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Superheroes Help Kids Vanquish MRI Fears

ALSO INSIDE:

LOOK AHEAD: *Breast Imaging—1974 to 2015 and Beyond*
SGR Repeal Raises Reimbursement Questions
Quantitative Imaging Data Warehouse Expands
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⁴MR scanning has not been established as safe for imaging fetuses and infants less than two years of age. The responsible physician must evaluate the benefits of the MR examination compared to those of other imaging procedures.

¹American College of Radiology Appropriateness Criteria 2014

²IMV 2014 MR Market Outlook Report

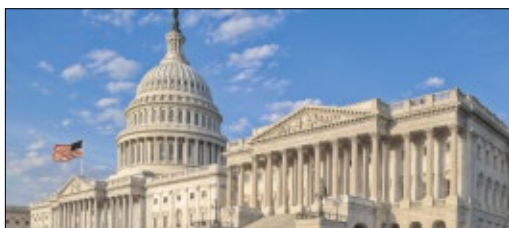
³This option is Pending 510(k) clearance, and is not yet commercially available in the United States.

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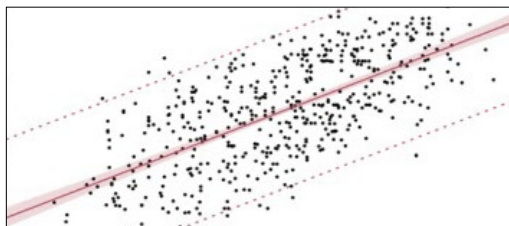
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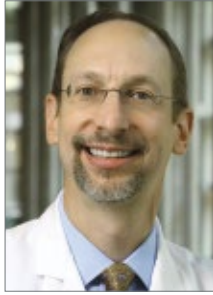
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ARRS Elects Lewin as President



Lewin

Jonathan S. Lewin, M.D., was elected the 115th president of the American Roentgen Ray Society (ARRS) during its recent annual meeting in Toronto. Dr. Lewin serves as the senior vice-president for integrated healthcare delivery and as co-chair for strategic planning at Johns Hopkins Medicine, the Martin Donner Professor and Chairman of the Russell H. Morgan Department of Radiology and Radiological Science at Johns Hopkins University and as radiologist-in-chief at The Johns Hopkins Hospital, with secondary appointments as professor of oncology, neurosurgery and biomedical engineering. Dr. Lewin is a pioneer in interventional and intraoperative MRI whose work has contributed to more than 20 patents.

Fourth Annual International Day of Radiology (IDoR) Focuses on Pediatrics

On Nov. 8, 2015, join 128 medical societies from 68 countries in celebrating the advances that radiologic innovations have brought to patients worldwide.

This year, the International Day of Radiology (IDoR) focuses on pediatric radiology, highlighting the important role that radiology plays in the detection, diagnosis and management of a wide variety of diseases affecting children, and the special treatment younger patients need.

IDoR is sponsored by RSNA, the European Society of Radiology (ESR) and the American College of Radiology (ACR), with a dedicated website (*IDoR2015.com*) and social media activities. The sponsoring societies are joined by the Society for Pediatric Radiology (SPR), World Federation of Pediatric Imaging (WFPI), European Society of Pediatric Radiology (ESPR) and the Image Gently® Campaign in recognizing the valuable contributions radiology has made to pediatric care.

Visit RSNA.org/IDoR for promotional materials you can customize for your practice or organization.



Numbers in the News

52,000

Approximate number of items uploaded to the Quantitative Imaging Data Warehouse—an open-image archive that curates physical test objects, digital reference objects and clinical images with associated meta-data on RSNA.org/QIDW. Read more about the RSNA initiative on [Page 13](#).

14,000

The number of accredited mammography units now operating in the U.S. Read more about the growth of mammography in “Look Ahead—Breast Imaging: 1974 to 2015 and Beyond,” on [Page 4](#).

17

The number of short-term “patches” enacted by Congress to avoid potential reimbursement cuts under the Sustainable Growth Rate (SGR) formula enacted in 1997. Radiology leaders are applauding the recent decision to repeal the much-maligned SGR law and replace it with new legislation. Read more on [Page 7](#).

14

Number of hours of audiovisual presentations available on RSNA’s new Essentials of Radiology flash drive—a lightweight device highlighting a broad spectrum review for general radiologists, residents and subspecialists. Read more on [Page 21](#).

AIUM PRESENTS AWARDS

The American Institute of Ultrasound in Medicine (AIUM) presented its Joseph H. Holmes Clinical and Basic Science Pioneer Awards to **Flemming Forsberg, Ph.D.**, and **Peter W. Callen, M.D.**, at its recent annual meeting in Lake Buena Vista, Florida. Dr. Forsberg is professor of radiology and head of research for the Jefferson Ultrasound Institute at Thomas Jefferson University, Philadelphia. Dr. Callen is emeritus professor of radiology, obstetrics and gynecology at the University of California, San Francisco.

Wesley Lee, M.D., professor of obstetrics and gynecology, section chief of women's and fetal imaging, director of fetal imaging research and co-director of the Fetal Center at Texas Children's Pavilion for Women at the Baylor College of Medicine, Houston, received the William J. Fry Memorial Lecture Award.

David Bahner, M.D., professor and director of ultrasound at the Ohio State University Department of Emergency Medicine, Columbus, received the Peter H. Arger, M.D., Excellence in Medical Student Education Award.

Lisa M. Allen, B.S., ultrasound coordinator and clinical instructor in the Department of Obstetrics and Gynecology, Division of Maternal-Fetal Medicine, at the Regional Perinatal Center, State University of New York Upstate Medical University in Syracuse, received the 2015 Distinguished Sonographer Award.



Forsberg



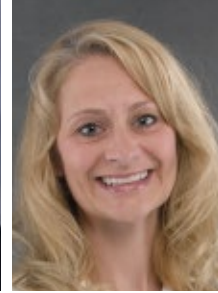
Callen



Lee



Bahner



Allen

RSNA Members Continue to Earn Advanced Level Quality Certificates

Five physicians received Advanced Level Quality Certificates so far this year, bringing the total number of recipients to nine since the program's inception in December 2013. Earning the certificate requires successful completion of Quality Essentials Certificate Courses in four domains – Quality Improvement in Your Practice, Staff and Patient Safety, Customer Satisfaction, and Radiologist Performance Improvement – and exhibition of a Quality Storyboard at an RSNA Annual Meeting.

<i>NAME</i>	<i>INSTITUTION</i>	<i>QUALITY STORYBOARD TITLE</i>
Marco A. Cura, M.D.	Baylor University Medical Center	Safe Use of Radiation During Fluoroscopy Procedures
Jeannie K. Kwon, M.D.	University of Texas Southwestern	Algorithm-based Imaging Approach for More Efficient Imaging Utilization in Suspected Appendicitis in a Pediatric Population
Eduardo J. Matta, M.D.	University of Texas Houston Medical School	Reduction of STAT Final Report Turnaround Times in Body Imaging
Andrew Rosenkrantz, M.D., M.P.A.	New York University Langone Medical Center	Use of a Referring Physician Survey to Direct Departmental-Wide Radiology Quality Improvement Efforts
Susanna C. Spence, M.D.	University of Texas Houston Medical School	Watching the Hours Tick By: Improving the Availability and Efficiency of Limited County MR Resources

To learn more about the RSNA Advanced Level Quality Certificate Program and other Quality Improvement offerings from RSNA, go to RSNA.org/Quality.

Fishman Honored by Miller-Coulson Academy of Clinical Excellence

Renowned radiology educator **Elliot K. Fishman, M.D.**, is among the 2015 inductees into the Miller-Coulson Academy of Clinical Excellence, of Johns Hopkins Mayview Medical Center, Baltimore. Dr. Fishman is director of diagnostic imaging and body CT at The Johns Hopkins Hospital, where he is professor of radiology, surgery and oncology.

A prolific author, Dr. Fishman's clinical and research interests have focused on advanced medical imaging with specific emphasis on 3-D imaging and CT. Dr. Fishman developed the website, www.ctisus.com, which offers thousands of free teaching files and has more than 200,000 users. The website received the Magna Cum Laude at the 2002 RSNA Annual Meeting. Dr. Fishman was named the 2009 RSNA Outstanding Educator and is the co-chair of the RSNA-ACR Public Information Website (RadiologyInfo.org) Committee.

Sponsored by the Center for Innovative Medicine, the Miller-Coulson Academy's mission is to recognize masterful physicians who are steadfastly committed to clinical excellence for the benefit of the patients and communities that they serve.



Fishman

IN MEMORIAM

William Eugene Shiels II, M.D.



William Eugene Shiels II, M.D., a well-known and widely respected innovator in ultrasound, died from pancreatic cancer May 5 in Dublin, Ohio. He was 61.

During his tenure at Nationwide Children's Hospital in Columbus, Ohio, Dr. Shiels introduced groundbreaking procedures for treating children with bone cysts and bone tumors through ultrasound. He was also known for using the technique to treat abnormal clusters of blood vessels.

Born in Cincinnati, Dr. Shiels graduated from Villanova University and the Philadelphia College of Osteopathic Medicine, completing a residency at Tripler Army Medical Center in Honolulu. He served as an army physician for more than 12 years, including a term as chief of pediatric radiology at Walter Reed Army Medical Center and as the radiology consultant to the U.S. Army Surgeon General. He was chief of radiology and a pediatric interventional radiologist at

Nationwide Children's Hospital, Columbus, where he began in 1995, and also served the hospital as president of the Children's Radiological Institute.

Over the course of his innovative career, Dr. Shiels received numerous accolades, including the 2015 Pioneer Honoree award from the Society of Pediatric Radiology (SPR), presented for special contributions to the early development of the specialty.

Among his many accomplishments, Dr. Shiels was a two-time recipient of SPR's John Caffey Award for best science paper and received a grant from the Department of Defense to teach new interventional radiology techniques to aid in the removal of shrapnel in wounded veterans.

Dr. Shiels was a long-time member and most recent track chair of RSNA's How-to/Hands-on Refresher Course Committee, where he also served as faculty to the always popular sessions. From 2002 to 2008, his enthusiasm for educating young students was integral to the "Explore Your Future in Radiology" program that brought Chicago Public Schools students to the RSNA Annual Meeting for lectures and to participate in hands-on workshops led by Dr. Shiels.

THIS MONTH IN THE RSNA NEWS ONLINE VERSION

Get more of this month's news online at 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 cover story on the MRI Heroes Kit designed to help kids combat anxiety about MRI scans, we invite readers to explore an educational video explaining the imaging process in a kid-friendly manner. Readers can also tour RSNA's Quantitative Imaging Data Warehouse (RSNA.org/QIDW) featured in this month's issue.



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LOOK AHEAD

Breast Imaging - 1974 to 2015 and Beyond

BY D. DAVID DERSHAW, M.D.

Mammography was in its infancy 40 years ago. Prospective randomized trials to test its impact as a screening tool were underway or being planned. The impetus to undergo screening grew from the 1974 breast cancer diagnoses of the wives of President Gerald Ford and Vice-President Nelson Rockefeller, but the annual mammogram was rarely part of routine medical care.

By 1987, 35 to 44 percent of women who could afford mammography had undergone the test in the preceding two years; for those without this ability, only 13 to 19 percent had undergone a mammogram. In 1991, there were an estimated 10,000 mammography units operating in the U.S. In 2015, the U.S. Food and Drug Administration (FDA) reported that more than 38 million mammograms had been performed in the U.S., with 62 to 73 percent of women 40 years and older having had a mammogram within the past two years. Some 14,000 accredited mammography units are now operating in the U.S.

In the face of ongoing controversies surrounding the usefulness of mammography, the personal experience of individual women with the early diagnosis of breast cancer and the 30 percent decline in breast cancer mortality in the U.S. continues to override discussions about risks, harm and unnecessary cancer diagnoses. An aggressive approach to imaging screening for high-risk women has become standard practice over the past decade.

The greater demand for mammography helped convince the industry to

work on improving technology. Radiation dose was reduced. Throughout the 1980s, single-emulsion film, screens and grids were developed to improve image quality. In 2000, digital mammography received FDA approval to be marketed in the U.S. Issues with over- or under-exposed film, quality of copied studies, and searches for prior mammograms were obviated. Currently fewer than 5 percent of all mammography units in the U.S. continue to use film. The advancements in mammographic technology have continued with recent introductions of tomography and contrast enhancement.

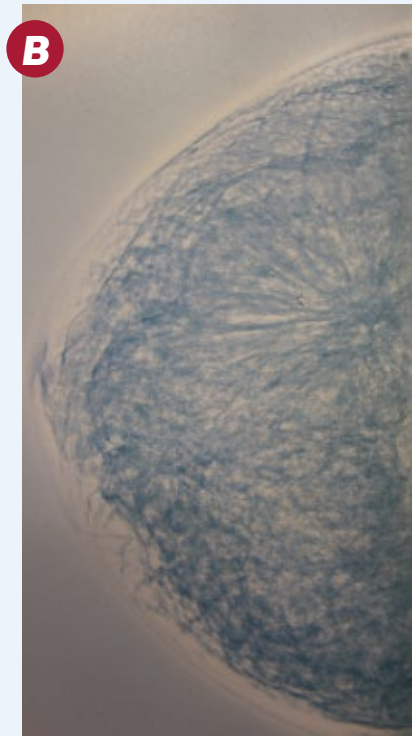
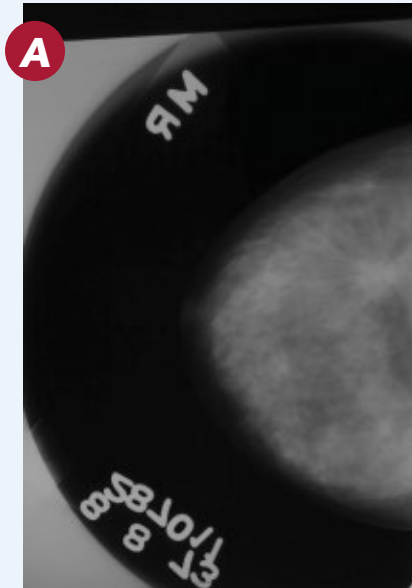
Concern about the quality of some mammography in the U.S. resulted in the development of the American College of Radiology's (ACR) mammography accreditation program in 1987. By 1991 half of the mammography units in the U.S. had voluntarily applied for accreditation and one quarter had received it. The need for national uniformity in mammography standards and the desire to terminate facilities that were performing substandard work caused Congress to pass the Mammography Quality Standards Act

Continued on Next Page



Dershaw

D. DAVID DERSHAW, M.D., is a renowned breast imaging expert who founded the Breast Imaging Service at Memorial Sloan Kettering Cancer Center, New York, and served as its director for 20 years. Dr. Dershaw, who has published more than 200 peer-reviewed articles, invited articles and chapters on breast imaging, has served as president of the Society of Breast Imaging and on the American College of Radiology Breast Imaging Task Force. He has worked to help establish breast cancer screening programs in several nations around the world. Dr. Dershaw is a member of RSNA's Public Information Advisors Network.



A. 1975. Early modern mammography was relatively high dose with part of the film unexposed (white border on left side of image) allowing ambient light through to degrade image interpretation. Labeling was limited to date, medical record number and technologists initials.

B. 1979. Xeromammography was a high contrast technique with blue powder adherent to paper to print the image. It did not stand the test of time.

“More than 10 percent of American women will develop breast cancer. The impact of imaging on these women and those who care about them cannot be understated”

D. DAVID DERSHAW, M.D.

Continued from Previous Page

(MQSA) in 1992 with the requirement in October 1994 that all facilities be accredited. This legislation regulated standards for personnel as well as equipment. While the number of mammography units in the U.S. increased, the number of certified facilities in the U.S. decreased by 10,000 to 9,011 during the first decade of MQSA-mandated FDA regulation. Further improvement in mammography practice became possible with standardized reporting and assessment of practice quality facilitated by the ACR’s development of the Breast Imaging Reporting and Data System (BI-RADS) in 1993. Along with these changes, mammography was increasingly included in residency programs, propelled by formation of the Society of Breast Imaging in 1985 and the incorporation of breast imaging into the examination of the American Board of Radiology in 1990.

Of course, mammography is only part of the story of breast imaging. The value of sonography, initially used to differentiate cysts from non-cysts, became evident in the 1970s. Further experience improved differentiation of benign versus malignant masses. Technical advances included Doppler and elastography. Although not greeted with uniform enthusiasm, the use of sonography as a screening tool has also been more widely incorporated into breast imaging practices.

By the 1990s, MRI was being investigated as an effective breast imaging tool. In 2007, the American Cancer Society included MRI screening for women with a greater than 20 percent lifetime breast cancer risk among their screening recommendations. Now used extensively in breast-imaging practices, the value of MRI for staging and assessing response to treatment as well as screening is widely accepted.

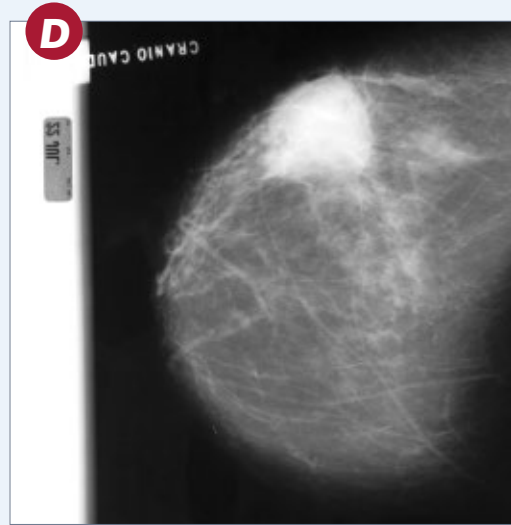
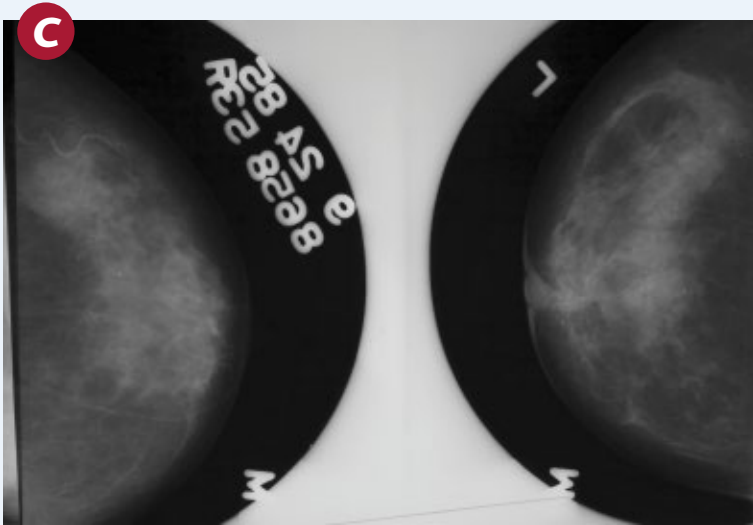
From Mammographer to Breast Imager

As well as being diagnosticians, breast imagers have increasingly become interventionalists. In the 1980s, preoperative localization procedures were an important aid in guiding biopsy surgery and for the treatment of nonpalpable breast disease. Over the next decade, breast imagers—rather than surgeons—became the physicians performing diagnostic biopsies. Today, 90 to 95 percent of breast biopsies are performed with imaging guidance.

The mammographers of 1975 have emerged from their darkened offices lined with view-boxes to become breast imagers—primary care physicians for breast disease who oversee women from screening, through multimodality imaging work-ups, biopsy and on to surveillance after breast cancer treatment. We are pivotal to decisions about breast conservation, neoadjuvant treatment response and genetic testing. Women with breast cancer know our faces and know our names.

Just 30 years ago a woman’s experience was quite different; if a suspected breast abnormality was found there would be days of consultations with specialists, including radiologists and surgeons, followed by a trip to the operating room for a biopsy under general anesthesia. If the tumor was malignant, mastectomy would be performed at the same time. She would awaken in the recovery room to find that her breast had been removed. She would then be facing the prospects of chemotherapy and radiation.

More than 10 percent of American women will develop breast cancer. The impact of imaging on these women and those who care about them cannot be understated. More than one third of women who would have died



of this disease now survive. Five-year disease-free status is better for women whose cancers are found by mammography than for those who are not screened. Along with other medical advances, the detection of smaller tumors has made it possible for oncologists to use less aggressive treatments in many cases. For these women, breast imaging has improved not only the duration, but also the quality of their lives.

But what the future might hold is even more spectacular. With technology that now makes it possible to percutaneously ablate tumors and with therapies that suggest that axillary dissection and negative histologic margins

are becoming less important, the actual treatment of some breast cancers may become the domain of the breast imager rather than the surgeon.

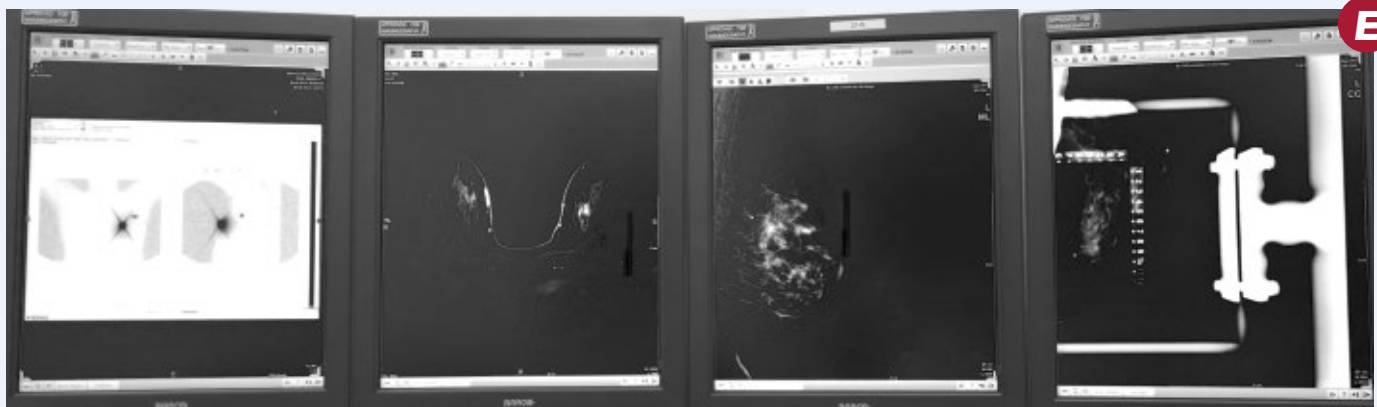
And the patient experience may be completely transformed.

Imagine the day when a healthy woman arrives at the breast center, undergoes screening and a small cancer is found. A biopsy is done at the same time by the breast imager, and the pathology results are quickly available. If the growth is malignant, the breast imager ablates the tumor and the woman goes home. At dinner that evening, her husband asks how her day was. She tells him she had breast cancer for a few hours. □

C. 1985. Image dose was lowered and grids were introduced, improving the image. Excessive ambient light continued to degrade interpretation.

D. 1995. Film improved, cassettes enhanced image information capture and finally the film was fully exposed to block out background light. Film labeling was applied with a flasher and a paper date sticker made it possible to separate examinations filed together in a single folder without holding each film up to the light to see the date.

All Images courtesy of D. David Dershaw, M.D.



E. 2015. The image is now electronic. Exposure can be windowed and leveled to compensate for poor exposure due to technical factors. Additional information is now readily available on other breast imaging studies such as MRI and isotope imaging, which is useful for the radiologist when planning interventional procedures.

SGR Repeal Raises New Reimbursement Questions for Radiology

BY RICHARD S. DARGAN

While Congress has finally repealed the much-maligned Sustainable Growth Rate (SGR) formula, replacing it with a new value-based Medicare reimbursement system, much is still unknown about the new law and what it means for radiologists.

THE SGR REFORM BILL WAS enacted in 1997 as a way to slow the growth of Medicare spending on physician services. The complicated formula linked Medicare physician reimbursements to increases in the gross domestic product. Each year the formula resulted in planned cuts for the following year.

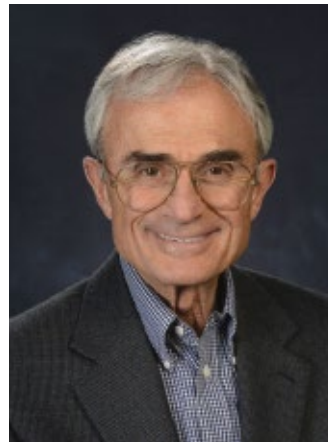
In what became an annual tradition in Washington, D.C., Congress avoided the potentially enormous SGR-related reimbursement cuts by approving a series of short-term “patches.” In all, 17 such patches were passed.

But in a rare display of bipartisan consensus, the House and Senate overwhelmingly passed the Medicare Access and Children's Health Insurance Program (CHIP) Reauthorization Act, or MACRA, that permanently repeals SGR. President Barack Obama signed the bill into law on April 21, ending the use of the SGR formula.

Healthcare organizations, including the American College of Radiology (ACR) and the American Medical Association, applauded the bill that many healthcare leaders say was a long time in coming.

“This legislation is long overdue,” said David Levin, M.D., professor and chairman emeritus of the radiology department at Thomas Jefferson University Hospital, Philadelphia. “It means that physicians can finally get out from under the constant threat of cuts.”

“The SGR formula was flawed from the inception,” added Cynthia R. Moran, executive vice-president, Government Relations, Economics & Health Policy at ACR in Washington, D.C. “It was a bad policy that hung around way too long and Congress decided to pass this bill even without deciding how to pay for it.”



Levin



Rao

“It is very good news that the SGR formula was repealed. There are many unknowns about how the new system will impact radiologists.”

VIJAY M. RAO, M.D.

Value-based Measure Adds Incentives

The new legislation replaces the SGR with a 0.5 percent increase in Medicare physician reimbursement over the last half of 2015, and then annual 0.5 percent increases lasting through 2019. No increases are scheduled from 2020 through 2025.

The measure adds incentives intended to increase efficiency and control cost. A merit-based incentive payment system (MIPS) will replace current incentive programs that terminate in 2018. MIPS allows for physicians to earn additional reimbursement for performing well on metrics in four categories: quality of care, resource use, meaningful use of electronic health records (EHRs) and clinical practice improvement activities.

“Physicians will either be penalized or receive a bonus depending on how they meet those quality measurements,” Moran said.

Potential bonuses could be significant, rising from 12 percent in 2020 to 27 percent in 2022, while penalties will start at 4 percent in 2020 and increase to 9 percent two years later.

“This legislation is the result of most policymakers acknowledging that the fee-for-service,



The new law—the Medicare Access and Children’s Health Insurance Program Reauthorization Act, or MACRA—permanently repeals the Sustainable Growth Rate (SGR) formula, helping to bring an end to the substantial reimbursement hits directed at radiology for many years.

volume-driven model is unsustainable, and that they want to reorient delivery systems away from quantity toward quality,” Moran said.

The measure also would offer higher fees to physicians who participate in value-based alternative payment models such as accountable care organizations (ACOs).

Radiologists Should Prepare for Next Steps

Although the new legislation is a welcome relief, radiologists need to start preparing for the transition, according to Vijay M. Rao, M.D., the David C. Levin Professor and Chair of Radiology at Jefferson Medical College of Thomas Jefferson University, Philadelphia, and the RSNA Board of Directors Liaison for Information Technology and Annual Meeting.

“It’s a good thing that the bill passed, but we radiologists need to think quickly about how to prepare for the next steps,” Dr. Rao said.

The new system promotes transition from volume based to one that rewards improvements in quality of care. Key questions include how radiologists will get paid through alternative payment models. Some of the quality measures for the new incentive payment system and alternative payment models have yet to be defined, Dr. Rao said.

The law is not paid for, but there is expectation that the move from volume to quality will result in lower costs, eventually enabling the SGR repeal to pay for itself.

“The next few years are critical to make sure the program evolves in the way people hope it will,” Moran said. “This transition represents a real opportunity to improve flaws in the current system.”

Concurs Dr. Rao: “It is very good news that the SGR formula was repealed. There are many unknowns about how the new system will impact radiologists.”

While the transition could be difficult for radiologists, Moran sees a potential silver lining.

“Radiologists were poster children for fee-for-service and volume-driven medicine for decades,” she said. “This new law is moving toward different models of delivery, which will allow radiologists to get back into the clinical setting and interact more with patients and physicians.” □

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

International Standard in Development for Size-Specific Dose Estimate

BY MARY HENDERSON

A new CT dose metric, the size-specific dose estimate (SSDE), is moving toward becoming an international standard. Developed by a task group of the American Association of Physicists in Medicine (AAPM), SSDE offers a better estimate of patient dose and may serve as an improved dose management tool.

IN JANUARY 2015, the International Electrotechnical Commission (IEC) convened a 20-member team to develop a universal method of calculating SSDE. Members from the Medical Imaging and Technology Alliance (MITA), liaisons from the U.S. Food and Drug Administration (FDA) and medical physicists in clinical

practice are working on developing uniform methodologies for calculating SSDE and determining how SSDE data should be displayed and recorded.

Although they are voluntary, standards set by the IEC—an organization that develops standards for safety and performance of electrical devices throughout the world—are often incorporated into the standards of the American National Standards Institute (ANSI) and the National Electrical Manufacturers Association (NEMA), as well as FDA regulations and regulations of other countries.

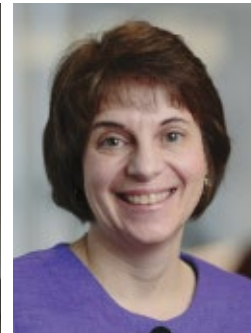
SSDE adds a new metric with a new value to current dosimetry metrics—CT dose index (CTDI_{vol}) and dose length product (DLP)—which essentially measure radiation output rather than individual patient exposure. CTDI_{vol} and DLP were defined by the IEC and recognized by the FDA in the 1980s.

“A parent who takes a child to the hospital for a CT scan today and asks what radiation dose the child received is unable to get that information from the equipment,” said Marilyn J. Goske, M.D., professor of radiology and pediatrics at the University of Cincinnati School of Medicine and co-chair of the Alliance for Radiation Safety in Pediatric Imaging/Image Gently. “Radiation output of equipment was not intended for use for a specific patient. But in the radiologist’s report, there’s a dose report page that lists CTDI_{vol} and DLP. That’s confusing.”

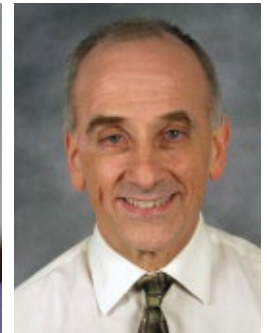
“Radiologists are used to seeing CTDI_{vol} and DLP numbers, but may forget that they aren’t



Goske



McCollough



Strauss

“Size-specific dose estimate will give radiologists, technologists, referring physicians, parents and patients relevant radiation dosage based on the patient’s size.”

MARILYN J. GOSKE, M.D.

patient-specific—they reflect how the machine is being operated,” added Cynthia H. McCollough, Ph.D., director of the CT Clinical Innovation Center and X-ray Imaging Core at the Mayo Clinic in Rochester, Minn.

In addition, interpreting the displayed CTDI_{vol} or DLP as the estimated patient dose can lead to overestimating or underestimating dose levels because of discrepancies in body size versus that of the calibration phantom.

“CTDI_{vol} underestimates the radiation dose being given to small children and smaller adults,” said Keith J. Strauss, M.Sc., a clinical imaging physicist at Cincinnati Children’s Hospital Medical

Center. “It gives clinicians a false sense of security. When you look at CTDI, it may look like quite a low dose, but the actual dose may be double for kids.”



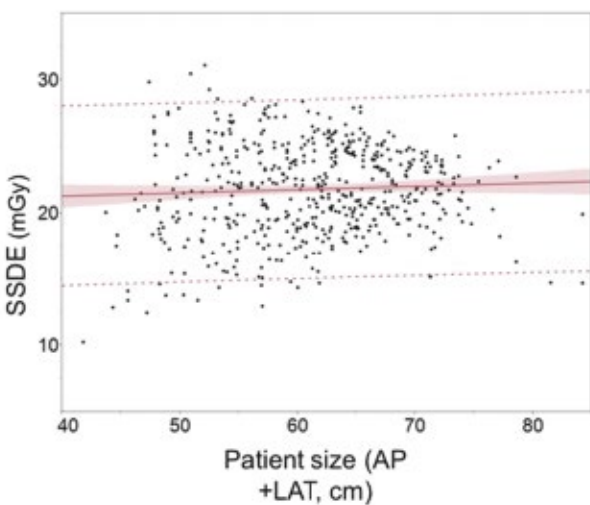
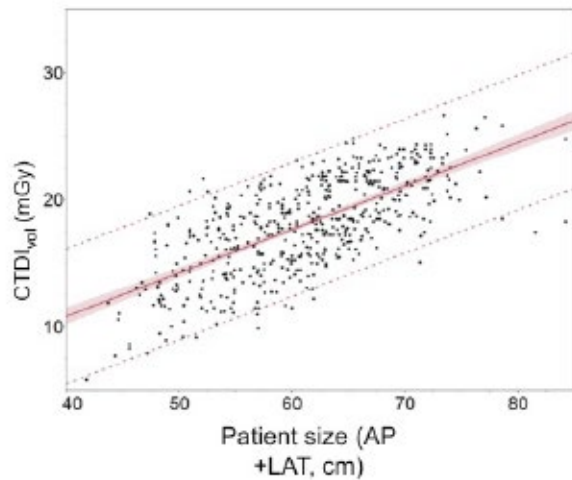
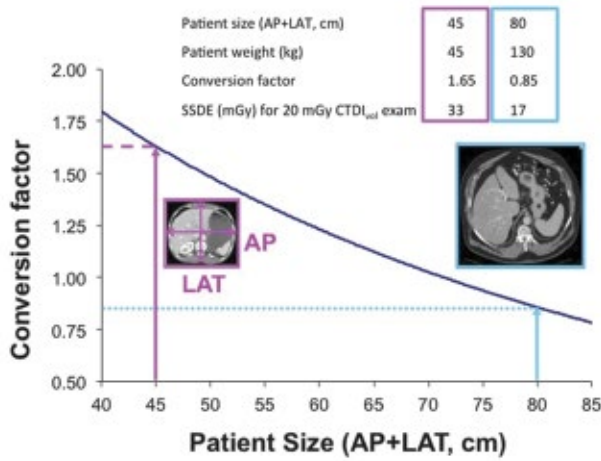
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AAPM Task Group Charged With Creating a Better Dose Metric

In response to organizations concerned with imaging pediatric patients, the American Association of Physicists in Medicine (AAPM) formed a task force dedicated to developing a better CT dose metric.

“The Alliance for Radiation Safety in Pediatric Imaging/Image Gently got the ball rolling in 2008 when they held a summit and asked vendors and stakeholders to help create a better dose index,” Strauss said.

In 2011, the AAPM task group—which included Dr. McCollough and Strauss, as well as Dr. Goske



Top: Demonstration of the higher patient dose (represented by size-specific dose estimate (SSDE) delivered to a smaller patient relative to a large patient, for the same scanner output (represented by CTDI_{vol}). Here the patient size is represented by the sum of the anteroposterior (AP) and lateral (LAT) patient dimensions in the center of the scan range. In practice, the scanner output would be lower for the smaller patient and the difference in dose (SSDE) would be minimal. **Center:** From left: in 545 adult patients undergoing abdominal CT, the scanner output (CTDI_{vol}) increased proportional to the sum of the anteroposterior (AP) and lateral (LAT) dimensions, measured in the center of the scan range. **Bottom:** After conversion to patient dose (SSDE), there is no statistically significant relationship between patient size and dose, demonstrating that the use of higher scanner output values (CTDI_{vol}) in larger patients (to obtain adequate image quality) does not necessarily translate to increased patient dose in larger patients.

as a consultant—published an AAPM Report 204 that included conversion factors to translate CTDI_{vol} to SSDE in accordance with patient size. Recently, another AAPM working group, chaired by Dr. McCollough, published AAPM Report 220, which describes how to best measure patient “size.”

“SSDE has been quickly and broadly embraced, which really shows that it was a concept whose time had come,” Dr. McCollough said.

“SSDE is much more accurate at estimating dose for patients of all sizes,” added Strauss.

Once the IEC working group reaches an international consensus on methods for calculating SSDE—a process that could take up to four years—the standard could then be incorporated into equipment design and clinical practice.

“I expect that the user community and stakeholders will push to have manufacturers implement [the SSDE standard] as soon as possible,” said project team leader John W. Jaeckle, chief regulatory affairs strategist at GE Healthcare.

Developing the international standard is a huge endeavor and a step in the right direction, according to Dr. Goske.

“Size-specific dose estimate will give radiologists, technologists, referring physicians, parents and patients relevant radiation dosage based on the patient’s size,” she said.

In addition to improving the monitoring and reporting of patient dose, SSDE will also help radiologists address issues of optimal image quality.

“For instance, two CT scans of the abdomen could each have a CTDI_{vol} of 20 mGy, but one patient may be tiny and the other very large in size,” Dr. McCollough said. “You might not be concerned about this because a CTDI_{vol} of 20 mGy is reasonable for CTs of the abdomen. However, for the smaller patient, the CT images would be incredibly sharp because too much dose would have been used; but for the very large patient, images would be difficult to interpret because not enough radiation was used. SSDE addresses that problem by providing a dose value that takes into account patient size.”

As a dose management tool, SSDE will also facilitate more meaningful dose comparisons and notification values for the NEMA/MITA Smart Dose standard, that helps ensure patients are imaged using optimal radiation dose and that the dose is being tracked and reported in a standardized manner. Beginning January 1, 2016, healthcare providers will be required to ensure that their CT scanners comply with this standard.

“The formula will be worked out and standardized for all variations, which means we will be able to compare apples to apples and collect and analyze data and identify outliers,” Dr. McCollough said. “SSDE is a solid data point people can trust.”

While the SSDE international standard is in development, radiology practices can obtain SSDE calculations for diagnostic CT exams by participating in a dose registry. For example, the American College of Radiology Dose Index Registry automatically calculates SSDE from an institution’s dose data, allowing for comparisons to other institutions. □

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For more information on the International Electrotechnical Commission, go to www.iec.ch.

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

Conquering Childrens' Fear of MRI with the Help of Superheroes

BY FELICIA DECHTER

A Denver teenager with a form of autism was daunted by the MRI scans he regularly needed. So just before Christmas in 2014, his mother phoned Robert J. Min, M.D., chairman of radiology at Weill Cornell Medical College, N.Y., to tell him that her son was excited to hear about a new program that could help battle his fear: Marvel: The MRI Heroes Kit.

"SHE CONTACTED ME and said that all her son wanted for Christmas was an MRI Heroes Kit and that if he received one, he was sure that he could do his scans without sedation," said Dr. Min, also radiologist-in-chief at NewYork-Presbyterian Hospital and president of Weill Cornell Imaging at NewYork-Presbyterian.

Dr. Min knows first-hand that having an MRI can be a scary experience for anyone, but especially for a child who may be getting his or her first scan. The machine's loud clanging noise, the confining space and the amount of time sometimes needed to complete the scan can terrify patients, especially children, to the point of requiring sedation.

So at RSNA 2013, Dr. Min approached a Siemens Healthcare representative and shared some of his thoughts about putting together an educational program to help combat children's fear of MRI scans.

"The result was the MRIahero! Program, a collaborative effort between Siemens, Weill Cornell Imaging at NewYork-Presbyterian and Marvel Custom Solutions," Dr. Min said. The MRI Heroes Kit is one element of the MRIahero! Program, which was officially launched at Times Square in New York City in October and highlighted at RSNA 2014.

Distributed by Siemens to radiology departments, the MRI Heroes Kit aims to change the way kids—and their parents—feel about the scans by educating them in a fun, non-intimidating way. And easing their fears translates to the highest-quality scans possible.

The departments receive the following: 100 copies of an educational comic book, 100 superhero-themed capes, 100 Captain America and Iron



Min and superheroes

Image courtesy of Robert J. Min

"The MRI Heroes Kit helps reduce the anxiety of children and their parents, and may offset the need for sedation in some instances."

ROBERT J. MIN, M.D.

Man plush toys, a mini-model of a Siemens MRI scanner and an educational DVD. Each child gets a comic book, a stuffed Captain America or Iron Man, and a superhero cape after their scan. They can also play with the model MRI scanner and are encouraged to watch the six-minute educational video, which—through the eyes of a 10-year-old girl recounting her MRI exam experience—details what children and parents should expect during their visit.

"We encourage parents to sit and watch the video with their kids before the scan," Dr. Min said. "By helping children understand what an MRI is, including what it looks like, what it sounds like, and what it does, I am convinced we can make a difference."

Kit Helps Curb Sedation

Often it isn't nerves about the MRI, but the fear of undergoing sedation that causes parents to withhold a test their child may need, or to go through it filled with anxiety, Dr. Min said.



ON THE COVER

The MRI Heroes Kit is part of the MRIahero! Program, which was officially launched at Times Square in New York City (left) in October and highlighted at RSNA 2014. The MRIahero! Program is a collaborative effort between Siemens Healthcare, Weill Cornell Imaging at NewYork-Presbyterian and Marvel Custom Solutions.

Image courtesy of Siemens Healthcare



Part of the MRI Heroes Kit, the comic book (right) explains in simple language what an MRI is and how it works. Above: After Captain America injures his arm in battle, Iron Man urges him to go to the hospital for an MRI, where the nurse assures him, "Getting an MRI is no big deal." Because he can't carry his metal shield into the MRI exam room, Captain America is given an Iron Man plush toy to hold during the exam. Parents can read the comic to their kids and answer questions, while kids can take the comic book into the MRI waiting room. Images courtesy of Siemens Healthcare



"The MRI Heroes Kit helps reduce the anxiety of children and their parents, and may offset the need for sedation in many instances," Dr. Min said. "Safety and efficiency go up while costs come down."

By reviewing the previous year's MRI scans performed on 4- to 12-year-olds with sedation, Dr. Min was able to quantify the potential impact of the program and determine where to direct the initial educational efforts.

"I was surprised to discover how many MRIs are currently performed with sedation," Dr. Min said. "If even 50 percent of last year's MRI scans can be accomplished without sedation, that is obviously a huge benefit to patients first and foremost, and a huge benefit to healthcare in general, because we are improving safety while driving down costs significantly."

The kit also de-stigmatizes the MRI process for children, said Linda Tait, Siemens Healthcare product manager for the MRI Heroes Kit.

"Parents are surprised by how simple and powerful the kit really is," Tait said. "With it, they now know what to expect for their children. It's been really well received. We're very proud of it."

Siemens Healthcare worked hand-in-hand with Marvel to make the comic book as fashionable and true to Marvel as possible, Tait said. In the comic book, Captain America's nagging shoulder pain

following a heated battle prompts Iron Man to urge his reluctant, anxiety-filled partner to obtain an MRI scan, sending the message that if Captain America can lie still during an MRI exam, so can anyone else—and that it's OK to be nervous or scared.

"We see the patients as the true superheroes, and believe they deserve a superhero cape and toy to take home after their MR exam, as well as a special comic book developed just for them," Tait said. "We couldn't be happier with the end result."

When an enjoyable educational program becomes part of routine imaging practice, positive results will follow—and not just in children, Dr. Min said.

"Adults can benefit from getting educated on what to expect from an MRI exam too," Dr. Min said. "Helping to improve the pediatric patient experience can improve not just the ability to care for these patients, but also their families' satisfaction with the organization as a whole." □

FELICIA DECHTER is a Chicago-based freelance writer specializing in healthcare topics.

WEB EXTRAS

For more information on the MRI Heroes kit, go to usa.healthcare.siemens.com.

To view an educational video explaining the imaging process in a kid-friendly manner, go to RSNA.org/News.

Quantitative Imaging Data Warehouse Supports Research Needs

BY PAUL LaTOUR

Meeting the informatics needs of the quantitative imaging community was the impetus behind RSNA's new Quantitative Imaging Data Warehouse (QIDW) project in 2011, an open-image archive that curates physical test objects, digital reference objects (DRO) and clinical images with associated metadata at RSNA.org/QIDW.

THE QIDW IS PUBLICLY available to support operational needs for basic research in quantitative imaging, including secondary analysis of archived images and metadata. The warehouse—a joint effort of RSNA's Quantitative Imaging Biomarkers Alliance (QIBA) and Radiology Informatics Committee (RIC)—allows bulk loading of files, storage, retrieval and data mining of structured and related non-image information (covariates, clinical and laboratory data, pathology results, protocol descriptions, etc.), and offers users the ability to query archive contents by the image tags and associated metadata, allowing data “mining” of the archive contents.

“We wanted to make sure the data warehouse was first and foremost widely available to the public so individuals can easily access data from a breadth of imaging modalities,” said Edward F. Jackson, Ph.D., newly appointed Chairman of the QIBA Steering Committee. Dr. Jackson has been involved with the QIDW project from the outset.

Dr. Jackson, chair of the Department of Medical Physics at the University of Wisconsin School of Medicine and Public Health in Madison, began as a beta-tester during the early development of the warehouse, uploading diffusion-weighted imaging data into the system and testing various data acquisitions and data transfers into and out of the QIDW.

Dr. Jackson described an example of a diffusion-weighted MRI project undertaken by QIBA's Perfusion-Diffusion-Flow Biomarker Committee that relied on the QIDW.



Jackson



Andriole

“Through that process, investigators uploaded data from multiple centers, both domestic and international, allowing project leaders to access and analyze the data, and then provide results,” Dr. Jackson said. “Use of the QIDW is being expanded in terms of diffusion-weighted imaging projects to allow 13 different QIBA site investigators to acquire data at multiple time points using a standardized isotropic diffusion phantom, and all of that data will also be uploaded to the site.”

A QIBA/RIC Task Force was formed in July 2011 to develop the warehouse. About six months later, a pilot site was created, and the QIDW was officially launched in May 2013. Initially use of the QIDW was only open to QIBA

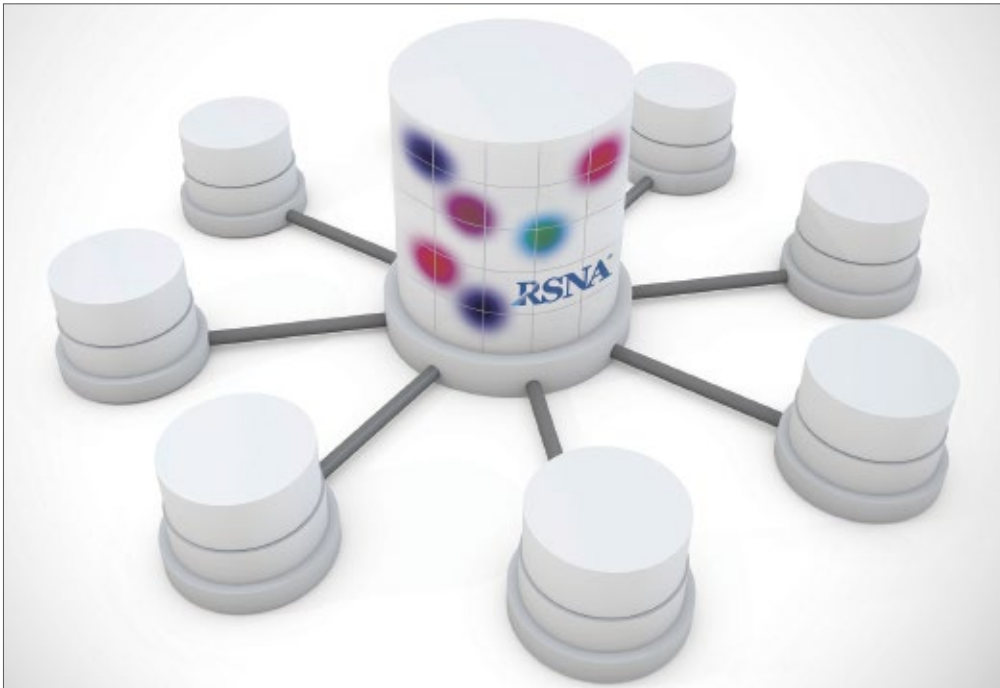
workgroup members in order to track who was accessing the data and for what reason, to test performance and ease-of-use, and to determine how it was being utilized.

Since RSNA 2014, there has been a push to make the QIDW more visible by promoting its Internet search engines.



“We wanted to make sure the data warehouse was first and foremost widely available to the public so someone can easily access that information across a breadth of modalities.”

EDWARD F.
JACKSON, PH.D.



The Quantitative Imaging Data Warehouse (QIDW)—a joint effort of RSNA’s Quantitative Imaging Biomarkers Alliance (QIBA) and Radiology Informatics Committee (RIC)—is publicly available to support operational needs for basic research in quantitative imaging, including secondary analysis of archived images and metadata.

“The first step was building the database and making sure we had something that was useable,” said Katherine P. Andriole, Ph. D., associate professor of radiology and director of imaging informatics at Brigham & Women’s Hospital in Boston, an RIC member and chair of the QIBA RIC Collaboration Committee. “Now we’re interested in looking at how we can make this more discoverable so other researchers outside of QIBA start using it. The more data in there, the more valuable the warehouse becomes,” she added.

Data, Users Continue to Expand

Seven modality-based data communities are currently available to registered users for viewing and downloading both phantom and DRO images and their associated quantitative protocols: COPD/ Asthma Phantom Images; DCE-MRI Digital Reference Object; DCE-MRI Work Group; Diffusion-Weighted Imaging (DWI) Phantom; FDG-PET/CT DRO; Functional MRI (fMRI) DRO; and US-SWS Digital Phantoms.

As of May, the QIDW has 169 registered users and over 52,000 items have been uploaded. Recently the RSNA Board of Directors approved opening up the site to allow de-identified human clinical data to be included in the QIDW.

The QIDW continues to evolve, with ongoing discussion among the QIBA community about what additional functionality and features they would like to see developed. “People have been using it in a variety of ways, in addition to testing protocols they’ve designed,” Dr. Andriole said. For instance, they have tested it for calibrating scanners, looking at display stations, testing imaging procedures and looking at different image analysis software.

Although QIDW access is free, users must complete a registration form to gain access. The form is used to help the QIBA and RIC members better understand who is using the warehouse (researchers, industry experts, and/or clinical individuals) and what they are using it for.

“It’s a collaborative space where free and open-source tools are used. Charging for access was a barrier for many researchers who might be seeking preliminary data before applying for funding,” Dr. Andriole said.

The QIDW project has been funded in part by the RSNA as well as from federal funds from the National Institute of Biomedical Imaging and Bioengineering, National Institutes of Health and Department of Health and Human Services. □

PAUL LaTOUR is an *RSNA News* staff writer.



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☑ Access the Quantitative Imaging Data Warehouse at RSNA.org/QIDW.

☑ For more information on QIBA and to access the QIBA Newsletter, go to RSNA.org/QIBA.

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Gregory Chang, M.D.

"In some ways, it all started with that RSNA
 Research Resident Grant. My first RSNA grant
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 Mark A. Smith, M.S., A.R.R.T.
 Gemma Solana, B.A.
 Ray Somcio, M.D.
 Tanop Srisuwan, M.D.
 Robert M. Steinberg, M.D.
 Roberta M. Strigel, M.D., M.S. &
 Ben Walker
 Leizle E. Talangbayan, M.D. &
 Glenn Gabisan
 Thomas J. Toffoli, M.D.
 Zsoka E. Vajtai, M.D.
 Ester P. Van der Wal, M.D. &
 Djavid Hadian, M.D.
 Cornelis F. van Dijke, M.D., Ph.D.
 Roque Sara & Publio J. Vargas, M.D.
 Gabor A. Volford, M.D.
 Jessica Wen
 Mark E. Whitley, M.D.
 Ali Zahiri, M.D.

INVEST



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HITACHI COMMITS TO INSPIRE-INNOVATE-INVEST CAMPAIGN

The Research & Education (R&E) Foundation is proud to announce that Hitachi Medical Systems America (HMSA), Inc., has generously made a new \$300,000 commitment to support R&E's Inspire-Innovate-Invest Campaign. As a Vanguard donor for 25 years, HMSA has supported 16 research seed and resident grants.

"Hitachi Medical Systems is pleased to support the RSNA Research & Education Foundation," said Sheldon Schaffer, HMSA vice-president and general manager of MR/CT. "We appreciate the value of this research contribution to the continuing advancement of medical imaging."

HMSA offers a broad range of patient-friendly diagnostic imaging equipment including MRI, CT and OT. Its innovations drive clinical solutions to deliver diagnostic confidence, improve workflow efficiency, and provide a better patient experience. In addition, HMSA is known for its comprehensive customer support programs that maximize the lifecycle value of equipment through responsive service maintenance, significant software upgrades and ongoing applications support.

RSNA thanks Hitachi for its continued support.

HITACHI
 Inspire the Next

Radiology in Public Focus

Press releases were sent to the medical news media for the following articles appearing in recent issues of *Radiology*.

Sex Differences in Working Memory after Mild Traumatic Brain Injury: A Functional MR Imaging Study

Female patients with mild traumatic brain injury (MTBI) had lower digit span scores than female control subjects, and functional MRI (fMRI) depicted sex differences in working memory functional activation, new research shows.

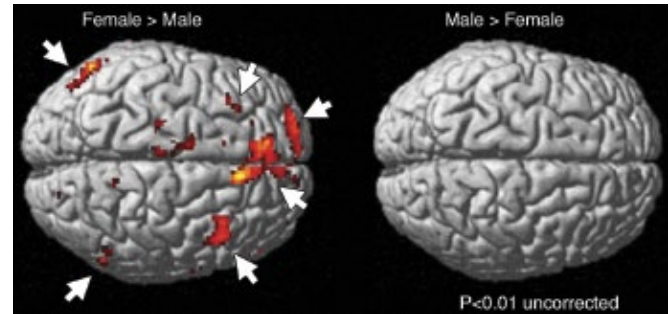
Hui-Ling Hsu, M.D., of the University Shuang-Ho Hospital in Taiwan, and colleagues used fMRI to assess 30 patients (15 consecutive men and 15 consecutive women) with MTBI and 30 control subjects (15 consecutive men and 15 consecutive women). Two imaging studies were performed in patients: the initial study, which was performed within one month after the injury, and a follow-up study, which was performed six weeks after the first study.

For each participant, digit span and continuous performance testing were performed before fMRI. Among female participants, the total digit span score was lower in the MTBI group than in the control group ($P = .044$). In initial working memory fMRI studies, hyperactivation was found in the male MTBI group and hypoactivation was found in the female MTBI group compared with control male and female groups, respectively.

At the six-week follow-up study, the female MTBI group showed persistent hypoactivation, whereas the male MTBI group showed a regression of hyperactivation at visual comparison of activation maps. The male MTBI group also demonstrated a higher initial β value than the male control group ($P = .040$), and there was no significant difference between the male MTBI group and the male control group ($P = .221$) at follow-up evaluation, which was comparable to findings on activation maps.

In the female MTBI group, average β values at both initial and follow-up studies were lower compared with those in the female control group but were not statistically significant ($P = .663$ and $P = .191$, respectively).

"The sex differences in MTBI outcomes might lead to future development of separate management strategies for men and women with MTBI. Also, fMRI has the potential to not only provide useful objective diagnostic information associated with working memory functional sequelae, but also to provide a sensitive measurement with which to monitor disease progression and treatment," the authors write.



Sex differences of working memory functional activation in healthy control subjects in response to increased working memory load (two-back > one-back condition). A voxel-by-voxel comparison of female (left image) and male (right image) control subjects shows more activation (arrows) in female control subjects than in male control subjects (display threshold, $P < .01$).

(*Radiology* 2015;35:424-437) ©RSNA 2015 All rights reserved. Printed with permission.

New on *RadiologyInfo.org*

Do you know someone interested in becoming a radiologist? Encourage them to visit the *RadiologyInfo.org* Understanding Radiology page to learn more about the radiology specialty, the role a radiologist plays in a patient's healthcare and what it takes to become a radiologist. Check out the Professions in Radiology page for more topics and information on radiology careers.

- Understanding Radiology:
www.radiologyinfo.org/en/careers/index.cfm?pg=understanding
- Professions in Radiology:
www.radiologyinfo.org/en/careers/

RadiologyInfo.org
For patients

Media Coverage of RSNA



In April, 1,041 RSNA-related news stories were tracked in the media. These stories reached an estimated 624 million people.

Coverage included *U.S. News & World Report*, *Chicago Tribune*, *Today.com*, *Philly.com*, *Boston.com*, *KCBS-TV* (Los Angeles),

KCAL-TV (Los Angeles), *WGN-AM* (Chicago), *WBBM-TV* (Chicago), *KING-TV* (Seattle), *NBCNews.com*, *WebMD*, *Medical News Today*, *RedOrbit* and *DOTmed Business News*.

JULY PUBLIC INFORMATION OUTREACH ACTIVITIES FOCUS ON CONTRAST MATERIAL AND MRI

In July, RSNA's 60-Second Checkup radio program will focus on the use of gadolinium-based contrast material when performing brain MRI.

New Research Shows Gadolinium May Remain in the Brain after Contrast MRI

New research suggests that some types of gadolinium-based contrast agents (GBCA) used in MRI exams may remain in the brain for years, but that the long-term effects are unknown.

Three recent online *Radiology* studies show that the administration of some types of GBCAs results in notably varied levels of accumulation of residual gadolinium in the brain and bones of patients, even those with normal renal function.

In their single-center study, "Intracranial Gadolinium Deposition after Contrast-enhanced MR Imaging," Robert J. McDonald, M.D., Ph.D., of the Mayo Clinic, Rochester, Minn., and colleagues examined signal intensities from T1-weighted MR images and postmortem neuronal tissue samples from 13 patients who underwent at least four GBCA-enhanced brain MR examinations between 2000 and 2014 (contrast group) and compared them with those from 10 patients who did not receive GBCA (control group). Using inductively coupled plasma mass spectrometry, transmission electron microscopy and light microscopy, researchers confirmed the presence of gadolinium in the neuronal tissues of the global pallidus, dentate nuclei, pons and thalamus. They observed a direct relationship between the amount of gadolinium detected in their brains and the total cumulative lifetime gadodiamide doses for each of the 13 gadodiamide-exposed patients, which also correlated well with the degree of T1 shortening observed in these tissues.

In their study, "Gadolinium-based Contrast Agent Accumulates in the Brain Even in Subjects without Severe Renal Dysfunction: Evaluation of Autopsy Brain Specimens with Inductively Coupled Plasma Mass Spectroscopy," Tomonori Kanda, M.D., Ph.D., of Teikyo University

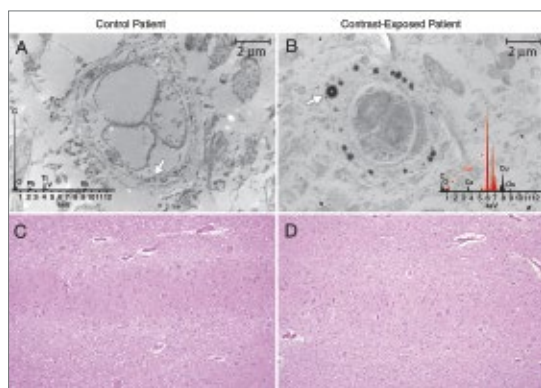
School of Medicine in Tokyo, and colleagues concluded that GBCA administration causes gadolinium accumulation in the brain, especially in the dentate nucleus (DN) and globus pallidus (GP), even in subjects without severe renal dysfunction.

Alexander Radbruch, M.D., J.D., of the University of Heidelberg Medical Center, Germany, and colleagues determined that a signal intensity increase in the DN and GP on T1-weighted images is caused by serial application of the linear GBCA gadopentetate dimeglumine but not by the macrocyclic GBCA gadoterate meglumine in their study, "Gadolinium Retention in the Dentate Nucleus and Globus Pallidus Is Dependent on the Class of Contrast Agent."

Present data now confirm that long-term multi-year residual gadolinium at these observed levels is a reality for some, but not all, of the GBCAs, according to the accompanying editorial in the June issue of *Radiology*, "Residual or Retained Gadolinium: Practical Implications for Radiologists and Our Patients," by Emanuel Kanal, M.D., of the University of Pittsburgh Medical Center, and Michael F. Tweedle, Ph.D., of Ohio State University.

"As we are now discovering new information regarding the biodistribution and pharmacokinetic behavior of at least some of these GBCAs, we suggest that the radiology community should consider these findings when using these agents," Drs. Kanal and Tweedle write.

Access the full *Radiology* studies and accompanying editorial at RSNA.org/Radiology.



Tissue localization and cellular response to gadolinium deposition. A, B, Transmission electron micrographs (0.2% lead citrate stain; original magnification, x10 000) of dentate nuclei tissue samples of, A, control patient 4 and, B, contrast group patient 13. X-ray spectra are also shown for selected electron-dense foci (arrow); gadolinium peaks in spectra are indicated by red overlay. C = carbon, Cs = cesium, Cu = copper, Gd = gadolinium, O = oxygen, Os = osmium, Pb = lead, Ti = titanium, V = vanadium. C, D, Photomicrographs from light microscopy (hematoxylin-eosin stain; original magnification, x100) of dentate nuclei from, C, control patient 4 and, D, contrast group patient 13.

(*Radiology* 2015;275:3:783-791) ©RSNA 2015 All rights reserved. Printed with permission.

Value of Membership

CME Gateway Makes CME Tracking Easy

CME Gateway—a tool developed by RSNA to help physicians track earned CME credits from multiple organizations in one central location—makes tracking your progress toward American Board of Radiology (ABR) Maintenance of Certification (MOC) easy.

Users can link their MyABR account to CME Gateway at www.cmegateway.org for automatic reporting of earned CME credits directly to ABR, eliminating the need to re-enter credits on the ABR website.

Users can register their CME Gateway account to link with any participating organization by inputting their society-specific username and password. After that, users can link their myABR account to CME Gateway for automatic reporting of credits to ABR. Users must be a member in good standing to successfully link to a participating society account with CME Gateway.

CME Gateway requests CME information by cross-referencing a member-specific user name and ID for each participating organization and compiling the data for easy retrieval. Users who have linked multiple society accounts will be able to view and generate aggregate reports of CME earned with participating institutions for easy tracking and record-keeping.

For free signup to CME Gateway and more information, go to www.cmegateway.org.



Journal Highlights

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

Endovascular Interventions for Acute and Chronic Lower Extremity Deep Venous Disease

The third most common cardiovascular disease, lower extremity deep venous disease is economically burdensome, debilitating and associated with significant morbidity.

Nevertheless, significant progress has been

made in understanding the disease and how and when to intervene.

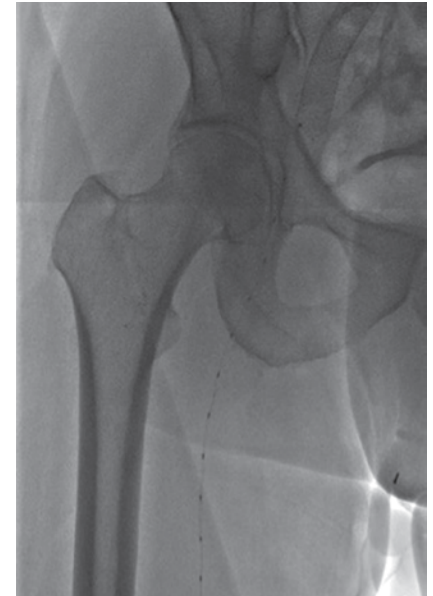
In a State of the Art article published in the July issue of *Radiology* (RSNA.org/Radiology), Akhilesh K. Sista, M.D., of Weill Cornell Medical College in New York City, and colleagues comprehensively review the state-of-the-art in the endovascular management of lower extremity deep venous disease in two sections.

Section one focuses on the epidemiology, consequences beyond pulmonary embolus (i.e., the post thrombotic syndrome, or PTS), patient selection for catheter-directed intervention, and outcomes of prior and modern techniques.

Section two covers thrombotic and non-thrombotic chronic lower extremity venous disease including imaging and clinical assessment, non-interventional management, endovascular techniques, post-procedure management and outcomes data.

Endovascular management of lower extremity deep venous disease is complex and dynamic, with new treatments emerging to treat its deleterious acute and chronic manifestations, according to the authors.

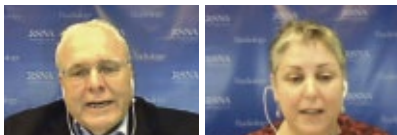
"Advances in knowledge, endovascular techniques, and medical devices have made venous interventions safer and more effective. It is therefore likely that these minimally invasive and often effective techniques will continue to play an important role in the treatment of lower extremity deep venous disease; their exact role will be determined by their continued evolution and the results of prospective clinical trials," the authors write.



Spot fluoroscopic image of US-assisted catheter infusion in a patient with common femoral and femoral deep venous thrombosis. Note the caudal aspect of an external iliac stent.

(*Radiology* 2015;276:1:31-53) ©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 May issue of *Radiology* at RSNA.org/Radiology-Podcasts.

- "Breast Cancer: Radiogenomic Biomarker Reveals Associations among Dynamic Contrast-enhanced MR Imaging, Long Noncoding RNA, and Metastasis," Shota Yamamoto, M.D., and colleagues.
- "Multiphase CT Angiography: A New Tool for the Imaging Triage of Patients with Acute Ischemic Stroke," Bijoy K. Menon, M.B.B.S., M.D., and colleagues.

"Golden Oldies" Spotlighted in July *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 July issue spotlights advancements in neuroradiology, including:

- "Cerebral blood volume maps of gliomas: comparison with tumor grade and histologic findings," 1994
- "Blood-Flow-Magnetic-Resonance Imaging," 1985
- "Mid-line anomalies of the brain; their diagnosis by pneumoencephalography," 1946

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.

Radiology
GOLDEN OLDIES

High-Resolution Microscopy-Coil MR Imaging of Skin Tumors: Techniques and Novel Clinical Applications

Microscopy-coil MR imaging presents an opportunity for radiologists to develop new clinical relationships in a novel area of radiologic practice.

In an article in the July-August issue of *RadioGraphics* (RSNA.org/RadioGraphics), Matthew J. Budak, M.D., of the University of Alberta Hospital in Edmonton, Alberta, Canada, and colleagues provide an overview of the role of radiology

RadioGraphics in diagnosing skin lesions, which is generally limited to local and distant staging of melanomas, and depiction of cutaneous manifestations of systemic disease processes. Little in the literature describes applicable imaging techniques for evaluation of non-melanocytic skin tumors in routine practice.

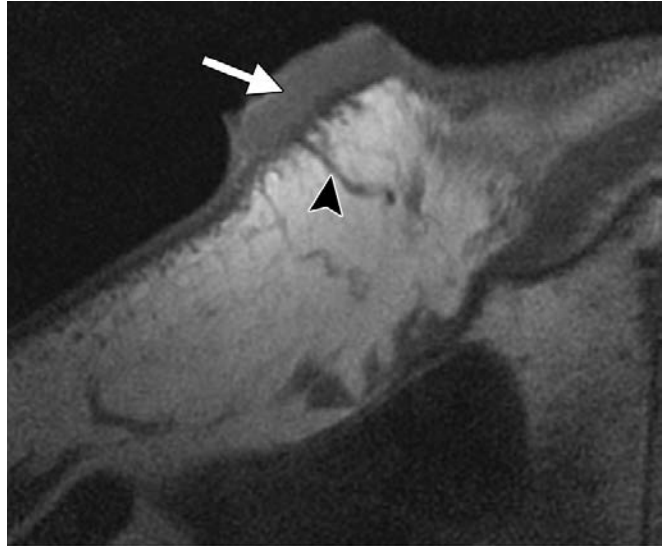
Microscopy-coil MR imaging uses a small surface coil and a 1.5-T or higher MR imaging system. Simple T1- and T2-weighted imaging protocols can be implemented to yield high-quality, high-spatial-resolution images that provide an excellent depiction of dermal anatomy. The primary application of microscopy-coil MR imaging is to delineate the deep margins of skin tumors, thereby providing a preoperative roadmap for dermatologic surgeons. The technique is particularly useful for performing Mohs micrographic surgery—especially in cases of nasofacial neoplasms, where the underlying anatomy is complex.

Basal cell carcinoma (BCC) is the most common non-melanocytic skin tumor and has a predilection to manifest on the face, where it can be challenging to achieve complete surgical excision while preserving cosmetic dignity. Microscopy-coil MR imaging provides dermatologic surgeons with valuable preoperative anatomic information that is not available at conventional clinical examination.

“The most immediate application of microscopy-coil MR imaging takes advantage of its ability to define the deep margins and anatomic relationships of skin tumors such as BCCs. Of particular importance is the ability to determine preoperatively whether a skin tumor extends into deep sub-dermal structures such as muscle, periosteum, and cartilage,” the authors write.

This article features an invited commentary by Ari M. Blitz, M.D., and Nafi Aygun, M.D., of the Russell H. Morgan Department of Radiology and Radiological Sciences, Johns Hopkins University, Baltimore, Maryland; and Daniel A. Herzka, Ph.D., of the Department of Biomedical Engineering, Johns Hopkins University School of Medicine.

SA-CME is not available for this article.

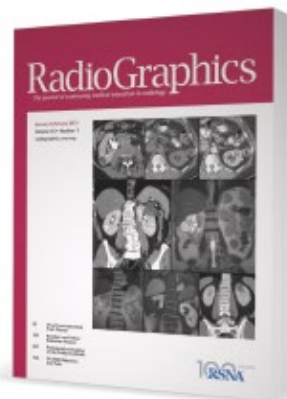


BCC of the right cheek in a 57-year-old man. Axial T1-weighted microscopy-coil MR image shows an elevated nipple-like BCC involving the epidermis and dermis (arrow). The lesion shows characteristic T1-weighted intermediate signal intensity. A clear fat plane is seen between the lesion and deep underlying structures. Note the feeding vessels coursing into the base of the tumor (arrowhead).

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

Become a *RadioGraphics* Reviewer

Those interested in becoming a *RadioGraphics* reviewer or in learning more about the peer review process are invited to watch a video podcast featuring *RadioGraphics* Editor Jeffrey S. Klein, M.D., and *RadioGraphics* Editorial Board members Mindy Horrow, M.D., and David DiSantis, M.D. Access the tutorial at RSNA.org/RadioGraphics.



Download the RSNA Journal Apps

Radiology and *RadioGraphics* mobile apps are available in the App Store for the iPhone® and iPad® and in Google Play for Android® devices. The apps are free to download. Learn about features and functionalities here:



Radiology

<https://itunes.apple.com/us/app/radiology-radiological-society/id741007884?mt=8>



RadioGraphics

<https://itunes.apple.com/us/app/radiographics-radiological/id741063884?mt=8&id741007884?mt=8>

Education and Funding Opportunities

Essentials of Radiology Now Available on Flash Drive

Previously only available at the RSNA Annual Meeting, RSNA's new Essentials of Radiology is now offered on flash drive. The attractive, lightweight device holds more than 14 hours of audiovisual presentations, highlighting a broad spectrum review for general radiologists, residents and subspecialists.

Subspecialty areas include: Breast Imaging, Cardiac Imaging, Chest Imaging, Genitourinary Imaging, Musculoskeletal Imaging, Neuro Imaging, Pediatric Imaging, Postoperative Gastrointestinal Imaging, and Ultrasound.

The RSNA Essentials of Radiology is also a perfect teaching companion. Use the collection to let world-class RSNA Annual Meeting speakers teach residents about topics including Evaluation of Adult Congenital Heart Disease with CT (Cardiac Imaging), The Mediastinum: A Case-Based Approach (Chest Imaging), Pattern-based Approach to White Matter Disease (Neuro Imaging), and Pediatric Ingested Foreign Objects: Recognition and Triage (Pediatric Imaging), among many others. The collection also includes access to content on non-interpretive skills for radiologists including "What Every Radiologist Needs to Know about Medicare" and "Quality—What is it and How to Improve It."

Purchase The Essentials of Radiology at RSNA.org/Essentials-Collection or visit RSNA.org/library and click the banner at the top of the page. The collection is \$175 for RSNA members, \$250 non-members.



RSNA/AUR/ARRS Introduction to Academic Radiology Program

Nominations are being accepted through
July 15, 2015

Sponsored by RSNA, the American Roentgen Ray Society (ARRS) and Association of University Radiologist (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, Nov. 29-Dec. 3, 2015, or the ARRS Scientific meeting in Los Angeles, April 17-22, 2016. A monetary award will be given to the departments of accepted applicants to be used to help advance the applicant's academic career. More information and application/nomination forms are available at RSNA.org/ITAR.

New Topics Added for 2015 CORE Workshop: Register Now

The 2015 Creating and Optimizing the Research Enterprise (CORE) workshop will be held Friday and Saturday, October 2-3, 2015 in Oak Brook, Ill. The workshop will focus on strategies for developing and/or expanding research programs in radiology, radiation oncology and nuclear medicine departments. New sessions include "Managing Research Finances in the Era of Constrained Resources" and "Building Diversity in Imaging Research." The CORE program features a combination of presentations, case studies and group discussions.

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

RSNA Advanced Course in Grant Writing: Final call for Applications

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

Accepted participants are responsible for travel expenses for each session. Hotel accommodations will be provided by RSNA. There is no separate fee for this course. For more information and to download an application, go to RSNA.org/AGW.

For Your Calendar

JULY 20–23, 2015

The Association for Medical Imaging Management (AHRA), Las Vegas
 Visit the *RSNA Booth*
 • www.ahraonline.org

SEPTEMBER 22, 2015

Faculty Skills Update
 Westin O'Hare, Chicago
 Registration Now Open
 • 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

OCTOBER 2-3, 2015

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

OCTOBER 18–21, 2015

American Society for Radiation Oncology (ASTRO), San Antonio
 Visit the *RSNA Booth*
 • www.astro.org

NOVEMBER 28, 2015

NIH Grantsmanship Workshop and RSNA/ARR Study Section Reviewers Workshop
 McCormick Place, Chicago
 RSNA 2015 Course Enrollment Opens July 8
 • 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 Now Open
 • RSNA.org/Register

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

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

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

FIND MORE EVENTS AT
RSNA.org/Calendar.aspx

Annual Meeting Watch

News about RSNA 2015

Important Dates for RSNA 2015

- July 8** Meeting program available
- October 16** International badge mailing deadline
- November 6** Deadline for discounted registration and hotel reservations



RSNA 2015 Registration

There are four ways to register for RSNA 2015:

- 1. Internet**
 Fastest way to register!
 Go to 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

For more information about registration at RSNA 2015, visit RSNA.org/Register e-mail rsna@experient-inc.com, or call (800) 650-7018.

Continued on Next Page

Continued from Previous Page

Hotels

Book your hotel reservation today

Top Reasons to Reserve Hotel Rooms Through RSNA

- **Lowest Rates:** More than 80 hotels in the heart of the city offering a wide range of options and price points and the lowest rates possible.
- **Flexible Terms:** Book today, and have the flexibility to change or cancel a reservation without charge up to 72 hours prior to arrival.
- **Easy Booking:** Easily book a hotel while registering for RSNA 2015.
- **Customer Service:** RSNA acts as an advocate if a dispute or problem arises and is also available to assist with a housing questions or concerns.
- **Supporting the Association:** Booking through our system helps RSNA negotiate the best deals on room rates.
- **Free Transportation:** Free Metra train service to Randolph Street Station, as well as shuttle bus service between all RSNA-contracted hotels and McCormick Place.



New Hotels for 2015

RSNA has expanded its hotel list by adding the following new hotels to the housing block:

- Chicago Athletic Association
- Hyatt Centric the Loop Chicago
- Loews, Chicago
- Virgin Hotels, Chicago



Buy Bistro RSNA Tickets Now

Avoid long lines by purchasing Bistro RSNA tickets earlier this year. Advance tickets to Bistro RSNA—which provides a comfortable setting for attendees to eat, meet, and network during the annual meeting—are only \$22 per ticket.

Bistro RSNA is located in both Technical Exhibit Halls. The daily lunch menu includes salads, soup, entrée choices, vegetables, pasta and more. Menu price includes full meal, beverage choices and dessert.

Purchase tickets in advance at RSNA.org/Register.

**Bistro
RSNA®**

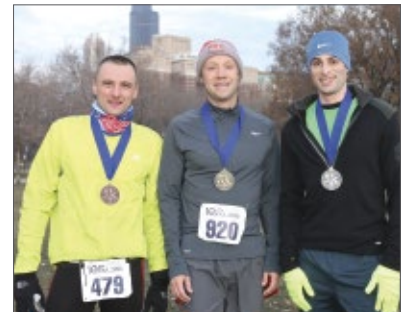
5k Fun Run



Enjoy a 5k event with your colleagues along Chicago's beautiful Lake Michigan shore and help fuel critical research to keep our specialty at the forefront of healthcare. Sign up as a runner or walker for the 5k Fun Run during the online registration period or onsite at McCormick Place. Your registration donation of \$40 will benefit the RSNA R&E Foundation and is fully tax deductible. Participants receive a commemorative T-shirt.

Event Date:

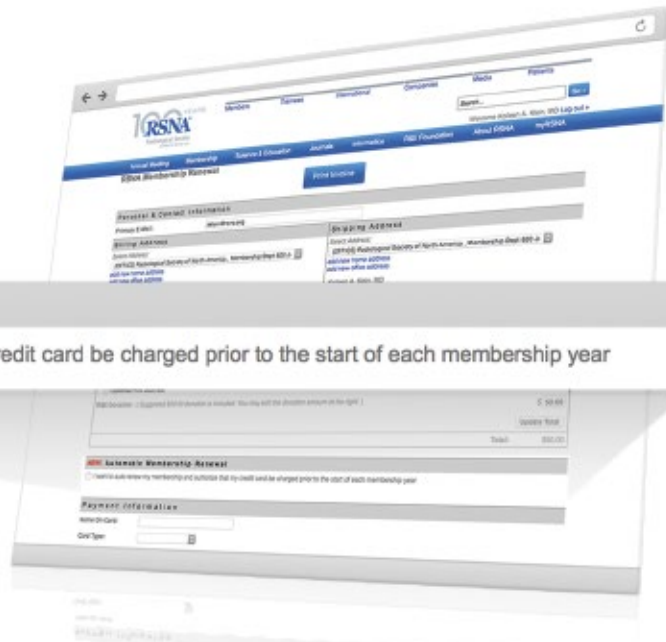
Tuesday, December 1 • 6:30 a.m. • Arvey Field, South Grant Park, Chicago



Meeting Central is Your Go-to Spot for RSNA 2015

Keep an eye out for the July launch of the RSNA 2015 Meeting Central site at Meeting.RSNA.org, offering one central location for registered attendees to plan their meeting experience. In August, *RSNA News* will feature a full report on Meeting Central in the *RSNA.org* section.

No Need to Remember: Try RSNA's Automatic Membership Renewal



NEW! Automatic Membership Renewal

I want to auto-renew my membership and authorize that my credit card be charged prior to the start of each membership year

It can be easy to forget about renewing your RSNA membership each year. For your convenience, Members can now opt-in for RSNA's automatic membership renewal program.

If you opt-in, on or about October 1 of each year (starting with renewal for 2016), RSNA will charge the designated credit card for annual membership dues based on the level of membership at the time of renewal, journal format choice, and specified donation amounts. Check the box on the payment page and fill in credit card information when renewing online, or check the "Automatic Renewal" box when completing credit card information on the print membership invoice.

Your membership will be automatically renewed until further notice from you. Automatic membership renewal ensures your membership benefits will continue without interruption.

Other exclusive member benefits include:

- **Free advance registration to the RSNA Annual Meeting**
the world's premier event in medical imaging.
- **Subscriptions**
Membership includes free online subscriptions to *Radiology* and *RadioGraphics*, the most essential journals in the field, and to *RSNA News* for the latest news on issues affecting the radiology community.
- **Online education resources**
Access to premier online education resources available for *AMA PRA Category 1 Credit™*.
- **Grant opportunities**
Launch your research and education career with grant opportunities from the Research & Education (R&E) Foundation.



For more information on automatic membership renewal or any of the other exclusive membership benefits, contact membership@rsna.org.

COMING NEXT MONTH

In August, *RSNA News* will report on recent *Radiology* research shedding new light on the safety of gadolinium-based contrast agents.



A NEW
CENTURY
BEGINS

100^{RSNA} 2015

INNOVATION
IS THE KEY
TO OUR FUTURE

November 29 – December 4
Meeting.RSNA.org