatory Medical Care Survey, David B. Larson, M.D., M.B.A., and colleagues discovered that CT use in the nation's EDs is growing at 16 percent per year—higher than rates reported in other settings. At that rate, nearly 20 percent of all ED visits this year will involve a CT exam, according to the study, published in the January 2011 issue of *Radiology*. Researchers analyzed data on a mean of 30,044 ED visits each year over the 13-year period to estimate overall usage of CT in the ED.

In a study published in the *Journal of the American Medical Association (JAMA)* in October 2010, lead author Frederick Korley, M.D., and colleagues discovered that the use of CT or MR tests nearly tripled over a 10-year period without a corresponding change in the prevalence of life-threatening conditions among ED patients. Using data from the National Hospital Ambulatory Medical Care Survey between 1998 and 2007, Dr. Korley and colleagues discovered that the share of injury-related ED patients who received MR or CT tests increased from 6 to 15 percent, based on a nationwide sample of more than 300,000 ED visits.

“This report confirms our suspicion that the increased use of advanced imaging during emergency department visits in recent times has not led to a similar increase in the diagnosis of important clinical conditions,” said Dr. Korley, an assistant professor in emergency medicine at Johns Hopkins University School of Medicine in Baltimore.

Results of the *Radiology* study were not entirely expected, according to Dr. Larson, director of quality improvement in the Department of Radiology at Cincinnati Children's Hospital Medical Center.

“It is not surprising that CT utilization has increased,” said Dr. Larson. “What's surprising is the sustained high rate of that growth.”

The most telling aspect of both studies is that increases in CT and MR tests in the ED show no sign of waning, said Christopher L. Siström, M.D., M.P.H., Ph.D., associate chair of informatics at the University of Florida in Gainesville, and an associate editor of *Radiology* who has written extensively on imaging overutilization.

“Because study authors found no indication that CT use is tapering off, the rate could eventually rise to 30 to 40 percent of all emergency department exams,” Dr. Siström said.

New Uses, Superiority of CT Cited as Increase Reasons

While *Radiology* researchers didn't analyze reasons behind the surge in CT use in the ED, Dr. Larson and colleagues attributed the increase in part to higher imaging rates for indications such as headache, trauma and seizure as well as new uses for CT in evaluating flank, abdominal and chest pain.

According to the *JAMA* study, factors likely contributing to the increasing use of advanced imaging in the ED are:

- Superiority of CT scans over other imaging modalities
- Routine use of whole-body scanning for patients treated in trauma centers
- Increased availability of CT scanners and proximity of scanners to EDs
- Speed of new generation CT scanners, eliminating the need to sedate pediatric patients
- Patient demand
- Physicians' ability to self-refer for imaging

While some argue that imaging leads to quicker diagnoses and improved ED throughput, emergency visits that involved CT or MR lasted two hours



(clockwise from top left) Larson, Korley, Rao, Siström

“It is not surprising that CT utilization has increased. What's surprising is the sustained high rate of that growth.”

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



longer than visits without advanced imaging studies, according to the *JAMA* study.

Another evolving trend contributing to increased CT utilization in EDs must also be monitored, experts said.

“Many emergency departments are now functioning as outpatient clinics,” said Vijay M. Rao, M.D., David C. Levin professor and chair of radiology at Jefferson Medical College and Thomas Jefferson University Hospital in Philadelphia and a noted researcher of imaging utilization. “Once a patient enters the doors of the ED, physicians feel obligated to ensure they haven't missed anything.”

In turn, many experts believe ED physicians order advanced imaging tests—necessary or not—out of fear of malpractice.

“Emergency physicians are just trying to get through the day, making decisions as best they can,” Dr. Siström said. “However, any time a consideration other than what is best for the patient—like reducing the doctor's malpractice risk—enters the equation, we aren't helping the patient and we may harm them.”

Guidelines Can Reduce Unnecessary Imaging

Despite the current surge in ED imaging, factors that may slow the rampant growth of CT use include cost, healthcare legislation, concern over radiation exposure and the use of population-based data to develop appropriate-use guidelines, Dr. Larson said.

Although limiting inappropriate CT use will become more successful with the improvement of evidence-based decision models to guide imaging appropriateness, the ED has typically been excluded from such efforts, he said. “It's the life-threatening nature of what happens in the ED that makes a difference,” Dr. Larson said.

Part of the solution, according to Dr. Rao, is to develop best practice guidelines that will hold up in court and demonstrate that a physician met the standard for care. While American College of Radiology Appropriateness Criteria® can provide a foundation for such guidelines, they must be customized to individual institutions and created with input from the multiple disciplines involved in the care of specific conditions—from head trauma to abdominal pain—in order to be accepted, Dr. Rao said.

Providing a forum for discussion and giving feedback to physicians is also critical to developing such guidelines, according to Dr. Larson. “Evidence indicates that utilization becomes more appropriate when ordering physicians know their decisions are being reviewed,” he said.

Physicians also need to become better educated, according to *JAMA* authors, who cited a 2004 survey of emergency department physicians showing that only 9 percent were aware that CT can increase a patient's lifetime risk of cancer.

More research is also necessary, according to Dr. Korley. “We need to improve our understanding of the reasons for the increase in the use of advanced imaging, better understand what constitutes appropriate use and how inappropriate use can be reduced,” he said.

While increasing awareness of radiation risk and implementing order entry systems are Herculean tasks, political challenges involved in decreasing CT utilization are even greater, Dr. Siström said.

“Lack of standards, lack of knowledge—we can work on these factors,” Dr. Siström said. “But basic conflicts of interest about money and time between doctors, healthcare organizations, payers and patients—those are much harder to tackle.” □

LEARN MORE

To access Dr. Larson's *Radiology* study, “National Trends in CT Use in the Emergency Department: 1995–2007,” go to RSNA.org/Radiology; for more information on the *JAMA* study, “Use of Advanced Radiology During Visits to U.S. Emergency Departments for Injury-Related Conditions, 1998–2007,” go to rsnanews.RSNA.org.

RADIOLOGY STUDY FOCUS OF VIDEOCAST

To view a videocast featuring David B. Larson, M.D., M.B.A., Department of Radiology at Cincinnati Children's Hospital Medical Center, discussing his *Radiology* study, go to RSNA.org/Radiology.

Radiology Editor Herbert Y. Kressel, M.D., and Deputy Editor David F. Kallmes, M.D., moderate the discussion.

Research Fuels Debate over Bismuth Breast Shields

Based on mounting evidence, the American Association of Physicists in Medicine (AAPM) is recommending against using bismuth breast shields in a forthcoming position statement.

WHILE NOT DISPUTING that bismuth breast shields reduce radiation, leading medical physicists contend the shields can cause errors in CT numbers or create streak artifacts that negatively impact image quality, according to AAPM President J. Anthony Seibert, Ph.D., a professor of diagnostic imaging physics at the University of California, Davis.

“That breast dose can be reduced with shields is certainly a fact; however, because the X-ray tube goes around to the other side during 360-degree rotation during acquisition, photons that irradiate the breast are subsequently attenuated by the shield which would, in the best scenario, be unattenuated,” Dr. Seibert said.

Although AAPM is not endorsing any one technique, many physicists contend that organ-based angular tube current modulation (TCM) offers similar levels of dose reduction at equivalent or improved levels of image quality as breast shields.

Since breast shields were introduced in 1997, conflicting data regarding their impact on diagnostic accuracy have emerged, creating two schools of thought. Many radiologists maintain that the shields reduce radiation without sacrificing diagnostic quality, whereas others feel that the negatives outweigh any benefits.

Research from investigators on both sides of the issue was presented at RSNA 2010.

Tube Current Method Reduces Noise

In a study comparing bismuth shielding with organ-based angular TCM and global reduction of tube current, lead author Cynthia H. McCollough, Ph.D., director of the CT Clinical Innovation Center at the Mayo Clinic in Rochester, Minn., and her team demonstrated that organ-based TCM and global tube current reduction offer similar levels of dose reduction to the breast at equivalent or improved levels of image quality.

“Simply reducing the tube current can provide the same dose reduction as bismuth shielding at similar image noise levels, but without causing errors in CT numbers or streak artifacts,” Dr. McCollough said.

Jia Wang, Ph.D., a research fellow in Mayo’s CT Clinical Innovation Center, studied thoracic phantoms representing patient sizes ranging from a typical 3-year-old to a large adult. He measured dose to the anterior surface of the phantoms using an ionization chamber with and without bismuth shields. After calculating dose reduction achieved by applying the shields, he decreased the tube current to match the dose reduction achieved with the shield.

He then repeated the scan and dose measurements at the lower tube current without shields.

“As we expected, the same dose reduction was achieved by lowering scanner output by the appropriate amount as by using bismuth shields,” Dr. Wang said. “However, the dose reduction achieved using shields was limited to the anterior surface of the phantom, while lowering the tube current reduced the dose by the same amount to all phantom surfaces. As expected, total dose to the patient is lower when the tube current is globally decreased compared to when using bismuth shielding.”

In comparing image noise in the heart and lung regions of the phantoms, Dr. Wang and colleagues found a similar noise increase between the use of bismuth shielding and reducing tube current throughout the entire scan. While shielding altered CT numbers and generated streak artifacts, reducing tube current did not create these problems.

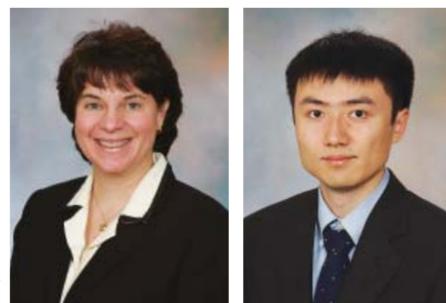
All experiments were repeated using organ-based TCM, which decreased tube current to the anterior surface but increased it to the lateral and posterior surfaces. With this approach, image noise did not increase, CT numbers remained accurate and no artifacts were produced. Also, dose reduction to the breast was similar to that generated by bismuth shielding.

Artifacts Don’t Limit Diagnostic Accuracy

In a second study, researchers at Rhode Island Hospital, affiliated with Brown University in Providence, demonstrated that the shields reduced radiation without impacting diagnostic quality. Lead author Kathryn McGillen, M.D., a second-year diagnostic radiology

“Until TCM becomes more widely available, I would still encourage breast shields as a methodology proven to reduce breast dose that is easily implemented, inexpensive and widely available.”

Robert Gould, Sc.D.

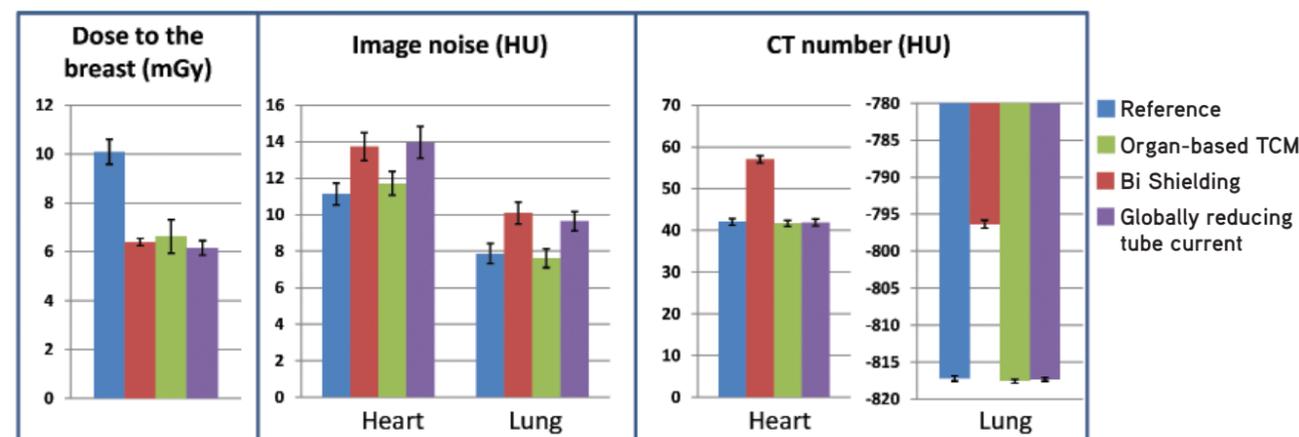


McCollough

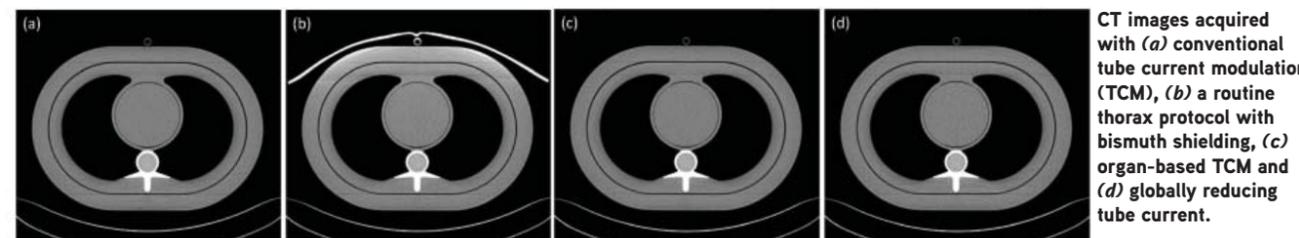
Wang



McGillen



Dose reduction, image noise and CT number accuracy achieved on an adult thorax phantom using bismuth shielding, organ-based tube current modulation (TCM) and global reduction of the tube current. The reference technique used conventional TCM and a routine clinical thorax protocol. Similar dose reduction was achieved with the three techniques. Organ-based TCM provided the best image quality, showing no increase in image noise or decrease in CT number accuracy. Bismuth shielding increased the CT numbers in the lung and heart regions relative to the correct values. Globally reducing the tube current showed a similar noise increase as bismuth shielding but maintained CT number accuracy.



Images courtesy of Cynthia H. McCollough, Ph.D.

CT images acquired with (a) conventional tube current modulation (TCM), (b) a routine thorax protocol with bismuth shielding, (c) organ-based TCM and (d) globally reducing tube current.

resident at the university, and colleagues reviewed the first 50 consecutive patients receiving a non-contrast chest CT who had also received a prior chest CT at the hospital before the routine use of breast shields. Researchers used the first 25 patients who had both exams performed on a 64-slice CT scanner followed by another 25 who had both scans performed on a 16-slice scanner.

Two radiologists evaluated the studies for diagnosis and the presence of artifact. No diagnostic errors, missed findings or non-diagnostic examinations were identified, although artifact occurred in 62 percent of shielded patients, researchers found. Streak artifact was most common in superficial soft tissues nearest the shield (62 percent), followed by artifact extending into the mediastinum (16 percent). In one patient, artifact limited visualization of a breast mass; however, the finding was not missed.

The distance of shield placement from the skin proportionately affected artifact and noise, researchers demonstrated. The further away the shield, the less artifact and noise, with no difference between scans performed on a 16- or 64-slice CT scanner.

While breast shields commonly result in beam hardening and streak artifact, researchers did not find the artifacts to limit diagnostic accuracy in any of the study participants, Dr. McGillen said.

She stressed that this retrospective study was unique in using patients rather than phantoms that use surrogate markers to evaluate noise and artifacts.

“By using patients, we are able to look at the actual diagnostic impact of artifact and found that it did not affect diagnosis,” she said. “Therefore the issue of shielding, artifact and noise become less relevant. Additionally, by keeping the breast shield off of the patient by approximately 2 cm, artifact becomes inconsequential while dose savings remain unchanged.”

Rhode Island Hospital has been using breast shields on all scanned patients since mid-2008, Dr. McGillen said. “There is just no good reason not to use one,” she said.

Data Remain Inconclusive

Issuance of the AAPM position statement notwithstanding, the matter is hardly settled—primarily because data do not yet support one clear answer. In the meantime, experts continue to explore positive and negative aspects of both techniques.

“While I agree that organ-based TCM can achieve about the same dose reduction as bismuth shields, this capability is not available on the overwhelming majority of CT scanners in the U.S. and is unlikely to be in the near future,” said Robert Gould, Sc.D., a professor and vice-chair, Technology and Capital Projects Department of Radiology and Biomedical Imaging, at the University of California, San Francisco. “It should also be noted that the effectiveness of TCM in reducing dose depends on the patient’s anatomy and its use also requires a degree of care by the technologist to maximize the benefits.”

While agreeing AAPM should encourage the use of TCM, Dr. Gould feels the use of breast shields should not yet be discouraged. “While bismuth shields must be positioned appropriately so that streak artifacts through the anatomy are minimized and do not interfere with the diagnostic quality of the images, we have found that with some instruction, technologists have little difficulty in placing the shields to avoid problematic artifacts,” Dr. Gould said.

“Until TCM becomes more widely available, I would still encourage breast shields as a methodology proven to reduce breast dose that is easily implemented, inexpensive and widely available,” Dr. Gould said. □

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Continued on Page 17

YOUR DONATIONS IN ACTION

With an RSNA R&E Foundation grant, Myria Petrou, M.A., M.B.Ch.B., is using PET imaging to evaluate the potential of an Alzheimer Disease (AD)-selective, small identification deficiency test as an early screening test for AD in patients with early mild cognitive impairment.



Journal Highlights

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

Histologic, Molecular and Cytogenetic Features of Ovarian Cancers: Implications for Diagnosis and Treatment

THE MOST COMMON ovarian malignancy, ovarian epithelial carcinoma (OEC), is a heterogeneous disease with several histologic subtypes that show characteristic cytogenetic features, molecular signatures, oncologic signaling pathways, and clinical-biologic behavior. Recent advances in histopathology and cytogenetics have provided unique insights into the pathophysiologic features and natural history of OECs.

In the May-June issue of *RadioGraphics* (RSNA.org/RadioGraphics), Neeraj Lalwani, M.D., of the University of Texas Health Science Center in San Antonio, and colleagues discuss various histologic subtypes of ovarian carcinoma in terms of epidemiologic features, taxonomy, histogenesis, hereditary ovarian cancer syndromes, cytogenetic features and oncogenesis, the role of cross-sectional imaging and clinical and therapeutic implications.

The characteristic genetic changes and cascade of tumor metabolic pathways partly determine clinical-biologic behavior, response to therapy and prognosis, the authors write.

“Recent developments in cytogenetics and molecular biology have helped clarify pathogenetic concepts that provide useful information for the rational design of targeted therapeutics,” the authors conclude. “Knowledge of less common hereditary ovarian cancers provides useful insights into the pathogenesis of sporadic ovarian cancers. The role of imaging in the diagnosis, treatment and monitoring of therapeutic response in patients with ovarian carcinoma continues to evolve and expand.”

This article meets the criteria for 1.0 AMA PRA Category 1 Credit™. CME is available in print and online.



Metastatic high-grade serous carcinoma in a 59-year-old woman. Axial-fused PET/CT image through the pelvis shows a hypermetabolic pericecal implant on the serosal surface (arrow). Small hypermetabolic tumor implants on the peritoneal or serosal surfaces are readily depicted with PET.

(RadioGraphics 2011;30:625-646) ©RSNA, 2011. All rights reserved. Printed with permission.

“Online Only” Publications Popular with Members

Thousands of RSNA members have opted to forgo their print copies of RSNA journals and access them online only, since the option was announced in September 2010. More than 2,700 *RadioGraphics* readers have gone online only; for *Radiology*, online-only readers number more than 4,100.

In addition, more than 3,800 RSNA members have opted to access *RSNA News* online only. RSNA introduced the “online only” option to help reduce the Society’s carbon footprint and to encourage members to take advantage of the myriad features and extra content in the online versions of its publications, including published-ahead-of-print and online-only articles, interactive image datasets, podcasts, videos, discussion forums, instant CME credit and the *Radiology* Legacy Collection, a searchable archive of historic *Radiology* issues from 1923 to 1998.

Members can read the online journals from anywhere they have an Internet connection. For more information about RSNA’s sustainable publishing initiative and to access User Guides for *Radiology* and *RadioGraphics* online and update your journal preferences, go to RSNA.org/Options.



Journal Highlights

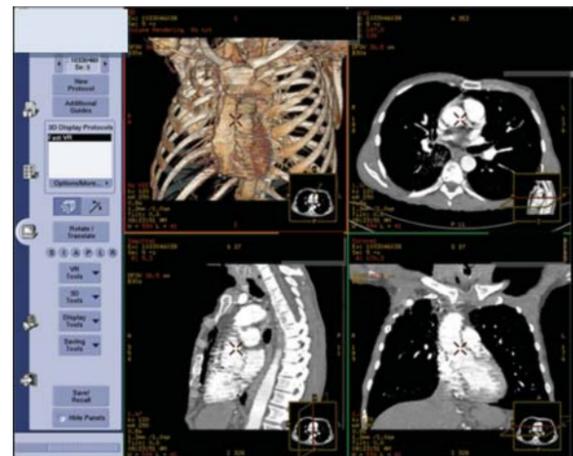
Optimizing Analysis, Visualization and Navigation of Large Image Data Sets: One 5000-Section CT Scan Can Ruin Your Whole Day

NEW TECHNOLOGIES and tools used in other fields can be adapted to healthcare to improve image analysis, visualization and navigation through large data sets. Understanding of radiologists' visual and interpretive behaviors—explored in conjunction with the capabilities of innovative advanced technologies—may provide useful new paradigms for interpreting results from medical imaging examinations.

In a historical psychophysical and technical review article in the May issue of *Radiology* (RSNA.org/Radiology), Katherine P. Andriole, Ph.D., Brigham and Women's

Hospital, Harvard Medical School, Boston, and colleagues focus on the analysis, visualization and navigation of image data performed during the interpretive process.

Successful new paradigms will integrate image and non-image data, incorporate workflow considerations and be informed by evidence-based practices, while 3D image display and incorporation of innovative human-machine interfaces will likely be the future, the authors write.



Advanced postprocessed 3D volume-rendered images with color and multiplanar reformations.

(*Radiology* 2011;259:2:346–362) ©RSNA, 2011. All rights reserved. Printed with permission.

“We are approaching a revolution in the role of the imaging specialist in direct patient care,” the authors conclude. “To achieve this, current practice must take full advantage of the technologies of today. This is radiology's challenge and opportunity.”

Honorary Authorship Focus of Free-Access *Radiology* Editorial

In response to the article, “Honorary Authorship in Radiologic Research Articles: Frequency and Associated Factors,” by Ronald L. Eisenberg, M.D., J.D., and colleagues in the May issue of *Radiology*, Editor Herbert Y. Kressel, M.D., and Adrian K. Dixon, M.D., co-authored a free-access editorial, “Where Is the Honor in Honorary Authorship?” also appearing in that issue. Drs. Kressel and Dixon discuss the cultural differences in scientific publishing in the U.S. and Europe. To access the editorial, go to radiology.rsna.org/content/early/2011/03/01/radiol.11110422.extract.

R&E Foundation Individual Donors

Continued from Page 15

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Rosario & Harold D. Young, M.D.

Radiology in Public Focus

A press release was sent to the medical news media for the following article appearing in the latest issue of *Radiology*.

Characteristics of a First-Generation X-Ray System

IN A COMPARISON of antiquated versus modern X-ray equipment, radiation dose and exposure time in the older system were greater than those of the modern system by about three and five orders of magnitude, respectively.

In the study, Martijn Kemerink, Ph.D., of Maastricht University in the Netherlands, and colleagues compared an 1896 system—still in working order—with modern X-ray equipment in terms of radiation dose, beam properties, image quality and some electrical parameters.

When measured on the skin of a hand specimen, the radiation dose of the antiquated system was about 10 times greater than that of the modern system for the same detector signal. Estimated skin dose was about 74 mGy for the antiquated system and 0.05 mGy for the modern system, researchers discovered.

“In the following century, the image quality and nearly all components of the X-ray system were greatly improved,” researchers concluded. “Simultaneously, radiation dose and exposure time were lowered by three and five orders of magnitude, respectively, turning X-ray imaging into a convenient and safe modality.”



Images of the hand of an 86-year-old woman obtained with Crookes tube number 9 (left) and a hand specimen obtained with a modern X-ray system (right). In both cases, the image receptor was a modern computed radiography plate. The exposure time with the 1896 system was 21 minutes, and the distance from the imager to the hand was 46 cm. With the modern system, the following settings were used: 45 kV, 3.5-mm Al filtration, 5 mAs (225 mA, 21 msec), and 1 m between the hand specimen and the imager.

(*Radiology* 2011;259:2:534–539) ©RSNA, 2011. All rights reserved. Printed with permission.

Media Coverage of RSNA

In March 2011, media outlets carried 416 RSNA-related news stories. These stories reached an estimated 398 million people.

March print and broadcast coverage included Associated Press, Dow Jones International News, *USA Today*, *Los Angeles Times*, WGRZ-TV (Buffalo, N.Y.), KTBS-TV (Shreveport, La.), WPTA-TV (Fort Wayne, Ind.), WLBT-TV (Jackson, Miss.) and WBRE-TV (Wilkes Barre, Pa.).

Online coverage included Yahoo! News, The Huffington Post, NPR – Online, *CBSNews.com*, *ABCNews.com*, *Washington Post* – Online, *Seattle Times* – Online, *Businessweek.com*, *Palm Beach Post* – Online, *Science Daily*, *PhysOrg.com* and WebMD.

May Public Information Activities Focus on Stroke

In recognition of American Stroke Month in May, RSNA distributed public service announcements (PSAs) focusing on:

- Signs of stroke
- Stroke imaging
- Interventional treatments for stroke
- Importance of receiving stroke treatment quickly

In addition to the PSAs, RSNA also distributed the “60-Second Checkup” audio program to radio stations focusing on imaging to detect stroke in its early stages.

SUBMIT YOUR IMAGES TO RADIOLOGYINFO.ORG

Residents, fellows, medical students and radiologic technologists are encouraged to submit their medical images and videos to help illustrate the pages of *RadiologyInfo.org*. Contributors of accepted images and videos will be recognized on the site and one winner will receive an Apple iPad.

Submissions will be accepted through June 30, 2011. Visit RadiologyInfo.org/contest for more information or to enter.



CTA with a graft of the abdominal aorta.

Radiology in Public Focus

Other Radiology Headlines

Angioplasty as MS Treatment Shown to be Safe

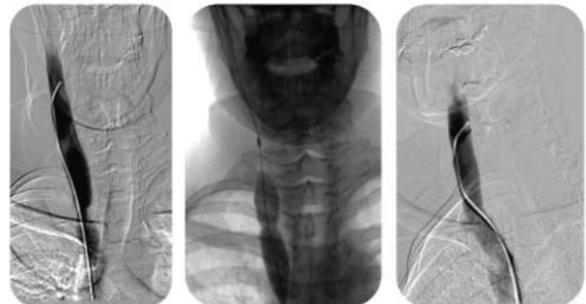
New data was presented at the Society of Interventional Radiology (SIR) annual meeting held in Chicago in March demonstrating the safety of using angioplasty in the internal jugular and azygos veins to improve cerebrospinal blood flow in patients with MS.

"Our study will provide researchers the confidence to study it as an MS treatment option for the future," Kenneth Mandato, M.D., an interventional radiologist at Albany Medical Center in Albany, N.Y., said in a press release.

A 2009 Italian study suggested that chronic cerebrospinal venous insufficiency might contribute to MS and its symptoms. In the recent retrospective safety study, 231 patients with MS (age range, 25 to 70 years old; 147 women, 84 men) underwent angioplasty of the internal jugular and azygos veins with or without placement of a stent—97 percent were treated without incident. Complications included abnormal heart rhythm in three patients and immediate re-narrowing of treated veins in four patients. All but two of the patients were discharged within three hours of treatment.

"This is an entirely new approach to the treatment of patients with neurologic conditions, such as multiple sclerosis," said Gary P. Siskin, M.D., an interventional radiologist and chair of the radiology department at Albany Medical Center and the co-chair of the SIR research consensus panel on MS. "As a result, there is a healthy level of skepticism in both the neurology and interventional radiology communities about the condition, the treatment and the outcomes."

Dr. Mandato noted that research still must be conducted concerning patient selection, technique and outcomes after angioplasty.



Images courtesy of the Society of Interventional Radiology

Higher Doses of Y-90 Safe and Effective in Metastatic Liver Cancer

Treating liver tumors with higher doses of yttrium-90 than previously tried is safe, provides results when chemotherapies have failed, preserves quality of life and can be done on an outpatient basis, according to results from a large multi-institutional study presented at the SIR meeting.

"Now we know that patients can actually tolerate much higher doses of radiation than previously thought, which provides results in patients progressing on standard chemotherapy," researcher Riad Salem, M.D., M.B.A., said in a press release. Dr. Salem is a professor of radiology, medicine and surgery and director of interventional oncology in the Division of Interventional Radiology, Department of Radiology at Northwestern University in Chicago. "While patients aren't cured, their lives are being extended with less down time and their quality of life is improving."

The four-year prospective study looked at 151 patients (the group was 55 percent male, with an average age of 64 years) with liver metastases from colorectal, neuroendocrine and other cancers. Several subgroups showed high rates of progression-free survival, including 186 days for neuroendocrine patients and 95 days for colorectal cancer patients.

The Nuclear Regulatory Commission recently changed its guidelines in order to create a specific pathway for interventional radiologists to become authorized users.

Antioxidants Prior to Radiation Exposure Can Protect DNA

A unique formulation of antioxidants taken orally before imaging with ionizing radiation can minimize cell damage, according to new research presented during the SIR meeting. Investigators observed as much as a 50 percent reduction in DNA injury after administering a proprietary formula prior to CT scans.

According to a press release, investigators looked specifically at whether a special combination of antioxidants could neutralize free radicals—created when X-rays collide with water molecules in

the body—before the free radicals could cause damage by direct ionization of DNA and other cellular targets.

Investigators looked at blood from two volunteers to find DNA strand breaks repaired by a protein complex that binds to the site of the damage. The more repair observed, the team assumed, the more DNA damage must have been done by the CT scan to initiate the repair.

There was a clear reduction of DNA repair in the treatment group, which means that there was less DNA injury as a result of pre-administering the anti-

oxidant mixture, said Kieran J. Murphy, M.D., professor and vice-chair, director of research and deputy chief of radiology at the University of Toronto and University Health Network.

"Pre-administering this formula before a medical imaging exam may be one of the most important tools to provide radioprotection, especially important for patients getting CT scans," said Dr. Murphy, adding that the research team has applied to patent its formulation and specific dose strategy.

Education and Funding Opportunities

CORE Workshop

October 28–29, 2011
Oak Brook, Ill.
Registration Deadline
September 23

Formerly the Revitalizing the Radiology Research Enterprise (RRRE) program, the newly named Creating and Optimizing the Research Enterprise (CORE) workshop will be held Friday and Saturday, Oct. 28 and 29 in Oak Brook, Ill. The workshop will focus on strategies for developing and expanding research programs in radiology, radiation oncology and nuclear medicine departments. The CORE program features a combination of presentations, case studies and group discussions. Register now at RSNA.org/CORE.



RSNA Clinical Trials Methodology Workshop

January 14–20, 2012
Scottsdale/Phoenix, Ariz.
Application Deadline
June 6

Over the course of this 6½-day workshop, each trainee will be expected to develop a protocol for a clinical study, ready to include in an application for external funding. Participants will learn how to develop protocols for the clinical evaluation of

- imaging modalities. 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

Applicants will undergo a competitive selection process for course entrance. Once admitted, trainees will participate in advance preparation, didactic sessions, one-on-one mentoring, small group discussions, self-study and individual protocol development. Familiarity with basic concepts and techniques of statistics and study design is required of all applicants.

NOTE

More information and an application/nomination form for these programs is available at RSNA.org/Research/educational_courses.cfm. Questions can be directed to Fiona Miller at 1-630-590-7741 or fmiller@rsna.org.

RSNA/AUR/ARRS Introduction to Academic Radiology Program

Application Deadline
July 15

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 RSNA 2011 or the ARRS annual meeting in 2012.

RSNA Derek Harwood-Nash International Fellowship

Application Due July 1

International radiologists three to 10 years beyond training are invited to apply for this six- to 12-week fellowship at a North American institution. One or two fellows will be selected.

The application for this program is available at RSNA.org/international/CIRE/dhnash.cfm. For more information, contact Fiona Miller at fmiller@rsna.org or 1-630-590-7741.

Medical Meetings

June – September

JUNE 2–5

Society for Informatics in Medicine (SIIM), Annual Meeting, Gaylord National Resort and Convention Center, Washington, D.C.
• www.siiim2011.org

JUNE 4–8

SNM Annual Meeting, San Antonio Convention Center, Texas
• www.snm.org

JUNE 6–8

U.K. Radiological Congress (UKRC), Manchester Central Convention Centre, England
• www.ukrc.org.uk

JUNE 9–12

World Congress on Interventional Oncology (WCIO), Sheraton New York Hotel & Towers
• www.wcio2011.com

JULY 31–AUGUST 4

The American Association of Physicists in Medicine (AAPM), 53rd Annual Meeting, Vancouver Convention Center, British Columbia
• www.aapm.org/meetings/2011AM

SEPTEMBER 7–10

2011 World Molecular Imaging Congress (WMIC), San Diego Convention Center, Calif.
• www.wmicmeeting.org

SEPTEMBER 14–17

American Society of Emergency Radiology (ASER), Annual Scientific Meeting, Ritz Carlton, Key Biscayne, Miami
• www.erad.org

SEPTEMBER 21–24

International Skeletal Society (ISS), Annual Meeting, Hotel del Coronado, San Diego, Calif.
• www.internationalskeletal-society.com

For Your Benefit

New Learning Modules Make Physics Clinically Relevant

Needing—and wanting—to learn medical physics in order to effectively do their jobs, radiology residents benefit most from a resource that puts the subject into a practical context, according to an RSNA member who has found what he's looking for in the RSNA/AAPM Online Physics Modules.

"Physics is a difficult topic and I wanted to find an educational review that was clinically relevant; the physics modules fit that well," said Sword C. Cambron, M.D., a radiology resident at Dartmouth Hitchcock Medical Center in Lebanon, N.H. "Our program decided to integrate these modules into the curriculum and our physicist is going over questions from the modules in problem-based educational sessions."

The RSNA/AAPM modules were designed to educate radiologists and radiology residents about important concepts in physics as identified in the AAPM Physics Curriculum. Each module was developed by a team of individuals including at least one physicist and one radiologist and was peer reviewed for content and quality.

The Value of Membership

Topics include radiation biology and protection, projection X-ray imaging, fluoroscopy, CT, ultrasound, MR and nuclear medicine. Dr. Cambron said he has reviewed about half of the topics, on his way to completing all of them by the end of his first year of residency. The modules are a great addition to basic physics texts, he said, and the questions at the end of each module are especially helpful.

"I hope the modules continue to be improved with new modules added often," Dr. Cambron said. "We should be asked the kinds of questions that we could be quizzed about every day on our various rotations or by patients concerned about radiation risks."

Access the modules at RSNA.org/Education/physics.cfm.



Cambron

Residents and Fellows Corner

Topics Announced for RSNA 2011 Program

New for RSNA 2011 is a program tailored specifically for residents and fellows, featuring the following sessions, topics and speakers:

Introduction

N. Reed Dunnick, M.D.

Where and When to Look for a Job

Nancy J. McNulty, M.D.

Analyzing the Offer

• Academic Job

Jocelyn D. Chertoff, M.D.

• Clinic Job

Duane G. Mezwa, M.D.

• Small Private Practice

William T. Thorwarth Jr., M.D.

• Large, Subspecialized Private Practice

Arl Van Moore Jr., M.D.

Contract Negotiations

• Philosophical Framework

William G. Bradley Jr., M.D.

• Legal Issues

Lawrence R. Muroff, M.D.

• Quality of Life

Beth A. Erickson, M.D.

How to Get Hired

Vijay M. Rao, M.D.

Advance registration for RSNA 2011 is under way for RSNA members. Visit RSNA2011.RSNA.org for more information.

Cardiopulmonary Imaging Education Available

A new "Residents and Fellows" section on the *Journal of Thoracic Imaging (JTI)* website includes a variety of open-access educational content:

- Cardiopulmonary review articles targeted for examination preparation
- American College of Radiology Appropriateness Criteria® reviews
- Links to online lectures and interactive "unknown" cases created by two of the journal's sponsoring societies, the Society of Thoracic Radiology and the Korean Society of Thoracic Radiology

"This educational initiative will help to fill in the gaps of cardiopulmonary education, especially for residents in training programs that do not have access to subspecialty-trained faculty in cardiopulmonary imaging," said *JTI* deputy editor Gautham P. Reddy, M.D., a professor of radiology at the University of Washington and past-president of the Alliance of Clinician-Educators in Radiology.

See more at www.thoracicimaging.com.



Annual Meeting Watch

News about RSNA 2011

Member Registration and Housing Now Open

RSNA and AAPM members can register now for RSNA 2011. General registration and housing opens June 1. The Advance Registration and Housing brochure is available online at RSNA2011.RSNA.org

Course Enrollment Begins July 6

Course enrollment information will be mailed in late June to all members and 2011 meeting attendees and will also be available online at RSNA2011.RSNA.org. People registering for RSNA 2011 prior to June 8 who wish to view course enrollment information online only can "opt out" of receiving the copy by mail.

RSNA 2011 Spotlights Chicago

Vienna Boys Choir Returns to Chicago

One of the oldest boys choirs in the world and a symbol of Austria for nearly 500 years, the Vienna Boys Choir returns to the Symphony Center with a showcase of traditional and holiday songs sure to delight the whole family. The choir performs one day—Saturday, November 26 at 3 p.m., at the Symphony Center, 220 S. Michigan Ave.

For more information and to order tickets through the Chicago Symphony Orchestra, go to CSO.org/TicketsAndEvents/EventDetails.aspx?eid=4085. To order pre-arranged tickets through RSNA's 2011 tours and events program beginning July 6, go to RSNA2011.RSNA.org.

Take in Chicago's Sights, Sounds at RSNA 2011

RSNA will once again spotlight Chicago's exciting array of sights, sounds and scenery through a series of exciting tours and events during the annual meeting week. On the agenda for 2011:

- "Memphis," the Tony Award-winning musical, at the Cadillac Palace Theater
- Boris Godunov at the Lyric Opera
- Ariadne auf Naxos at the Lyric Opera

The lineup will also feature city tours, shopping excursions, culinary experiences, museum exhibits and much more. RSNA course and tour enrollment opens July 6 at RSNA2011.RSNA.org.



November 27–December 2 | McCormick Place, Chicago



Chicago Symphony Orchestra



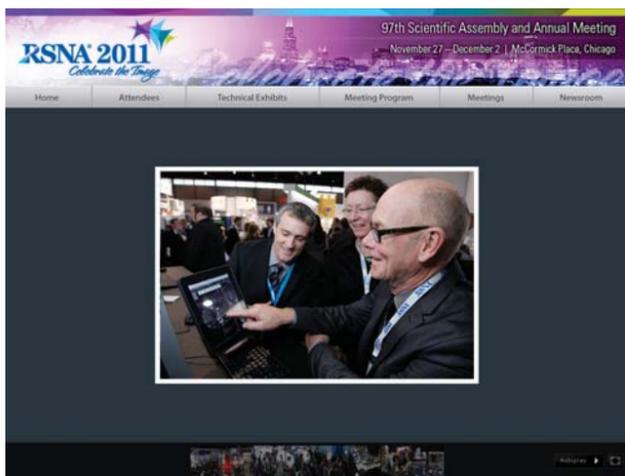
"Memphis"



Lyric Opera

Relive RSNA 2010 in Pictures

As you gear up for RSNA 2011, relive the excitement of RSNA 2010 by viewing the slideshow photo gallery of images spanning the full spectrum of events from last year's annual meeting. Images of classrooms, technical exhibits, award ceremonies, Bistro RSNA and much more are available for viewing through RSNA's annual meeting page at RSNA2011.RSNA.org.



INTERNATIONAL VISITORS International Letters Available— Act Now for Visa

Personalized letters of invitation to RSNA 2011 are available by request during online registration. In addition, the International Visitors section of *RSNA2011.RSNA.org* 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.

RSNA.org

RSNA 2011 Registration

RSNA 2011 advance registration and housing is now open for RSNA and AAPM members. General registration and housing opens June 1. Advance Registration and Housing information is available at RSNA2011.RSNA.org.

Registration is required for various meeting components, including refresher and multisession courses, informatics workshops and RSNA tours and events.

Information from the Profile Page will be used to create your name badge and send your materials prior to the meeting.

On the Demographic Information Page, select various demographics, including subspecialty and continuing education certificate needs.

Booking your hotel reservations gives you a choice of more than 70 hotels offering the lowest rates in Chicago and access to RSNA's free shuttle to McCormick Place. Indicate your arrival and departure dates to see a list of hotels meeting your criteria.

On the Payment Information Page, enter your credit card information. A meeting confirmation will appear and a complete e-mail confirmation of your arrangements will be sent to you within 24–48 hours.



RSNA 2011 Registration

How to Register

There are four ways to register for RSNA 2011:

Fastest way to register!

1 INTERNET

Go to RSNA.org/register

2 FAX (24 hours)

1-800-521-6017

1-847-996-5401

3 TELEPHONE

(Mon.-Fri. 8:00 a.m. – 5:00 p.m. ct)

1-800-650-7018

1-847-996-5876

4 MAIL

Experient/RSNA 2011

568 Atrium Drive

Vernon Hills, IL 60061 USA

Registration Fees

	BY NOV. 4	AFTER NOV. 4	
\$ 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	
165	265	Non-Member Resident/Trainee	
165	265	Radiology Support Personnel	
750	850	Non-Member Radiologist, Physician or Physician	
750	850	Hospital or Facility Executive, Commercial Research and Development Personnel, Healthcare Consultant and Industry Personnel	
300	300	One-day registration to view only the Technical Exhibits	

Important Dates

- May 4** RSNA/AAPM member registration and housing open
- June 1** General registration and housing open
- July 6** Course enrollment opens
- October 21** International deadline to have full-conference materials mailed in advance
- November 4** Final discounted advance registration, housing and course enrollment deadline to have full-conference materials mailed in advance
- Nov. 27 – Dec. 2** RSNA 97th Scientific Assembly & Annual Meeting

For more information about registering for RSNA 2011, visit RSNA2011.RSNA.org, e-mail reginfo@rsna.org or call 1-800-381-6660 x7862.

For Your Benefit

RSNA Discounts Prices on Bundled Refresher Courses

For a limited time, RSNA is offering discount pricing on select refresher courses from past annual meetings. The three-CD Breast Imaging/High Risk Collection (BUN06) and two-CD Dosing Collection (BUN12) are specially discounted at 25 percent off the original bundle price. The discounted price is \$90 for members and \$130 for non-members for BUN06, and \$60 for members and \$100 for non-members for BUN12.



The breast imaging collection focuses on imaging the high-risk patient (from determining exactly who is at risk to recognizing when and how to use particular imaging modalities), while the dosing collection presents practical approaches to

keeping radiation dose at acceptable levels, particularly for CT and mammography exams.

Quantities are limited and the offer is good only while supplies last. To order online, go to RSNA.org/orderCDs and enter

the appropriate BUN number into the Product Code area.

New RSNA 2010 refresher courses will soon be available on CD. As courses become available, they will appear on RSNA.org/education.

myRSNA Web Tip



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STATdx®, an imaging point-of-care, diagnostic clinical decision support system, can be accessed through myRSNA. STATdx streamlines workflow by reducing the time required to research and complete a difficult imaging analysis. The digital format ensures that physicians can access on-demand reference tools wherever and whenever needed—in the hospital, the imaging center or at home. Annual subscriptions are available to individuals and groups.

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COMING NEXT MONTH

Wondering about the future of computers in healthcare? Meet Watson, the IBM Supercomputer designed to help doctors make diagnoses and analyze healthcare resources, including electronic health records and medical journals, in ways that doctors and nurses may not be able to. Read about the recent “Jeopardy” champion in next month’s *RSNA News*.



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