RSNA News™
April 2015 Volume 25, Issue 4

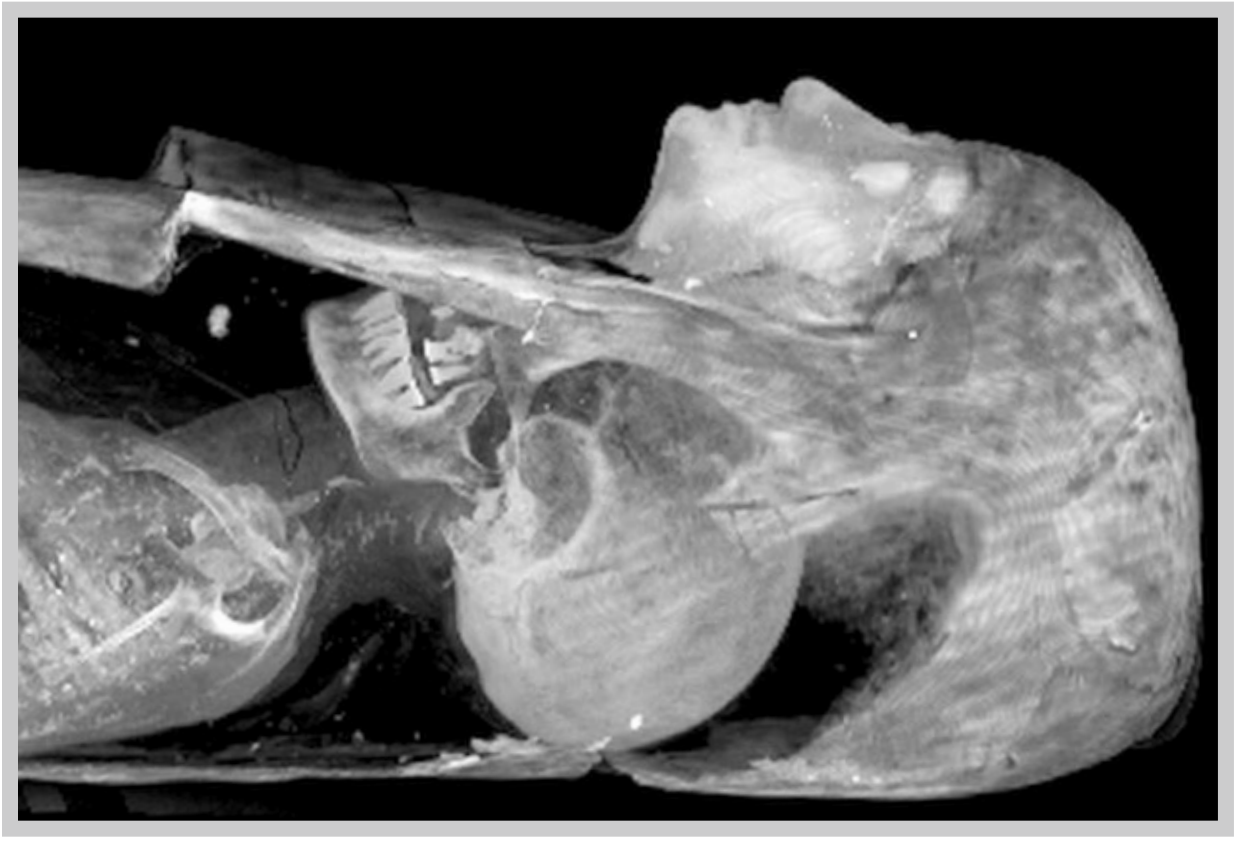

Image courtesy of Barry D. Daly, M.D., University of Maryland Medical Center

Art World Draws on Imaging to Examine Artifacts

ALSO INSIDE:

Advance Registration and Housing Open April 29
See Page 23

NEW
RSNA ESSENTIALS OF RADIOLOGY COLLECTION

COURSES FROM RSNA ANNUAL MEETING

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- Non-interpretive Skills
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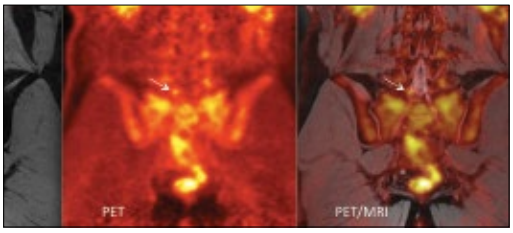
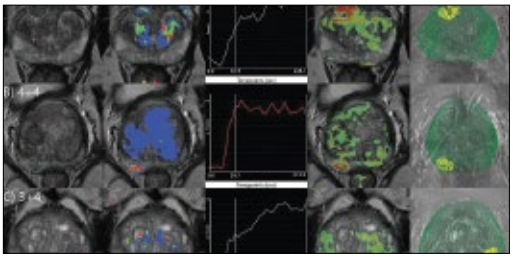
RSNA Education

APRIL 2015 • VOLUME 25, NUMBER 4

RSNA News

FEATURES





UP FRONT

RADIOLOGY'S FUTURE

NEWS YOU CAN USE

RSNA MISSION

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

Follow us for exclusive news, annual meeting offers and more!

TELL A COLLEAGUE: *Renew RSNA Membership Now*

RSNA members who did not renew their membership by Dec. 31, 2014, ceased receiving their RSNA publications, including *RSNA News*. Know someone who hasn't renewed? Encourage them to retain all the benefits of RSNA membership by renewing today at *RSNA.org/Renew*.

Members who are transitioning from training into practice pay reduced rates their first and second years. For more information, contact *membership@rsna.org*, 1-877-RSNA-MEM (776-2636) or 1-630-571-7873 (outside the U.S. or Canada).

Those interested in learning about RSNA retired status, which requires no membership dues and includes free advance registration for the annual meeting, can go to *RSNA.org/Retired_Member_Application*.

GE Healthcare Renews Commitment During the Inspire-Innovate-Invest Campaign

RSNA is proud to announce that GE Healthcare has made a new $1 million commitment in support of the RSNA Research & Education (R&E) Foundation and Inspire-Innovate-Invest, The Campaign for Funding Radiology's Future®.

"GE Healthcare is proud to continue our commitment to the R&E Foundation as part of the Inspire-Innovate-Invest Campaign," said Rob Reilly, GE Chief Marketing Officer, Americas.

A 1989 founding Vanguard donor company, GE Healthcare has been one of the Foundation's strongest supporters. In its time as a Vanguard company, GE has enabled more than $4.5 million in research and education grants.

Karim Karti, Vice-President and Chief Marketing Officer, GE Healthcare, (*left*) and current RSNA Board member and former R&E Foundation Chair, James P. Borgstede, M.D.

The impact of these awards was evident throughout the halls of McCormick Place during RSNA 2014, with current and former recipients presenting on 150 topics. The power of GE Healthcare's support is demonstrated through the outstanding professional accomplishments of those grant recipients.

GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world. From medical imaging, software and IT, patient monitoring and diagnostics, to drug discovery, biopharmaceutical manufacturing technologies and performance improvement solutions, GE Healthcare helps medical professionals wdeliver great healthcare to their patients.

GE Healthcare's impact will continue to inspire for many years to come.

Numbers in the News

5

Number, in billions, of potential audience members reached by media coverage of RSNA 2014. Read about the topics covered and the media where stories were published, on Page 18.

116

Number, in millions, of American adults affected by chronic pain. Turn to Page 11 to learn how MR neurography has emerged as an exciting new modality in pain detection and management.

193

Percentage increase in cost when a chest port is placed in an operating room rather than an interventional radiology suite, according to a study funded by the RSNA Research & Education Foundation. Read more on Page 9.

1218

The year, AD, in which a Gothic reliquary believed to contain the bones of the 7th century Christian Saint Amandus was made. Staff at Baltimore's Walters Art Museum relied on radiologists and 3D-CT images in determining the container was created 150 years earlier than previously believed. Turn to Page 5 to learn how curators around the world are increasingly relying on a range of modalities as critical tools in examining ancient artifacts.

CMS issues final CT lung cancer screening approval

In a major victory for individuals at high risk for lung cancer, the U.S. Centers for Medicare and Medicaid Services (CMS) recently released its final decision memo to cover CT lung cancer screening. The memo contained several changes from last fall's draft decision memo—smokers may now be screened up to age 77 rather than age 74. And the memo was written with a strong emphasis on facilities maintaining a detailed registry of lung cancer patients.

CMS will cover the exam for individuals age 55-77 years with a 30 pack-year smoking history and who currently smoke or have quit within the past 15 years (one pack-year = smoking one pack per day for one year; 1 pack = 20 cigarettes). CMS will require providers to submit clinical and follow-up data to an approved registry.

For more information, go to *CMS.gov/medicare-coverage-database/details/nca-decision-memo*.

Applications Accepted Through April for Eyler Editorial Fellowship

Applications are still being accepted for the RSNA William R. Eyler Editorial Fellowship. The one-month fellowship offers the opportunity to work with *Radiology* Editor Herbert Y. Kressel, M.D., in Boston and *RadioGraphics* Editor Jeffrey S. Klein, M.D., in Burlington, Vt. The Eyler fellow will also visit the RSNA Publications Department at RSNA Headquarters in Oak Brook, Ill., and work with the *RadioGraphics* editorial team at RSNA 2015.

Radiology
RadioGraphics

The application deadline for the Eyler fellowship is May 1. Learn more at *RSNA.org/RSNA_Editorial_Fellowships*.

IVP Program Headed to Four Countries in 2015

Destinations have been selected for the 2015 RSNA International Visiting Professor (IVP) program. The IVP program annually sends teams of experts to lecture at national radiology society meetings and teach at selected host institutions with radiology residency training programs in developing nations. Destinations for 2015 are:

Nicaragua—July
Mexico—July
Chile—October
Bangladesh—December

During his 2014 visit to Argentina with the RSNA IVP team, *RadioGraphics* Editor Jeffrey S. Klein, M.D. (*far right*), engaged with radiology colleagues at Hospital Alemán in Buenos Aires.

RSNA—which also provides educational materials to host institutions—has supported the IVP program since 1986. The IVP program is made possible by the support of Agfa HealthCare and Fujifilm Medical Systems.

For more information about the RSNA IVP program, please go to *RSNA.org/IVP*.

Updates for Journal Mobile Apps Available

Radiology and *RadioGraphics* mobile apps have been updated and are available in the App Store for the iPhone® and iPad® and in Google Play for Android® devices. The apps are free to download.

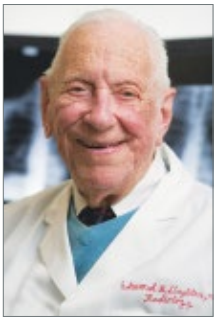
Features include:

- Updates for iOS8
- Now save up to one year of journal content to your device
- Simplified navigation to SA-CME exams
- Automatic pairing of your device when you access the app from your institution's Wi-Fi
- Minor bug fixes and usability improvements

To learn more about the features and functionalities of the RSNA journal apps, go to *Pubs.rsna.org/page/help/mobileoptions.*

IN MEMORIAM

Edward B. Singleton, M.D.



Edward B. Singleton, M.D., who devoted his 60-plus year career to pediatric radiology, died Jan. 10 in Houston. He was 94.

Dr. Singleton received many honors during his illustrious career, including the RSNA Gold Medal in 1995. He also was honored with gold medals from the Texas Radiology Society, the American Roentgen Ray Society, the American College of Radiology and the Society of Pediatric Radiology. Born Oct. 20, 1920, in Galveston, Texas, Dr. Singleton graduated from the University of Texas in Austin and earned his medical degree from the University of Texas Medical Branch (UTMB) in Galveston. A tuberculosis diagnosis while in medical school led him to radiology rather than pursuing a career as a surgeon, which would have been too demanding given his condition.

After his residency, Dr. Singleton served in the Air Force while based in Alaska before returning to radiology. In 1953 he became chief of radiology at two combined hospitals being built in Houston—Texas Children's Hospital and St. Luke's Episcopal Hospital. He later became a professor of radiology at both Baylor College of Medicine and the University of Texas Health Science Center in Houston.

In recognition of his 60-plus year legacy and devotion to pediatric radiology, the Texas Children's Hospital board of trustees established the Edward B. Singleton, M.D., Chair in Pediatric Radiology in 2012. At the time, Dr. Singleton was chief emeritus of radiology at Baylor College of Medicine and Texas Children's. In October 2011, Dr. Singleton was awarded the Baylor College of Medicine Excellence in Teaching Award for the 2010-2011 academic year.

Dr. Singleton was also the recipient of UTMB's 1980 Ashbel Smith Distinguished Alumnus Award, the university's highest medical alumni honor. In 1991, the Society of Gastrointestinal Radiologists awarded him the Walter B. Cannon medal for his outstanding contributions to the field. The following year, Dr. Singleton was named as a Distinguished Physician at St. Luke's.

Dr. Singleton was involved with RSNA in various ways throughout his career, including serving as advisory editor for the *Radiology* editorial board from 1975-1984. He presented the Annual Oration in Diagnostic Radiology at the RSNA Annual Meeting in 1980.

IN MEMORIAM

Ferenc A. Jolesz, M.D.

Considered one of the great innovators in advanced imaging technology, Ferenc A. Jolesz, M.D., died Dec. 31, 2014, at 68. He was director of the MR imaging division and the image-guided therapy program at Brigham and Women's Hospital (BWH) in Boston.

Born in Budapest, Hungary, on May 21, 1946, he earned his medical degree from Semmelweis Medical School in 1971 and completed his research fellowship in biomedical engineering at K. Kando College of Electrical Engineering. He completed his residency in neurosurgery at the Institute of Neurosurgery (Budapest).

Dr. Jolesz was invited to the U.S. in 1979 to begin a fellowship in neurology at Massachusetts General Hospital and the Boston Biomedical Research Institute, followed by a research fellowship in physiology at Harvard Medical School (HMS). In 1982, he joined the BWH radiology department as a clinical fellow in neuroradiology and later became a diagnostic radiology resident. He joined the faculty at BWH and HMS in 1985. Dr. Jolesz was appointed as the first incumbent of the B. Leonard Holman Chair in Radiology at Harvard in 1998.

Dr. Jolesz was also the driving force behind the first intra-operative MRI, and more recently, the advanced multimodality image-guided operating (AMIGO) suite. Largely due to Dr. Jolesz's pioneering work in image-guided therapy and experience in managing a large research enterprise, the National Institutes of Health established the National Center for Image-Guided Therapy at BWH in 1995. The AMIGO suite is a unique integration of MRI, PET, CT, ultrasound and angiography combined with advanced navigational technologies in a single operating suite that has revolutionized patient evaluations before, during and after surgery.

Dr. Jolesz and his colleagues also introduced the first MRI-guided, focused ultrasound (MRgFUS) surgical procedure, which has been successfully applied to the treatment of solid neoplasms. Most recently, he was working on new applications of MRgFUS in functional neurosurgery, specifically, blood-brain barrier disruption for targeted drug delivery.

RSNA Attends Mexican Society of Radiology and Imaging Annual Meeting

The RSNA Booth traveled to Mexico City for the Sociedad Mexicana de Radiolgía e Imagen/ Mexican Society of Radiology and Imaging annual meeting. *Top left (l-r)*: Residents Jhon Saray, M.D., Gabriel Escobar, M.D., and Julio Noyola, M.D., were excited to attend the SMRI meeting; *top right:* 2015 RSNA President Ronald L. Arenson, M.D., gave two scientific lectures at SMRI; *bottom, left*: the RSNA Booth hosted a steady stream of visitors; *bottom right*: RSNA staff with the winner of RSNA iPad Mini giveaway, Maria Guadalupe Garcia Moran, M.D. (*center*).

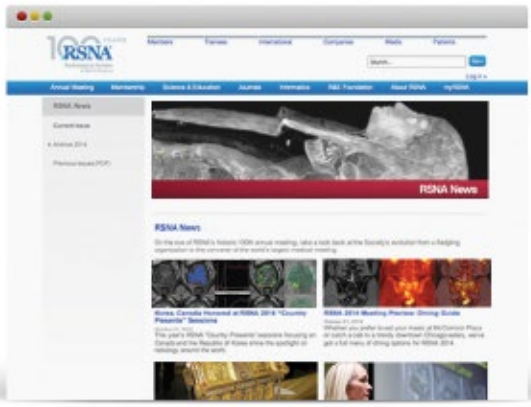
MEXICO PRESENTS

RSNA staff traveled to the annual meeting of the Sociedad Mexicana de Radiolgía e Imagen (SMRI)/Mexican Society of Radiology and Imaging, held February 18-21 in Mexico City, Mexico, where they hosted the RSNA booth offering attendees a chance to join RSNA and register for the annual meeting. 2015 RSNA President Ronald L. Arenson, M.D., presented two scientific lectures along with a presentation on the many programs and benefits offered by the Society. RSNA, which travels to SMRI each year, also promoted the RSNA 2015 "Mexico Presents" session, spotlighting challenges and solutions in radiology education.

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 story on imaging insights on cancer from across the globe, visitors can go to *RSNA.org/News* to view video interviews with Byung Ihn Choi, M.D., Michelle McNicholas, M.D., and Claire Shadbolt, M.D., M.B.Ch.B., discussing their RSNA 2014 research. Expanding on the *RSNA News* feature on the role of imaging in chronic pain, readers can view a video of Abneesh Chhabra, M.D., discussing advances in high-resolution MR neurography in treating/managing pain.



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Art World Draws on Imaging to Examine Ancient Artifacts

BY MARY HENDERSON

The guiding principle in medicine—"first, do no harm"—is also a major tenet in the art world, where museum curators and art conservationists ardently seek noninvasive techniques to investigate ancient and fragile treasures. Because imaging techniques are continually advancing, curators around the world are relying more heavily on a range of modalities as critical tools in examining ancient artifacts.

Daly

Brown

Yaghmai

Although X-ray is a common tool at many museums and conservation labs, CT is especially useful for its ability to provide detailed views of the inside and outside of art objects, according to a trio of experts who presented an RSNA 2014 session on imaging ancient artifacts. CT viewing software also gives curators and art experts the freedom to virtually manipulate fragile objects that cannot be readily handled.

"When people ask, 'Why do you use medical CT?' I always answer, 'Why wouldn't we?'" said Jonathan P. Brown, M.S., Regenstein Conservator at The Field Museum of Chicago. "There's tremendous enthusiasm among the museum community for these types of studies."

Presenters shared their CT studies on a wide range of art and artifacts, including Mesopotamian stucco art, Renaissance paintings, archeological finds and a Japanese wood sculpture, among many others.

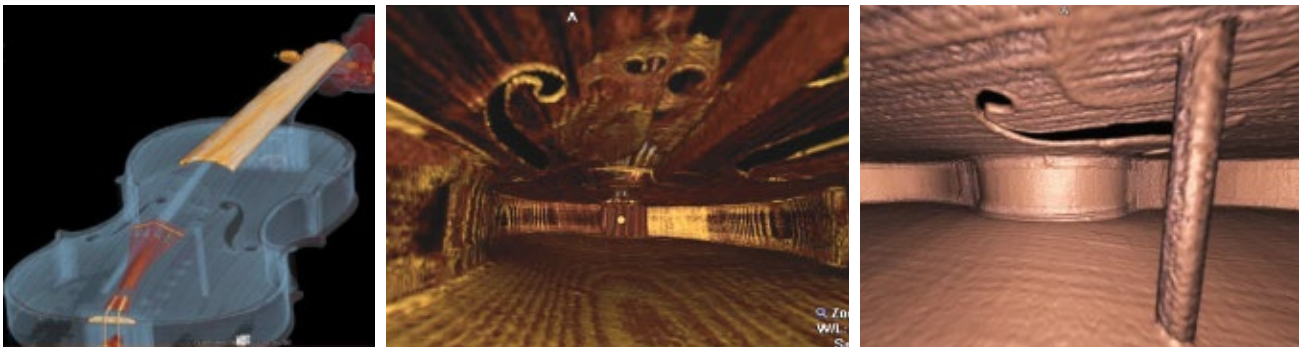
Radiologists enjoy applying their skills to ancient artifacts for a number of reasons, said Brown, who has collaborated on imaging studies at Northwestern University as well as other Chicago area and national institutions for the last eight years. "You get to use the CT scanner in cool ways," Brown said. "It's not often that you get a reason to turn all the settings to 11 and see what it can really do."

During the RSNA 2014 course, the panel—which also included Barry Daly, M.D., professor of radiology at the University of Maryland Medical Center (UMMC), and Vahid Yaghmai, M.D., professor and director of imaging services, Northwestern University and *RSNA News* Editorial Board member—discussed a number of objectives for art-related imaging studies, from determining age, authenticity, composition or geographic origin to detecting internal contents, structural damage or hidden repairs.

One example: Baltimore's Walters Art Museum asked Dr. Daly for help in determining the age of a Gothic reliquary believed to contain the bones of 7th century Christian Saint Amandus.

Images courtesy of Barry D. Daly, M.D., University of Maryland Medical Center

By providing historical and chronological context as well as structural details, CT studies can also provide information useful in the restoration, preservation and valuation of artifacts. *Above, left*: a gothic reliquary displayed on a CT scanner table; right: a CT scan of the ancient artifact clearly displaying rings from the tree used in constructing the reliquary.



Images courtesy of Vahid Yaghmai, M.D.

Researcher Vahid Yaghmai, M.D., conducted a "virtual endoscopy" of an approximately 300-year-old Cremonese violin (*above*), one of the finest and most valuable musical instruments in existence. Dr. Yaghmai used CT to compare the instrument's symmetry and contours to that of modern-day violins.

"You get to use the CT scanner in cool ways. It's not often that you get a reason to turn all the settings to 11 and see what it can really do."

JONATHAN P. BROWN, M.S.

A 3-D-CT study provided detailed images of the wood under the reliquary's gilded copper casing, which enabled experts to conduct tree-ring dating and determine the container was made in 1218 AD—150 years earlier than previously believed.

"Sometimes even the experts can be fooled," Dr. Daly said.

In an attempt to unlock the mystery of Stradivarius violins, Dr. Yaghmai has conducted a "virtual endoscopy" of the revered instrument, comparing its symmetry and contours to that of modern-day violins.

By providing historical and chronological context as well as structural details, CT studies can also provide information useful in the restoration, preservation and valuation of artifacts. 3-D-CT images of a rare flea market purchase—an ancient piece of wood with a Hebrew inscription—allowed investigators to more easily read the obscure script on the piece of wood, thanks to the presence of barium paint. Investigations determined that the wooden remnant was part of a Torah ark door from the 12th century Ben Ezra synagogue in Cairo, associated with the noted philospher and physician Maimonides.

"Barium is more than just a nasty drink that radiologists give to their patients," Dr. Daly quipped.

CT Can Add or Subtract Value

Information gained through imaging studies may also decrease the value of an antiquity by revealing imperfections that are invisible to the naked eye. Such was the case for a Chinese Quing dynasty ceramic vase dating to the 1700s that was evaluated with CT, revealing a well-repaired crack that had eluded curators for more than 100 years.

"Similar pieces have sold for as much as $32 million in China, where there's a very hot market for these items," Dr. Daly said. "Damage can drop the value of a piece by 50 percent."

Details of an artifact's internal structure can also prove useful for keeping valuable treasures safe. After the UMMC Radiology Department uploaded more than 13,000 CT images of a rare Pre-Columbian ceramic figure to a cloud server, the staff at the Walters Art Museum—which recently added 3-D technology and advanced visualization tools—was able to study the piece along with radiologists. The images revealed the artifact was too fragile for worldwide tour due to multiple internal fractures that were not outwardly visible.

Continued on Next Page

(C) 2005 The Field Museum. Photographer JP. Brown.

Advanced digital imaging and 3-D-CT have been used to determine the age, authenticity, composition and geographic origin of ancient artifacts, as well as to help researchers investigate their internal contents and detect prior structural damage and hidden repairs. *Above*: Moche stirrup spout vessel in the form of a monkey.

(C) 2005 The Field Museum. Photographer: JP Brown.

In recent years, museums worldwide—including the Field Museum of Chicago—have sought to partner with radiology departments in the non-invasive investigation of ancient and fragile treasures. "When people ask, 'Why do you use medical CT?' I always answer, 'Why wouldn't we?'" said Jonathan P. Brown, M.S., Regenstein Conservator at the Field Museum. *Above, from left*: Japanese polychrome statue; *center*: the statue from proper left. *Far right*: a volume rendering of the interior of the Japanese polychrome statue's head showing cavity, multi-part construction and bone pins used to secure the eyes in place. The relics are among the 1.5 million specimens in the Field Museum's Anthropology storage collection, which is not on public display.

Continued from Previous Page

Chicago's Field Museum has also used CT to enhance its educational exhibits. For its "Images of the Afterlife" exhibit, museum staff used high-tech software to manipulate CT images of an Egyptian mummified woman, creating a touch-screen display that enabled visitors to view the various layers of the mummy from the outside of her sarcophagus to her skeleton. Brown said the museum is working on creating more image-based interactive exhibits, which are extremely popular with patrons.

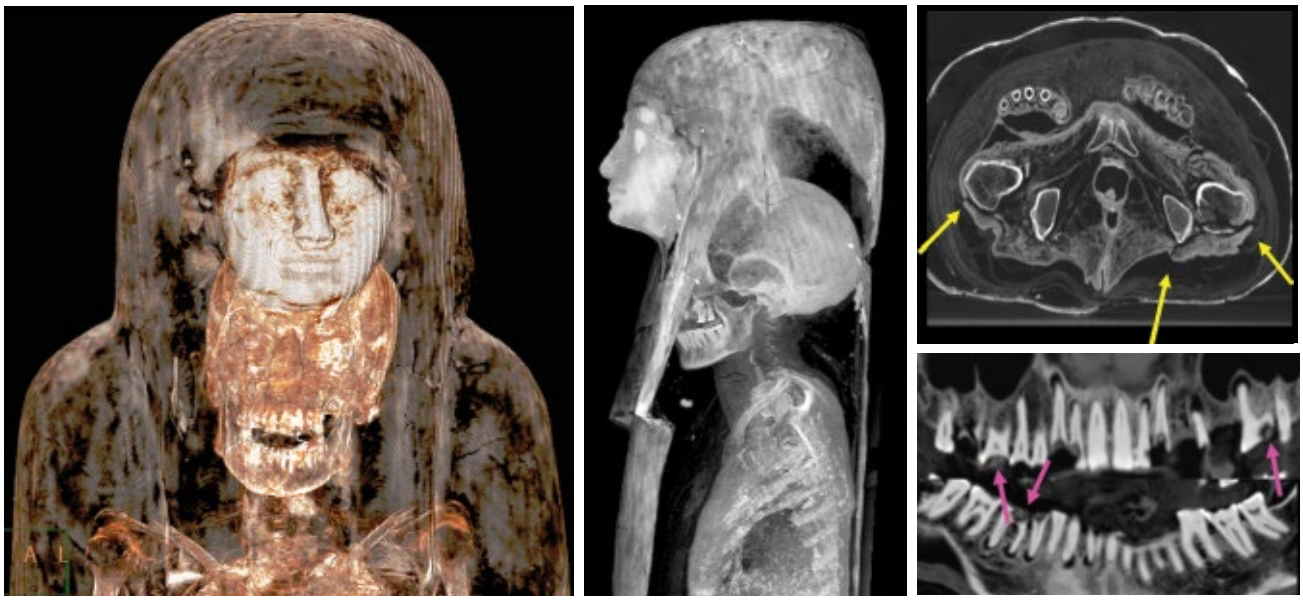
Projects Require Team Effort

Because such studies are labor-intensive, Dr. Yaghmai recommended gathering a team including the conservator, radiology hardware and software experts, technologists, PR personel and a legal expert, before embarking on a project. Some conservators have access to 3-D imaging software at museums, while others use cloud-based servers to remotely analyze cases along with collaborating radiologists.

"Start with your objectives and then address logistics, security and whether you'll need dual-energy, microCT, etcetera," Dr. Yaghmai said. He recommended using the highest kVp possible as well as a higher KeV.

"You only get one chance to scan these precious objects," he added. "Plan your imaging strategy ahead of time and preserve the raw data, if possible." □

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



Images courtesy of Barry D. Daly, M.D., University of Maryland Medical Center

CT is useful for its ability to provide detailed views of the inside and outside of art objects. *Left and center*: CT of a mummy skull seen below calcium containing an outer casing, from two perspectives; *top right:* CT of an Egyptian mummy with a post-mortem pelvic fracture; *bottom right*: CT of a mummy with dental decay and ancient dental prostheses.

Radiologists from Across the Globe Offer Imaging Insights on Cancer

BY FELICIA DECHTER

The need for a national database for breast cancer screening, a push to expand MR imaging in pelvic oncology, and the increasing role of functional and molecular imaging in cancer were among the topics discussed by presenters of "Global Cancer Imaging—Insights From Overseas" at RSNA 2014.

McNicholas

Shadbolt

Presenters from Ireland, Korea, England and Australia stressed a shared commitment to better understanding, treating and improving survival rates for cancer.

Discussing "Lessons Learned from the National Irish Breast Screening Program: The first 12 years-One Million Mammograms On," Michelle McNicholas, M.D., a consultant radiologist at Mater University Hospital, Dublin, reported that the program has made considerable progress in a relatively short span of time. "It's early in the program to detect a reduction in mortality, but surrogate parameters such as the numbers of small cancers we are detecting would suggest that we will meet and exceed our target of 20 percent reduction in mortality," Dr. McNicholas said.

Under the program, women ages 50-64 receive free breast X-rays on a two-year cycle. Dr. McNicholas said cancer detection rates have well exceeded targets for first screen (around nine per 1,000) and subsequent screen (six per 1,000).

One of the biggest difficulties facing the program was the lack of a population database to identify the target population, Dr. McNicholas said. The database had to be created from scratch by combining information from various sources, such as health insurers, various government agencies and self-registration. "Maintenance of an accurate population database is an ongoing challenge," she said.

Australia Seeks to Bolster MRI Access

In Australia, access to MR imaging varies depending on location and is offered mainly in larger cities, said Clair Shadbolt, M.D., M.B.Ch.B., consultant radiologist/director of training, Royal Women's Hospital, and lead radiologist for the Breast MRI Service at the Peter MacCallum Cancer Centre, Melbourne. In addition, government-funded MR imaging for pelvic oncology is extremely limited, she said.

Daily Bulletin* coverage of RSNA 2014 is available at *RSNA.org/Bulletin.

"In Australia, only the first staging of MRI for cervical and rectal cancer can be claimed, while all other pelvic oncology is non-funded and follow-up/post-treatment studies also are not funded," Dr. Shadbolt noted in her presentation, "MRI of Pelvic Malignancy—The View from Down Under."

To that end, in 2012 the Australian government announced a $104.4 million Diagnostic Imaging Review Reform Package to increase access to MR imaging and increase cancer services.

WEB EXTRAS

Go to *RSNA.org/News* to view video interviews with Drs. Choi, McNicholas and Shadbolt discussing their research on "Global Cancer Imaging—Insights From Overseas" at RSNA 2014.

Contrast-enhanced Ultrasound Aids HCC Diagnosis in Korea

Contrast-enhanced ultrasound—particularly with the new contrast agent Sonazoid—and dynamic contrast-enhanced MR imaging—particularly with the Gadolinium-EOB-DTPA contrast agent—are especially effective techniques for detecting and diagnosing hepatocellular carcinoma (HCC), said Byung Ihn Choi, M.D., professor of radiology, Seoul National University Hospital, College of Medicine, Seoul National University in Seoul, South Korea. Dr. Choi received RSNA Honorary Membership in 2007 and currently chairs the RSNA Regional Committee for Asia/Oceania.

"With those new techniques, we can diagnose HCCs at an early stage, with better outcome of treatment and prognosis," said Dr. Choi, who presented "Imaging of HCC-A Korean Perspective." In addition, new contrast agents are helpful for better results with overall survival rate, he said.

English Trials Focus on Functional, Molecular Imaging

In England, functional and molecular imaging in cancer treatment are the focus of a number of trials at Churchill Hospital in Oxford, said presenter Fergus Gleeson, M.D., M.B.B.S., consultant radiologist at Oxford University Hospitals NHS Trust. Among them: investigating the role of hyperpolarized xenon in chronic obstructive pulmonary disease, pre-surgical resection or radiotherapy for lung cancer, the role of perfusion CT in assessing the completeness of percutaneous ablation, and the use of DCE-MRI, proton CT and PET-CT in cancer angiogenesis.

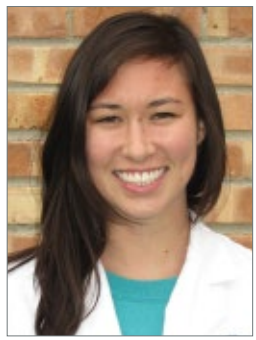
In his presentation, "Functional and Molecular Imaging at Oxford University," Dr. Gleeson also shared some of the findings of his research. "Xenon appears to be useful in assessing lung structure and function and is more accurate than currently available techniques," Dr. Gleeson said. "Perfusion CT appears to be a useful technique in determining whether the ablation has been complete." □

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

Interventional Chest Port Insertions Less Expensive Than Surgery

BY PAUL LATOUR

A chest port (CP) can be inserted at significantly lower cost, with no difference in complication or infection rates, if performed by radiologists in an interventional radiology (IR) suite rather than by surgeons in an operating room (OR), according to a new cost-analysis study conducted with the aid of a 2013 RSNA Research Medical Student Grant.



LaRoy

"With the healthcare system under increasing pressure to minimize cost of care while maintaining quality, examining how and where services are rendered will be increasingly important," said Jennifer LaRoy, B.A., a medical student at the Medical College of Wisconsin in Milwaukee, who performed the two-pronged study, "Cost and Morbidity Analysis of Chest Port Insertion: Interventional Radiology vs. Surgical Implantation," at her institution.

Before determining the cost-analysis part of the study, LaRoy sought to discern any difference in complication and infection rates associated with the placement of CPs, whether the procedure was done in an OR or the IR suite.

Researchers compared data from 478 charts from two cohorts (239 patients in each) who underwent isolated CP placements in the IR and OR. Approximately 50 data points were collected for patients including demographic information, indication and primary diagnosis for port placement, placement of catheterwtip immediately after procedure, and port-related complications/infections.

Thrombosis/tip occlusion was the most common complication experienced by patients in both cohorts. Operating-room patients had more cases of tip malposition and venous thrombosis than IR patients. Although 18 IR patients experienced infection compared with 13 of the OR patients, bivariate analysis determined no significant complication or infection rates between the cohorts.

> *"'. . . studies like ours will help us make data-driven informed decisions."*
>
> JENNIFER LaROY, B.A.

"Because there wasn't a factor for which we had to correct, we were able to just look at costs alone," said Parag J. Patel, M.D., M.S., assistant professor of radiology and surgery at the Medical College of Wisconsin, who served as LaRoy's scientific advisor for the study.

The study showed the overall cost to place the CP in an OR setting was 193 percent greater than when done in the IR suite. Room costs were higher in the OR for every component reviewed—variable labor, variable supply and fixed cost. Performing the procedure in the IR suite also saved significant time. The average room time was 36.9 minutes in the IR suite, compared to 69 minutes in an OR setting.

Researchers found the same pattern on the pharmacy side. The pharmacy cost was 201 percent greater for CPs placed in the OR versus the IR suite. As with room costs, each component of pharmacy cost was greater on the OR side.

"While more research is necessary, the study shows a possible area for cost-cutting as healthcare continues to evolve toward a value-based system and reimbursement undergoes a wide range of changes," said LaRoy, who presented her research at RSNA 2014.

"We can't continue to afford our current spending on healthcare. When we get to a point where we need to make cuts, studies like ours will help us make data-driven informed decisions on how to more efficiently practice medicine," Dr. Patel said.

Radiologists are urged to request such cost-effectiveness/comparative effectiveness data "to prevent further erosion of our services by assessing our performance as a field and working to improve the quality and value that we deliver," LaRoy said.

RSNA Grant Nurtures Research Skills

LaRoy, a 2016 medical degree candidate who plans to pursue a career in academic radiology, sought out opportunities to perform mentor-guided research, which led to receiving the 2013 RSNA Research Medical Student Grant.

Under the supervision of Dr. Patel, LaRoy showed a propensity for research work. "She was diligent about this process, whether it was protocol planning, research planning, statistical analysis and critical analysis of data. She did a great job on each phase of this project," Dr. Patel said.

Along with Dr. Patel, LaRoy credits Sarah B. White, M.D., M.S., for guiding her through the process. Dr. White, who received a 2013-2014 RSNA Research Seed Grant and a 2014-2016 Bracco Diagnostics RSNA Research Scholar Grant, assisted with oversight of the project, particularly data collection and analysis. "This grant gave me the opportunity to develop skills in research design, data collection, analysis, and interpretation and manuscript preparation," LaRoy said.

"I now have two excellent mentors who have helped me to appreciate the value of continuing research throughout my career," LaRoy continued. "I look forward to pursuing my career in academic radiology and continuing research." LaRoy added she plans to expand on this project during her final years in medical school. □

PAUL LaTOUR is an *RSNA News* staff writer .

INNOVATE

GRANTS IN ACTION

NAME:

Jennifer LaRoy, B.A.

GRANT RECEIVED:

2013 RSNA Research Medical Student Grant

STUDY:

"Cost and Morbidity Analysis of Chest Port Insertions: Interventional Radiology vs. Surgical Implantation."

LaRoy conducted her research under the supervision of Parag J. Patel, M.D., M.S. (*right*).

CAREER IMPACT:

"This provided me with an opportunity to pursue my interests in radiology and work closely with physicians and gain a deeper appreciation for the research that is needed to allow for evidence-based practice to continue. I intend to expound on this project during my next few years in medical school and am very interested in pursuing a career in academic radiology."

CLINICAL IMPLICATION:

"Our overall findings suggest that there is a similar complication rate, a similar rate of infection, and a significantly lower cost associated with chest port placement performed in the IR suite. In the current healthcare environment and with the initiation of the Affordable Care Act, quality of care is of the utmost importance. We hope by publishing our results, hospitals will understand not only the quality of services offered by interventional radiology (IR), but also the value of IR services.

R&E Foundation Restructures Grant Study Section

At the RSNA Research & Education (R&E) Foundation, spring marks the beginning of grant season—a time of great potential for new innovations in radiologic research and education.

To keep pace with ever-increasing number of grant applications and to maintain the quality of the grant review process, the R&E Foundation Grant Program Committee has restructured the Radiology Research Study Section into two new smaller sections. These two new bodies—the Research Faculty Grant Study Section and the Research Trainee Grant Study Section—are charged with reviewing Scholar and Seed grant applications and Resident and Fellow grant applications respectively.

This new targeted review process allows for additional review time and enhanced discussions, thus meeting the challenges related to reviewing the large number of applications. R&E grant reviewers provide essential feedback to all applicants with the goal of improving their research approach and grant writing skills.

The Radiology Research Study Sections, the Education Study Section and the Radiation Oncology Study Section met in March to score grant applications. The Medical Student Grant Review Panel also completed its work. Final funding decisions will be made by the R&E Foundation Board of Trustees and grant recipients will be announced this summer.

"The RSNA Foundation strives to engage and encourage promising new scientists and educators in radiology and related sciences," said Grant Program Committee Chair Kathryn A. Morton, M.D. "The receipt of an RSNA Research and Education Foundation grant is often the springboard from which a successful career in academic radiological science is launched. These high profile awards underscore the commitment of the RSNA R&E Foundation and its generous donors to education, research and development in radiological sciences and to the support of new individuals to carry forward these goals."

For more information about the R&E Foundation grant process, go to *RSNA.org/Foundation*.

MR Neurography an Emerging Modality in Chronic Pain

BY MIKE BASSETT

In a few short years, MR neurography (MRN)—a technique for the direct imaging of spinal and peripheral nerves—is generating excitement as a promising inroad into a perennially challenging area: the diagnosis and management of pain.

In fact, MRN can often be seen as "the poster child for innovation" in the area of musculoskeletal pain and one of the leading developments in that subspecialty over the last four or five years, according to Sandip Biswal, M.D., an associate professor of radiology at the Stanford University Medical Center, who presented "PET and MR Methods to Image Pain" at RSNA 2014.

In America alone, chronic pain affects 116 million adults, resulting in hundreds of billions of dollars annually in treatment costs and lost productivity, Dr. Biswal said. For example, according to a report issued by the Institute of Medicine in 2011, the annual cost of chronic pain in the U.S. is estimated at $560-635 billion—more than the annual costs associated with heart disease, cancer and diabetes combined.

But the "ugly truth," Dr. Biswal added, is that conventional methods of finding pain generators are just not adequate, which is one of the reasons MRN is generating so much interest.

According to Amelie Lutz, M.D., a colleague of Dr. Biswal who presented the session, "MR Neurography of the Brachial Plexus and Upper Extremities," with improved scanner and coil techniques, and advances in pulse sequences, "we are now capable of directly imaging nerves with a very high resolution. This has become a really exciting—and evolving—field in radiology."

What MRN does is "really display the nerves beautifully," Dr. Biswal said. "We can reconstruct these images in a variety of dimensions and lay out the nerves just as we do with the vascular system. You can really see if there is intrinsic pathology, such as a neuroma or inflammation, or an extrinsic process involving the nerve."

MRN Breaks Ground with Brachial Plexus

Dr. Lutz discussed the anatomy and normal MR imaging appearance of the brachial plexus and upper extremity nerves and how to recognize the most commonly encountered pathologies and their differential diagnoses in these regions.

"With the more central or proximal nerves like the brachial plexus it can be very challenging for nerve conduction studies to really pinpoint or specify the problem. The brachial plexus is probably one of the first areas where this type of imaging is really making an impact," Dr. Lutz said.

And while the complexity of this anatomic region can appear daunting, she said, with this new tool for systematically analyzing the anatomy, "then all of a sudden it makes sense."

Dr. Biswal discussed a number of new approaches to imaging pain involving PET and MRI, including developing a PET biomarker that targets and helps measure the mechanisms of pain at the molecular level. "Whether it's increased ion channels or increased pain receptors, or increased cellularity, we're looking at a number of potential markers of inflammation." That, combined with MR imaging techniques, can provide both a molecular readout along with an anatomic diagnosis to identify where the pain is originating with great specificity and sensitivity, Dr. Biswal said.

Biswal

Lutz

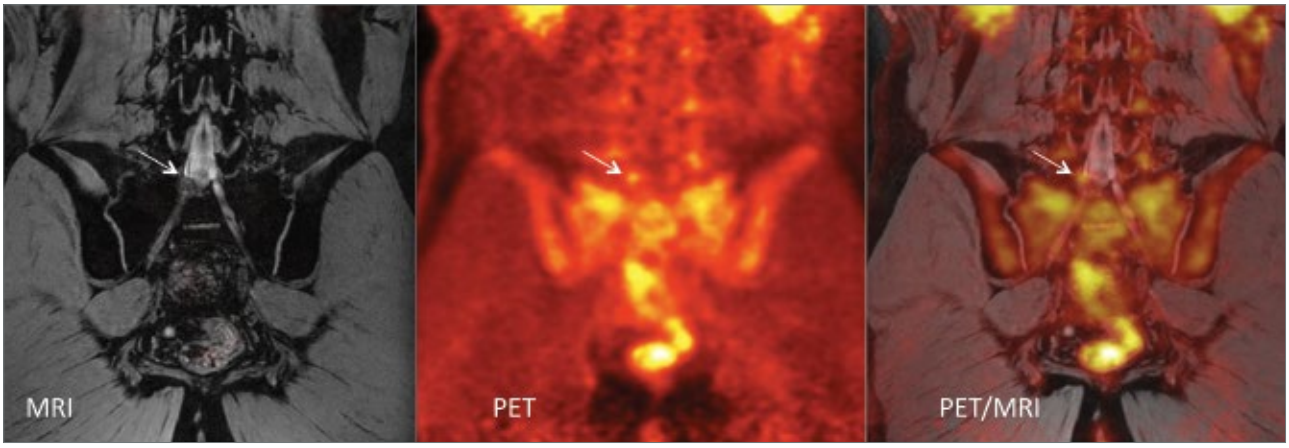
"Another example of where conventional approaches to imaging pain just haven't been very effective, has been the use of MRI and CT to image patients with non-specific back pain," he said. "A number of medical organizations have issued recommendations advising against lumbar MRI, mainly because it has not been very predictive or helpful in the acute setting."

Ultimately, Dr. Biswal said, improving ways to use imaging to find the source of pain will not only help patients by improving outcomes, but will serve to improve their quality of life. "We probably all have friends or relatives who struggle with chronic pain, and get labeled as crazy or depressed," he said. "Their pain can come to dominate their existence with little hope for a cure. Now, perhaps we can help them on the route to recovery." □

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

"Basically, we are all responding to that fact that conventional approaches to imaging pain just haven't been very good."

SANDIP BISWAL, M.D.



Images courtesy of Sandip Biswal, M.D.

A coronal MRI, PET and fused PET/MR image of a patient suffering from right-sided chronic sciatica. The MR image is a coronal DESS through the lumbosacral spine through the neuroforamina of L5-S1. The white arrow points to the right L5-S1 neuroforamina. The coronal PET image shows increased FDG uptake at the lumbosacral junction in the right L5-S1 neuroforamina (*white arrow*) as confirmed by the fused PET/MR image. Ongoing work will determine if PET/MRI is a more accurate predictor of pain generators over conventional methods.

Researchers Advance MR Neurography

MR Neurography of the Lumbar Plexus and Lower Extremities

Chhabra

Lumbosacral plexus has a complex anatomy with numerous nerve convergences and divergences resulting in the formation of multiple essential peripheral nerves that provide motor and sensory function to the pelvis and lower extremities.

Due to the deep location and complexity, 3-D MR neurography (MRN) plays a major role in the evaluation of its normal and pathologic states.

At RSNA 2014, Avneesh Chhabra, M.D., chief musculoskeletal radiologist and associate professor of diagnostic radiology and orthopedic surgery at the University of Texas Southwestern Medical Center, discussed the role MRN plays in chronic pelvic pain, nerve injuries, entrapments and diffuse neuropathies. Along with discussing the incremental value of MRN over conventional lumbar spine imaging, Dr. Chhabra addressed new 3-D techniques that encompass diffusion and motion-sensitive driven equilibrium pulses and suppress vascular signals effectively while preserving selective nerve visualization in neurovascular bundles.

"It is essential to objectively visualize and evaluate nerve anatomy and pathology with multiplanar MRN techniques rather than just identifying indirect findings of neuropathy on lumbar spine imaging or regional muscle imaging," said Dr. Chhabra, also an adjunct professor at Johns Hopkins School of Medicine, Baltimore. "MRN results significantly impact patient management and outcomes."

Access research on this topic co-authored by Dr. Chhabra at *NCBI.nlm.nih.gov/pubmed*. A video of Dr. Chhabra discussing high-resolution MRN and MR-guided injections is available at *Hopkinsradiology.org/Musculoskeletal/Neurography*.

DTI of the Peripheral Nervous System

Andreisek

While diffusion tensor imaging (DTI) is an established imaging technique in the brain and central nervous system, its application to the peripheral nervous system has been limited due to technical reasons.

But recent research has not only shown that the technique can be applied successfully to imaging peripheral nerves, but that it exhibits a high sensitivity and specificity for detecting peripheral nerve injuries and other neuropathies, according to RSNA 2014 presenter Gustav Andreisek, M.D., senior radiologist at the University Hospital Zurich. DTI may also serve as a biomarker for the demyelination of axons and the extent of nerve fiber loss, he said.

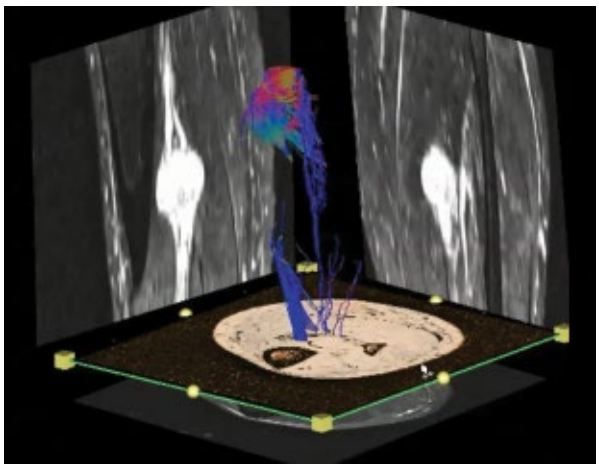


Image courtesy of Gustav Andreisek, M.D.

DTI of the tibial nerve at the lower leg in a patient with a benign peripheral nerve sheath tumor.

"With diffusion tensor imaging of peripheral nerves, we cross the border of pure morphological imaging and move on to functional imaging. This will generate information of much higher value to the referring clinician, enabling an earlier and more precise treatment of patients with peripheral neuropathies. The sites where DTI is already used in the clinical routine report improvements in patient management and likely outcome," Dr. Andreisek said.

Research on this issue co-authored by Dr. Andreisek is available at *Ncbi.nlm.nih.gov/pubmed/?term=andreisek*.

MRI-guided Technique Creates 3-D Roadmap of the Prostate

BY ED BANNON

A prostate cancer detection technique that combines MR imaging technology with ultrasound "is like GPS for urologists" who currently have to rely on a less accurate map to locate their biopsy samples, says one radiologist who is pioneering the technique's clinical use.

"The new MRI technique allows us to work in concert with our colleagues in urology to make their biopsies more reliable."

DAVID KAROW, M.D., PH.D.

Karow

Parsons

Dale

The procedure overlays the results of an MR scan onto an ultrasound image to help urologists target lesions, said David Karow, M.D., Ph.D., an assistant professor in the department of radiology at the University of California, San Diego (UCSD). The MR overlay of problem regions in the prostate offers a potentially significant advantage in the diagnosis and treatment of prostate cancer.

"The new MRI technique allows us to work in concert with our colleagues in urology to make their biopsies more reliable," Dr. Karow said.

Dr. Karow teamed up with urologists J. Kellogg Parsons, M.D., M.H.D., associate professor, and Christopher Kane, M.D., professor and chair in the Department of Urology at UCSD Moores Cancer Center, to introduce the technique at Moores. They use sophisticated new tools and software—DynaCAD for Prostate with the UroNav fusion biopsy system—to combine the MRI with real-time, ultrasound-guided biopsy images in the clinic to create a 3-D map of the prostate. The technique is already in use in clinical procedures at UCSD.

"With an ultrasound exam we are typically unable to see the most suspicious areas of the prostate, so we end up sampling different parts of the prostate that, statistically speaking, are more likely to have cancer," Dr. Parsons said. "MRI is a game-changer. It allows us to target the biopsy needles exactly where we think the cancer is located. It's more precise."

Fewer lesions will be missed with MR imaging, especially in the anterior portion of the prostate, which is difficult to reach during a biopsy, Dr. Karow said.

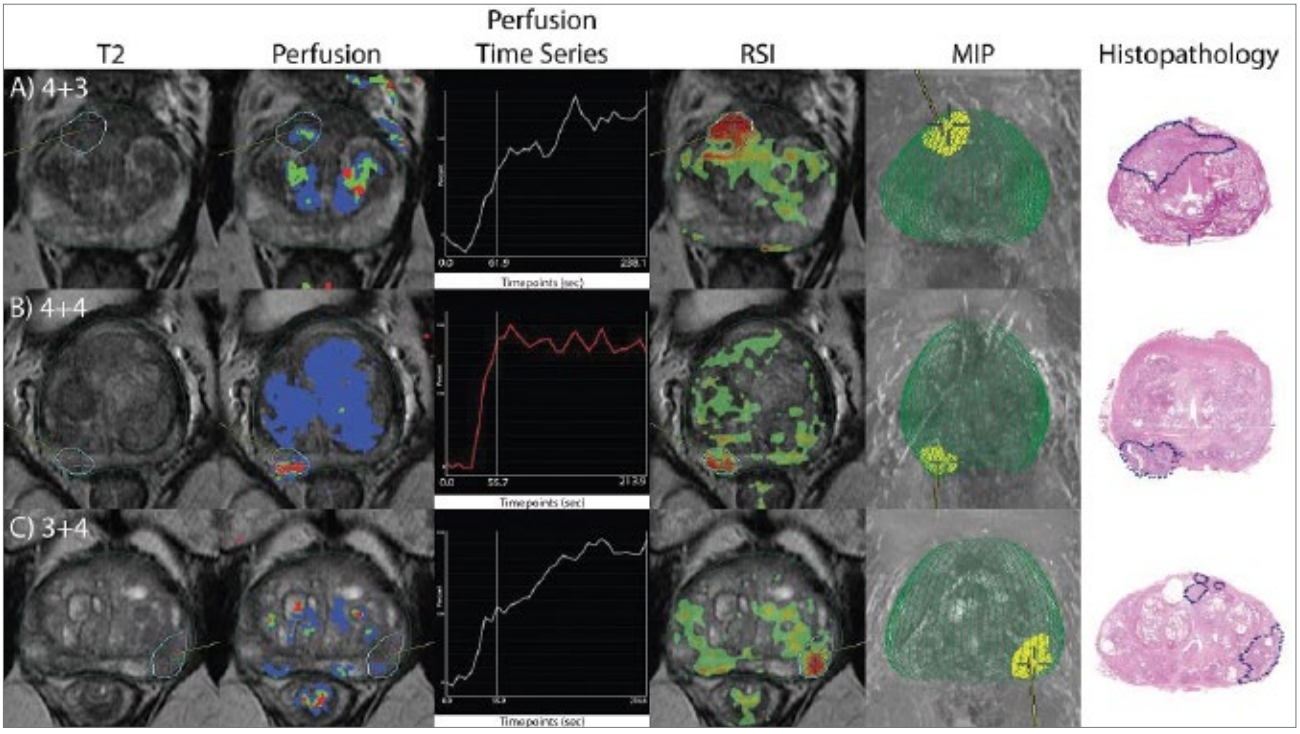
Radiologists, Urologists, Must Collaborate

For radiologists, the MR-guided technology doesn't require a drastic change, Dr. Karow said. After the MRI, the radiologist identifies regions of interest and contours any suspicious areas. The real departure occurs when these data are transferred to the urologist who now sees an MR-fused image on a biopsy device.

This technique won't be used for every prostate biopsy, Dr. Parsons said. Initial biopsies will still be performed using the traditional procedure in which urologists draw 12 to 15 samples from the patient's prostate. The MR-overlay technique will more likely be used in cases when initial biopsy is negative but a patient still shows cancer symptoms or when urologists are monitoring a tumor over the long term.

Urologists "are not to the point where we feel comfortable" using only the MR overlay, Dr. Parsons said, adding that trials in Europe will determine whether the MR-overlay technique should replace the systematic procedure.

Introducing the MR imaging technique requires communication between both specialties as well as an expert in prostate MR, Dr. Parsons said. "You really need to be talking to each other to make this work. You need a team approach," Dr. Parsons said.



Images from three patients who underwent targeted biopsy: The first column demonstrates the T2 map with the ROI drawn to guide the MR-fused ultrasound guided biopsy; the second column displays the DynaCAD perfusion maps, where red signifies rapid intense enhancement with washout, green signifies rapid intense enhancement with plateau washout and blue signifies gradual enhancement; the third column demonstrates the perfusion curves for the location identified by the crosshair in the other images; the fourth column illustrates a heatmap based on the Restriction Spectrum Imaging (RSI) overlaid on T2 images, with red regions correlating to the areas of greatest restricted diffusion; the fifth column shows maximum intensity projections of the prostate boundary (*green*) and ROI for targeting (*yellow*); and the sixth column shows histopathology. A) Patient with three negative previous biopsies. The targeted biopsy found Gleason 4+3 cancer. B) Patient with previous incomplete radiation therapy for response to low-grade cancer. Targeted biopsy found Gleason 4+4 cancer. C) Patient with previous biopsy demonstrating low-grade cancer. Targeted biopsy found Gleason 3+4 cancer.

UCSD Continues MR Imaging Innovation for Prostate

In addition to using MR imaging to help target biopsies, UCSD radiologists have developed an MR technique that further aids prostate cancer detection. Using an innovation to better detect brain cancer co-invented by Anders Dale, Ph.D., UCSD professor and vice-chair of research, and Nate White, Ph.D., assistant professor of radiology, radiologists teams up with Dr. Karow to adapt the technique for prostate cancer detection.

"It's something we developed in our lab in the last two years, and we successfully translated it into clinical practice," Dr. Karow said.

The technique, called restriction spectrum imaging (RSI), is an advanced diffusion-weighted technique based on intracellular restricted motion of water in cancer cells, Dr. Dale said. (See Web Extras to access their recently published research on prostate RSI-MRI).

"RSI really shows a very robust signal in the tumor areas," Dr. Karow said. "Preliminary evidence suggests RSI improves detection over conventional perfusion and diffusion imaging and does not suffer from the spatial distortions intrinsic to existing diffusion MRI methods." □

ED BANNON is a Chicago-based freelance writer.

WEB EXTRAS

Drs. Karow, Anders and Parsons are contributing authors on recent Restriction Spectrum Imaging-MRI research:

- "MRI-derived restriction spectrum imaging cellularity index is associated with high grade prostate cancer on radical prostatectomy specimens," in the February 2015 issue of *Frontiers in Oncology*, Journal, *Frontiersin.org/article/10.3389/fonc.2015.00030/abstract*
- "Novel Technique for Characterizing Prostate Cancer Utilizing MRI Restriction Spectrum Imaging: Proof of Principle and Initial Clinical Experience with Extra-Prostatic Extension," January 2015 issue of *Prostate Cancer and Prostatic Diseases*, *Nature.com/pcan/journal/v18/n1/full/pcan201450a.htm*

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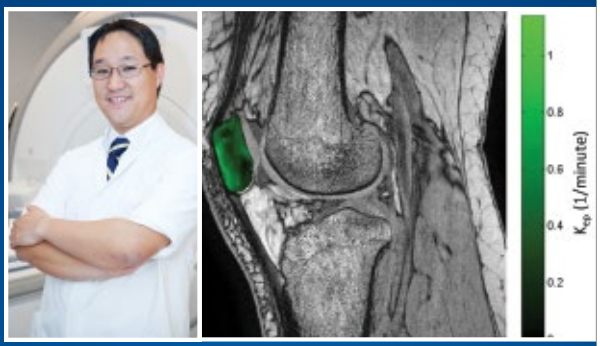
Dynamic Contrast-Enhanced MRI Advances Knowledge of Bone Diseases



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Dynamic Contrast-Enhanced MRI (DCE-MRI) provides visualization and quantification of blood perfusion changes in bone and shows promise as a novel imaging biomarker that can advance knowledge on the pathogenesis of bone diseases such as osteoarthritis and patellofemoral pain syndrome. With a Hitachi Medical Systems/RSNA Research Seed Grant, **Edwin H.G. Oei, M.D., Ph.D.**, will develop standardized methodology for DCE-MRI analysis, aiming to contribute to the further understanding, development, validation and implementation of this promising technology.

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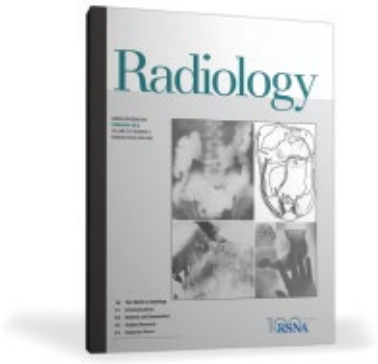

Media Coverage of RSNA

In December, 6,663 RSNA-related news stories were tracked in the media. These stories reached an estimated 1.5 billion people.

Coverage included *Los Angeles Times*, *U.S. News & World Report*, *New York Magazine*, *Newsday*, *Investor's Business Daily*, *BusinessWeek*, *Business Standard*, *International Business Times*, Bloomberg Radio, FOX Business News, BBC News, WABC-TV (New York), KCBS-TV (Los Angeles), KABC-TV (Los Angeles), WGN-TV (Chicago), WBBM-TV (Chicago), *Yahoo! Health*, *Yahoo! Finance*, *MSN.com*, *UPI.com*, *WebMD*, *NBCNews.com*, *FOXNews.com*, *Discovery News*, *Forbes.com*, *Reuters.com*, *Health.com*, *Xinhua News Agency* and *Boston.com*.

In January, 14,741 RSNA-related news stories were tracked in the media. These stories reached an estimated 3 billion people.

Coverage included *TIME*, *Los Angeles Times*, *Daily Mail*, *U.S. News & World Report*, *Newsday*, *Bloomberg BusinessWeek*, *International Business Times*, *Daily Herald*, *Orlando Sentinel*, *Detroit Free Press*, *China Daily*, *Modern Healthcare*, *Examiner*, *Smart Parenting*, *The Week*, Today, Headline News, *FOX and Friends First*, BBC News, New England Cable News, WNBC-TV (New York), KNBC-TV (Los Angeles), KCAL-TV (Los Angeles), WBBM-TV (Chicago), WMAQ-TV (Chicago), KING-TV (Seattle), WDIV-TV (Detroit), WFLA-TV (Tampa Bay), KDKA-TV (Pittsburgh), Bloomberg Radio, *Yahoo! Health*, *Huffington Post*, *Philly.com*, *Boston.com*, *AZCentral.com*, *ABCNews.com*, *CBSNews.com*, NBCNews.com, *FOXNews.com*, *MSN.com*, *WebMD*, *Discovery News*, *Forbes.com*, *Health.com*, *HealthCentral.com*, *Everyday Health*, *EmpowHER*, *Medicine.net*, *Medical News Today*, *RedOrbit.com*, *MLive.com*, *Drugs.com*, *Doctors Lounge*, *Medscape*, *Reuters*, *UPI* and *Xinhua News Agency*.

Total RSNA 2014 annual meeting media coverage tracked through February 8, 2014, has resulted in 21,247 media placements with an estimated potential audience/circulation of more than 5.7 billion.

RSNA 2014 press conferences, including one presented by Bonnie N. Joe, M.D., (*above*) on risk-based mammography screening, helped drive media coverage of RSNA 2014 sessions.

Notable placements for RSNA 2014 include: *Bloomberg News*, *TIME*, *Washington Post*, *Los Angeles Times*, *New York Magazine*, *Newsday*, *Businessweek*, *International Business Times*, *Business Standard*, *Today*, CBS News, BBC News, Fox News Channel, CNN Headline News, New England Cable News (Boston), Bloomberg Radio, Discovery News, National Public Radio, US Radio, *UPI*, *Yahoo! News*, *WebMD*, *NBCNews.com*, *USNews.com*, Reuters, *Xinhua News Agency*, *Health.com*, *AZCentral.com* and *Huffington Post*.

APRIL PUBLIC INFORMATION OUTREACH ACTIVITY

In April, RSNA is distributing the "60-Second Checkup" audio program to nearly 100 radio stations across the U.S. The segments focus on chest X-rays in pediatric patients.

New on *RadiologyInfo.org*

Visit *RadiologyInfo.org*, the public information website produced by the RSNA and ACR, to read the latest content posted to the website:

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Journal Highlights

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

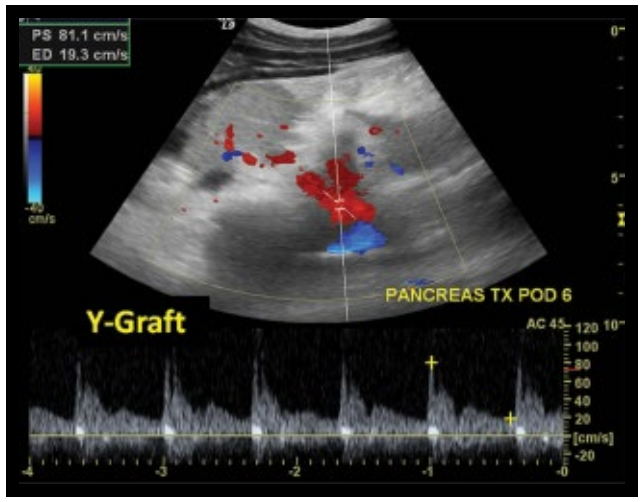
Pancreas Transplant Imaging

Radiologic imaging plays an important role in directing the postoperative management of pancreas transplant recipients. Accurate imaging is critical in the precise delineation of vascular abnormalities, pancreatic and peripancreatic fluid collections and the localization of pancreatic leaks, whether originating from the pancreatic duct or the duodenojejunal anastomosis.

In a "How I Do It" article in the April issue of *Radiology* (*RSNA.org/Radiology*), Parag P. Tolat, M.D., of the Medical College of Wisconsin, and colleagues report that sonography—both grayscale and color Doppler—and multipass contrast-enhanced CT are the preferred imaging modalities to accomplish these objectives. Contrast-enhanced MR angiogram/MR imaging has lower resolution than CT scanning but may have some advantages in selected situations.

The major advantages of sonography are that it can be performed portably and, in addition to grayscale images, provides a real-time vascular flow map that may allow detection of vascular anastomotic stenoses and reduced pancreatic transplant perfusion. Lack of ionizing radiation and ability to image without intravenous contrast are also major advantages.

"Sonography is most useful for detection of thrombosis, pseudoaneurysms, detection of peripancreatic fluid collections, guidance for transplant biopsy and guidance (typically in conjunction with CT) for needle aspiration and/or catheter drainage of pancreatic/peripancreatic fluid collections," the authors write.



Arterial flow waveform obtained at the bifurcation of the Y-graft demonstrates sharp systolic upstroke and expected normal antegrade diastolic flow consistent with normal graft hemodynamics. PS 5 peak systolic velocity (cm/sec), ED 5 end-diastolic velocity (cm/sec).
(*Radiology* 2015;275;1;InPress) ©RSNA 2015 All rights reserved. Printed with permission.

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

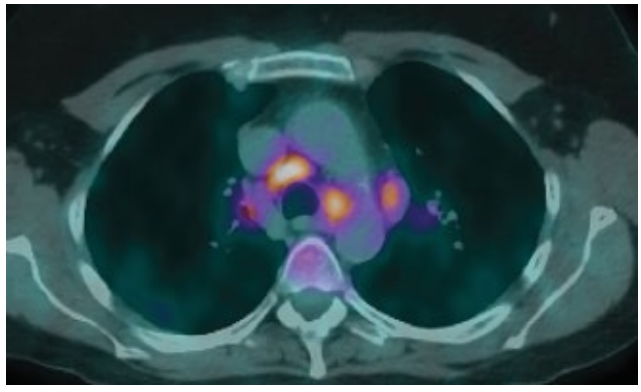
Cancer Immunotherapy: Imaging Assessment of Novel Treatment Response Patterns and Immune-related Adverse Events

Cancer immunotherapy is changing the imaging evaluation of cancer treatment response and treatment-related toxic effects. New emerging patterns of treatment response and treatment-related toxic effects after treatment with immunomodulating agents have been observed.

In an article published in the March-April issue of *RadioGraphics* (*RSNA.org/RadioGraphics*), Jennifer J. Kwak, M.D., of the University of Colorado School of Medicine, and colleagues review cancer immunotherapy and discuss immune-related response patterns and immune-related adverse events, with multimodality imaging examples given to help radiologists accurately interpret postimmunotherapy images.

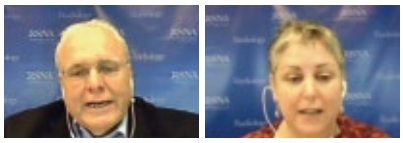
Treatment response after immunomodulatory therapy can be associated with significantly delayed decrease in tumor size; new or enlarging tumors observed soon after completion of treatment may not reflect disease progression. In addition, activation of the immune system to fight cancer may lead to unwanted autoimmune-mediated toxic effects that could be mistaken for metastatic disease or misdiagnosed as a nontreatment-related process and delay appropriate clinical management.

"Advancements in cancer immunotherapy challenge the current imaging approach to evaluation of cancer treatment response and treatment-related complications. Radiologists must recognize the novel treatment response patterns and the wide range of autoimmune-related toxic effects that should not be mistaken for disease progression," the authors write.



Treatment-related sarcoid-like adenopathy in a 65-year-old woman after treatment of recurrent metastatic melanoma to the left side of the chest wall. The melanoma was treated with an immunomodulatory monoclonal antibody (ipilimumab). Sarcoid-like mediastinal and hilar adenopathy developed immediately after treatment. PET/CT image shows fluorodeoxyglucose (FDG)–avid mediastinal lymph nodes. The adenopathy spontaneously resolved.
(*RadioGraphics* 2015;35;424–437) ©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

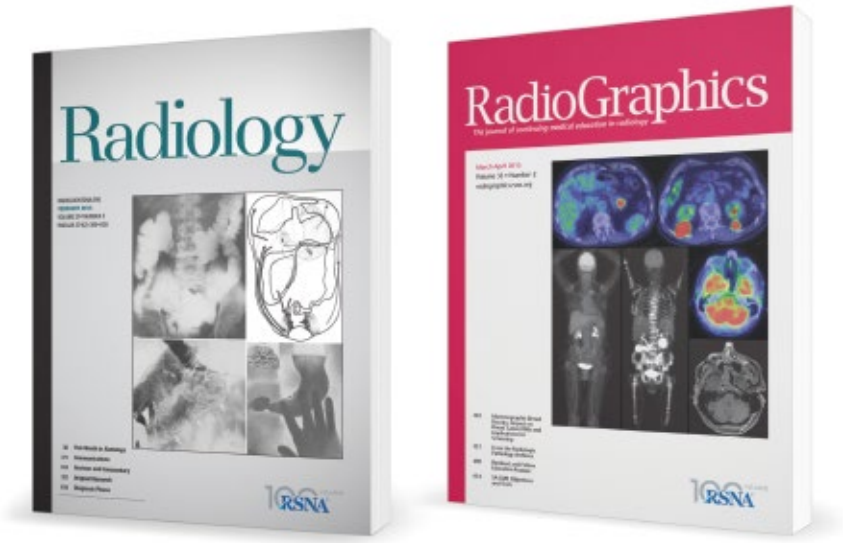
Listen to *Radiology* Editor Herbert Y. Kressel, M.D., deputy editors and authors discuss the following articles in the February issue of *Radiology* at *RSNA.org/Radiology-Podcasts*.

- "Structured Reporting of Multiphasic CT for Pancreatic Cancer: Potential Effect on Staging and Surgical Planning," Olga R. Brook, M.D., and colleagues.
- "Right Arcuate Fasciculus Abnormality in Chronic Fatigue Syndrome," Michael M. Zeineh, Ph.D., M.D. and colleagues.
- "Muscle Changes Detected with Diffusion-Tensor Imaging after Long-Distance Running," Martijn Froeling, Ph.D., and colleagues.

Value of Membership

Free Subscriptions to *Radiology* and *RadioGraphics*

Whether you prefer the print, online or mobile apps, free access to *Radiology* and *RadioGraphics*—the finest journals in the field—is a premier benefit of RSNA membership.



Radiology, an authoritative reference for the most current, clinically relevant and highest quality research in the field of medical imaging, is continually among the top-cited journals in the field. Each month the journal publishes approximately 300 pages of peer-reviewed original research, authoritative reviews, well-balanced commentary on significant articles and expert opinion on new techniques and technologies. *Radiology* has the largest readership of any journal in the field and its current 6.214 impact factor is among the highest of all general diagnostic imaging journals. Members also have free access to the *Radiology* Legacy Collection, a searchable electronic archive of *Radiology* issues from 1923 to 1998. *Radiology* Select, a continuing series of selected *Radiology* articles that highlight developments in imaging science, techniques and clinical practice, is offered to members at a discounted price.

RadioGraphics publishes the best peer-reviewed educational material in radiology and is a top source for earning CME credit toward maintaining professional certification. *RadioGraphics* offers readers a broad selection of image-based educational content in radiologic subspecialties. The journal is published bi-monthly online and in print with a special monograph issue published each October. The 2015 monograph focuses on non-interpretive skills that are essential for supporting and fostering high-quality practice performance.

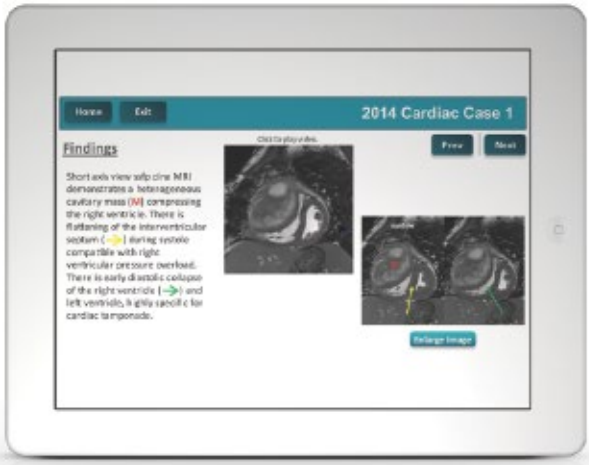
Visit the RSNA Journal websites to access the same high-quality content with new features and functionalities. *Radiology* and *RadioGraphics* mobile apps are available for iPhone®, iPad® and Android® devices and include major improvements and additions. Earn SA-CME on-the-go by taking *RadioGraphics* and *Radiology* SA-CME tests on mobile devices.

For more information about this member benefit, go to *RSNA.org/Journals*.

Education and Funding Opportunities

Online Cases of the Day

Individual Cases of the Day taken from RSNA 2014 will be released online twice a week throughout 2015. Cases are drawn from all 15 subspecialties, and offer an opportunity for users to make a diagnosis whenever it is convenient. Correctly diagnosed cases earn SA-CME credit.



Receive instantaneous feedback on the correct diagnosis, complete with a review of pertinent imaging findings and case discussion.

Each Online Case of the Day features a clinical case history and relevant imaging studies to assist in the correct diagnosis.

These interactive cases feature some of the most challenging and unusual cases gleaned from the RSNA 2014 Annual Meeting.

Users review the case history and choose the best diagnosis from a list of possible answers, including the correct answer and the most frequently submitted incorrect answers from Cases of the Day at RSNA 2014. Immediate feedback is given once a diagnosis has been submitted, to help gauge understanding of the case. In addition, users can explore imaging findings, read case discussions related to the diagnosis and review references that will bolster their understanding of the case.

Visit *RSNA.org/Library* and select "Cases of the Day" to get started. Stay tuned throughout 2015 for the newest and most challenging cases as they come online.

RSNA Clinical Trials Methodology Workshop

January 9-15, 2016
La Jolla, CA
Applications due
June 15, 2015

Over the course of this 6 ½ – day workshop, participants will learn how to develop protocols for the clinical evaluation of imaging modalities. Each trainee will be expected to develop a protocol for a clinical study, ready to include in an application for external funding. 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. Familiarity with basic concepts and techniques of statistics and study design is required. Once admitted, trainees participate in group and individual learning, including preparative readings, didactic sessions, one-on-one mentoring, small group discussions, self-study and individual protocol development. The course is free, although students selected are responsible for their own transportation and hotel accommodations.

More information and application/nomination forms are available at *RSNA.org/ResearchCourses*. Questions can be directed to Rachel Nelson at 1-630-368-3742 or *rnelson@rsna.org*.

RSNA/AUR/ARRS Introduction to Academic Radiology Program

Nominations/ applications due **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 101st RSNA Scientific Assembly in Chicago from Nov. 29 to Dec. 3 or the ARRS Scientific meeting in Los Angeles, April 17-22, 2016.

More information and application/nomination forms for these programs are available at *RSNA.org/Grant_Writing_and_Research_Development_Programs*. Questions can be directed to Rachel Nelson at 1-630-590-7741 or *rnelson@rsna.org*.

REGISTER FOR 2015 CORE WORKSHOP

New topics added have been added for the 2015 Creating and Optimizing the Research Enterprise (CORE) workshop, which takes place October 2-3 at RSNA headquarters in Oak Brook, Illinois. 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. Deadline for registration is September 3.

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

Medical Meetings April-May 2015

APRIL 9-11
American Brachytherapy Society (ABS), Annual Meeting, Orlando Renaissance Sea World, Orlando, Florida
• *www.americanbrachytherapy.org*

APRIL 10-12
American Society for Radiation Oncology (ASTRO), 2015 State of the Art Radiation Therapy (START) Meeting, Las Vegas
• *www.astro.org*

APRIL 11-14
American Physical Society (APS), April Meeting 2015, Baltimore
• *www.aps.org*

APRIL 12-16
Healthcare Information and Management Systems Society (HIMSS), Annual Conference and Exhibition (HIMSS15), McCormick Place, Chicago
• *www.himss.org*

APRIL 14-17
Association of University Radiologists (AUR) in joint providership with **RSNA,** Joint Sponsored 63nd Annual Meeting in conjunction with **SCARD, APDR, A3CR2, ACER, AMSER, RAHSR, RRA, APCR, SNMMI,** New Orleans Marriott
• *www.aur.org*
Visit the RSNA Booth

APRIL 17-20
Australian and New Zealand Society of Nuclear Medicine (ANZSNM), 45th Annual Scientific Meeting, Brisbane Convention and Exhibition Centre, Brisbane, Queensland
• *anzsnm2015.com.au*

APRIL 19-24
American Roentgen Ray Society (ARRS), 2015 Annual Meeting, Metro Toronto Convention Centre
• *www.arrs.org*

APRIL 24-28
European Society for Radiotherapy & Oncology (ESTRO), 3rd ESTRO Forum, Barcelona International Convention Center, Barcelona, Spain
• *www.estro.org*

APRIL 25-28
Society of Breast Imaging (SBI) and the **American College of Radiology (ACR)**, Breast Imaging Symposium 2015, Hilton Bonnet Creek, Orlando, Florida
• *www.sbi-online.org*

APRIL 25-30
American Society of Neuroradiology (ASNR) 53st Annual Meeting and the Foundation of the ASNR Symposium 2015, Sheraton Chicago Hotel and Towers
• *www.asnr.org/2015*

APRIL 26-29
British Nuclear Medicine Society (BNMS), Spring Meeting, Brighton Conference Centre, Brighton, England
• *www.bnms.org.uk*

APRIL 27-MAY 1
Society for Pediatric Radiology (SPR), Annual Meeting and Postgraduate Course (SPR 2015), Hyatt Regency Hotel, Bellevue, Washington
• *www.pedrad.org*

APRIL 30-MAY 3
The Radiological and Diagnostic Imaging Society of São Paulo (SPR), 45th São Paulo Radiological Meeting (JPR 2015), Transamerica Expo Center, São Paulo
• *www.spr.org.br/en/jpr/2015*
Visit the RSNA Booth

MAY 2-5
American Radium Society (ARS), 97th Annual Meeting, Grand Hyatt Kauai, Kauai, Hawaii
• *www.americanradiumsociety.org*

MAY 4-8
Educational Symposia (ESI), 32nd Annual Magnetic Resonance Imaging 2015: National Symposium, Loews Royal Pacific Resort, Orlando, Florida
• *www.americanradiumsociety.org*

MAY 5-8
Iranian Society of Radiology (ISR), 31th Iranian Congress of Radiology (ICR), Olympic Hotel, Tehran, Iran
• *www.isr.org*

MAY 6-9
World Congress on Interventional Oncology (WCIO), Hilton New York
• *www.wcioevents.org*

FIND MORE EVENTS AT *RSNA.org/Calendar.aspx*.

Annual Meeting Watch

News about RSNA 2015

RSNA 2015
November 29 – December 4

Advance Registration and Housing Opens April 29

RSNA 2015 advance registration and housing open April 29 for RSNA and AAPM members. Non-member registration and housing open June 3. Advance Registration and Housing information is available at *RSNA.org/Register*.

Register for RSNA 2015 Virtual Meeting

This year's Virtual Meeting offers 60 courses live and on-demand. Registration for RSNA and AAPM members begins April 29 at *RSNA.org/Register*.

Use RSNA Housing System to Reserve Hotel Rooms Now for RSNA 2015

RSNA has secured more than 80 downtown hotels offering the lowest rates in the city. Choose from a variety of room rates to accommodate every budget, including Hilton, Hyatt, IHG, Kimpton, Marriott, Starwood and Wyndham to earn loyalty points.

Hotel rooms are available only to registered individuals.

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.

International Visitors

If you must apply for a temporary non-immigrant visa to attend RSNA, you are advised to apply as soon as travel to the U.S. is decided and no later than three to four months in advance of the travel date. RSNA offers a personalized official letter of invitation for RSNA 2015 attendees. Information is available at *RSNA.org/International_Visitors*.

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	N/A	625	One-day registration to view only the Technical Exhibits

Important Dates for RSNA 2015

April 29	Member registration and housing open at 10:30 a.m. CT
June 3	Non-member registration and housing open at 10:30 a.m. CT
July 8	Course enrollment open at 10:30 a.m. CT
October 16	Deadline for international badge mailing
November 6	Final housing and discounted registration deadline at 5 p.m. CT
November 25	Deadline to guarantee a seat for all ticketed courses at 5 p.m. CT
Nov. 29 – Dec. 4	101st Scientific Assembly & Annual Meeting

RSNA.org

Professional Vignettes Aid Radiologists with Daily Dilemmas

At one time or another, most radiologists will encounter professional dilemmas in their practice. Many aren't sure how to handle those situations or even where to look for guidance and education on the best protocol for addressing such issues.

RSNA members need look no further than the Professionalism Resources page at *RSNA.org/Professionalism*. Among the host of tools and information essential to bolstering your professionalism IQ, the website features vignettes that provide thought-provoking scenarios in an interactive question-and-answer format that can be completed in a short period of time.

Developed by the RSNA Professionalism Committee, each vignette illustrates a real-life situation with a professional dilemma that might be encountered in a radiology practice, followed by a series of multiple-choice questions that draw attention to important, specific teaching points on professionalism—one of radiology's core competencies.

The Professionalism Committee recently added two new vignettes—Professionalism in Radiology Research: Duplicate Publication and Related Issues and Professionalism in the Age of Social Media—to its diverse roster of topics including, Hiring Practices and Workplace Discrimination, Professionalism in Radiology Research: Authorship, Sexual Harassment, Partner Relationships and Disclosure of Radiological Error. New topics are currently in development as the committee continues to build on its library of content.

Along with sparking discussion on these important issues, the vignettes provide radiologists with an opportunity to consider how they might employ best practices in selected situations and to facilitate discussion of professionalism.

Access the vignettes from the Professionalism Vignettes homepage at *RSNA.org/Professionalism_Vignettes*. To submit questions, suggest topics or for more information, contact *Professionalism@rsna.org*.

COMING NEXT MONTH

In May, *RSNA News* examines how accessible, readable and automatic multimedia radiology reports can improve and enhance the practice and satisfaction of referring physicians and improve patient care.

Interested in developing a protocol for your Imaging Clinical Trial?

Now accepting applications for the RSNA 2016 Clinical Trials Methodology Workshop!




January 9-15, 2016 | La Jolla, California

Learning objectives

Acquire the tools and expertise to develop a protocol and become a funded principal investigator for imaging clinical trials. Topics include:

- Principles of clinical study design
- Statistical methods for imaging studies
- Practicalities of running a clinical trial
- Sponsorship and economics of imaging trials
- Regulatory processes

This 6-1/2 day workshop is intended for M.D. and Ph.D. investigators who are faculty members in radiology, radiation oncology or nuclear medicine departments.

Application deadline:

June 15, 2015 (acceptance based on competitive selection process)

Prerequisites:

Applicant must be familiar with basic concepts and techniques of statistics and study design.

Candidate's department must commit to providing financial support for transportation and hotel (onsite stay required).

This live activity has been approved for *AMA PRA Category 1 Credit™.*

Learn more and apply at *RSNA.org/CTMW*

For more information contact Fiona Miller
1-630-590-7741 or *fmiller@rsna.org*

RSNA Education™