

October 2018 Volume 28, Issue 10



RSNA 2018 to Highlight the Latest in 3D Printing

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Radiologists Increasingly Turn to Physician Extenders Radiology Salaries Dipped Slightly in 2017 PI-RADS v2 Effective in Prostate Cancer Diagnosis RSNA Journals Continue to Lead the Field Cost Factor in CT Colorectal Cancer Screening

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PI-RADS v2 Effective in Prostate Cancer Diagnosis



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#### **RSNA MISSION**

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



# Outstanding Educator and Researcher Announced

The RSNA Board of Directors has announced the Outstanding Educator and Outstanding Researcher who will be honored at the 104th Scientific Assembly and Annual Meeting.



OUTSTANDING EDUCATOR



David M. Yousem, MD Baltimore, MD

OUTSTANDING RESEARCHER



Carolyn C. Meltzer, MD Atlanta, GA

# Celebrate the Seventh Annual International Day of Radiology on Nov. 8

The International Day of Radiology (IDoR) is set for Nov. 8 to create greater awareness of the value that radiology research, diagnosis and treatment contribute to safe patient care and bring better understanding of the vital role radiologists perform in health care delivery.

IDoR is an initiative of RSNA, the European Society of Radiology (ESR) and the American College of Radiology (ACR) with a dedicated website (IDoR2018.com) and social media activities.

Visit RSNA.org/IDoR for customizable promotional materials and more information.



### **RSNA R&E** Foundation Grant Applications Open

The RSNA Research & Education (R&E) Foundation awards millions of dollars each year to promising researchers and educators in radiology. Many past recipients have credited an R&E grant for sparking a career in academic research and opening doors to additional funding from national resources.

The online application process will open in October for several research, medical student and education grants. Deadlines for applications begin in January. Visit RSNA.org/Foundation to discover the available grants, learn how to apply and read about current and past funded projects.



# New at RSNA 2018: 3D Printing & Advanced Visualization Showcase Moves to Technical Exhibits Floor

The 3D Printing & Advanced Visualization Showcase is returning to this year's RSNA annual meeting, but attendees will find it in a new location: the Technical Exhibits floor in the South Hall. Previously, the showcase was located in the Learning Center.

This year's showcase will feature daily sessions, hands-on courses, poster presentations and a 3D printing demonstration area. Attendees can also explore products

in 3D printing equipment and software as well as advanced visualization products including augmented reality, holography and virtual reality platforms.

Throughout the meeting, exhibitors will give short product presentations in the Showcase Theater, which will also feature daily presentations from members of RSNA's 3D Printing Special Interest Group. Read more about 3D printing at RSNA 2018 on Page 8.

The 3D Printing & Advanced Visualization Showcase is sponsored by TeraRecon.



# IRIYA Participants at 2018 Annual Meeting

The RSNA Introduction to Research for International Young Academics (IRIYA) program encourages young radiology professionals to strengthen and grow their teaching and research careers. The program offers young academics the chance to attend specialized courses, small group discussions and other networking opportunities during the RSNA annual meeting.

The 2018 IRIYA participants and their home countries are:

Ankit Balani, MBBS, DMRB India

Yu-Chen Chen, MD, PhD China

Claudia Corona, MD Mexico

Ilona Dekkers, MD, MSc Netherlands

Fatma Elkafrawy, MBBCH, MSc Egypt

Dyan Christine Flores, MD Philippines

Salvatore Gitto, MD Italy

Hidayatullah Hamidi, MD Afghanistan

Eui Jin Hwang, MD, Republic of Korea

Brendan Kelly, MBBCH, BSc, MSc Ireland

Ghizlane Lembarki, MD Morocco

Filippo Pesapane, MD Italy

Rolf Reiter, MD Germany

Adolfo Enrique Rodriguez, MD Mexico

Domiziana Santucci, MD Italy

Abdul Thalakkottu, MD India

Kai Wang, MD China

# ABR Online Longitudinal Assessment Preview at RSNA 2018

The American Board of Radiology's (ABR) Online Longitudinal Assessment (OLA) for Part 3 of the Maintenance of Certification (MOC) program will be available for preview at RSNA 2018.

Diagnostic radiology and diagnostic radiology subspecialty diplomates will be able to access OLA in early 2019, with subsequent roll-out to the other ABR specialties of interventional radiology, medical physics and radiation oncology in 2020.

OLA is a progressive online assessment that will replace the previous proctored MOC exam required every 10 years. OLA enables diplomates to demonstrate what they know through a convenient and flexible online format, eliminating the need for travel.

Stop by the ABR booth 1013 in the South Hall at RSNA 2018 for a personal OLA demonstration.

# QIBA<sup>®</sup> Profile Conformance Testing Now Available

The Quantitative Imaging Biomarkers Alliance<sup>®</sup> (QIBA) is offering a new conformance testing service to help clinical sites demonstrate achievement in high-quality quantitative imaging results. QIBA is an RSNA initiative to advance quantitative imaging and the use of imaging biomarkers in clinical practice and clinical trials by engaging health care professionals, researchers and industry.



Clinical sites that achieve QIBA Profile specifications will receive a QIBA Conformance Certification Mark to distinguish themselves as performing quantitative imaging studies with a high level of precision. Scanner and analysis software vendors can also obtain the QIBA Conformance Certification Mark to demonstrate that their specific medical device has been thoroughly tested and has achieved conformance with a QIBA Profile.

QIBA Conformance Certification Services, including an image quality assessment phantom and online phantom analysis services, are currently only available for the QIBA CT Small Lung Nodule Profile.

RSNA works in partnership with Accumetra, a software development company focused on developing and improving quantitative imaging technologies, to manage the imaging results.

For more information on QIBA's conformance testing and certification, go to RSNA.org/QIBA.

### In Memoriam

#### Alexander R. Margulis, MD

An internationally renowned educator, researcher and visionary in radiology, Alexander R. Margulis, MD, died Sept. 7, in New York. He was 97.

During his long and distinguished career, Dr. Margulis earned a reputation as a founding father of gastrointestinal radiology and touched the lives of countless radiologists and scientists throughout the world.

In 2012, RSNA honored Dr. Margulis, a frequent contributor and associate editor for Radiology, by establishing the Alexander Margulis Award recognizing the best original scientific article published each year in Radiology.

"Alex was a friend to everyone and a mentor to many of us," said James Borgstede, MD, chairman, RSNA Board of Directors. "His textbook, Alimentary Tract Radiology, has been a study guide and resource for me in my career. Nearly every imaging modality has the imprimatur of Alex Margulis. We have lost a dear friend and colleague."

Dr. Margulis served as chair of the University of California, San Francisco (UCSF) Department of Radiology for 26 years, from 1963 to 1989. He led the department to international prominence, establishing UCSF as a destination for physicians around the world to learn the latest imaging techniques and technology. Dr. Margulis was instrumental in building the emerging fields of CT, MRI and molecular imaging.

Dr. Margulis was born in Belgrade in the former Yugoslavia and served as an officer during World War II. After attending Harvard Medical School in Boston, he completed his residency in diagnostic radiology at the University of Michigan Medical School in Ann Arbor. He joined the

faculty at the University of Minnesota in Minneapolis, eventually becoming a U.S. citizen. He then served in the U.S. Army Medical Corps at Fort Bragg, NC, as a clinical radiologist and chief of medical education.

After his military service, Dr. Margulis joined Washington University in St Louis, eventually becoming a full professor in 1961. Following his retirement from UCSF, Dr. Margulis was named UCSF associate chancellor and then special consultant to the chancellor.

In 2000, at the same time, his wife, Hedvig Hricak, MD, PhD, Dr(hc), was named the chair of radiology at Memorial **Sloan Kettering Cancer Center in New** York, Dr. Margulis became a clinical professor of radiology at The Weill Cornell Medical College in New York, where he taught until the time of his passing. Dr. Hricak, a former RSNA president, continues to serve at Memorial Sloan Kettering.

Dr. Margulis was a co-founder of the Society of Gastrointestinal Radiology that later merged with the Society of



Uroradiology to become the Society of Abdominal Radiology. He was also co-founder of both the **International Society of Magnetic Resonance in Medicine and the** International Society for Strategic Studies in Radiology. He served as president of the Association of University Radiologists, the Society of Chairmen of Academic

Radiology Departments and the California Academy of Medicine.

During his academic career, he published more than 280 manuscripts and 21 books including his seminal work, Alimentary Tract Radiology - the very first textbook on gastrointestinal radiology.

In 2014 he was appointed to the rank of Chevalier of the French Legion of Honor by the President of France for educating most of the present leaders of French radiology during his years at UCSF.

Dr. Margulis presented the RSNA Annual Oration in Diagnostic Radiology in 1971 and was honored with an RSNA Gold Medal in 1983. Dr. Margulis received the 1989 J. Allyn Taylor International Prize in Medicine. The American College of Radiology awarded him the 2013 Radiology Leadership Institute Leadership Luminary Award. Together with his wife, Dr. Margulis was an RSNA Research & Education (R&E) Foundation Centennial Pathfinder. Presidents Circle Donor and Visionary Donor.

#### James D. Cox, MD

A recognized leader in radiation oncology and proton therapy, James D. Cox, MD, professor emeritus, **Department of Radiation Oncology at** the University of Texas MD Anderson Cancer Center (MDACC) in Houston, died Aug. 14 in Houston. He was 80.

During his nearly three decades at MDACC, Dr. Cox was internationally acclaimed for his contributions to treating cancer.

Dr. Cox received his medical degree from the University of Rochester School of Medicine and Dentistry in New York. Dr. Cox served in the U.S. Army at Walter Reed National Military Medical Center, Bethesda, MD, before beginning

his academic career at Georgetown University. Dr. Cox was recruited to MDACC in 1988 as a professor of radiation oncology, physician-in-chief and vice president of patient care. From 1995 until his retirement in 2014, Dr. Cox served as head of the Division of Radiation Oncology and chair of the Radiation Oncology Department at MDACC.

His wife, Ritsuko U. Komaki, MD, is a professor and section chief of thoracic radiation oncology at MDACC.

Dr. Cox was a former president of the American Society for Radiation Oncology (ASTRO). He authored nearly 500 research papers published and coauthored the authoritative guide,

Radiation Oncology, now in its 9<sup>th</sup> edition. Dr. Cox served as **RSNA** second vice president in 1991 and was a former associate editor of the Radiology Editorial Board. He also gave the 1993 RSNA



Annual Oration in Radiation Oncology. He was a former chair of the RSNA **Refresher Course Radiation Oncology** Subcommittee and served as RSNA faculty at several annual meetings. He was also an RSNA Research & Education (R&E) Foundation Visionary donor.

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PAPER

# Radiologists Increasingly Turn to Physician Extenders

Nurse practitioners, physician assistants and radiologist assistants help offset the mounting radiology workload.

#### BY RICHARD DARGAN

As radiology practices grow busier and more complex, many are turning to physician extenders (PEs) to help in a variety of areas. In fact, two types of PEs — physician assistants (PAs) and nurse practitioners (NP) — are experiencing significant growth as radiologists face ever-mounting workloads.

While PAs and NPs make up the greater number of PEs, radiologist assistants (RAs) — another type of PE — are gaining a greater foothold in radiology where the specialized nature of RA training is demonstrating value.

The history of PEs dates back several decades. PEs emerged in the 1960s as mid-level providers who could help alleviate the impact of physician shortages experienced at the time, including in radiology.

The number of NPs and PAs accelerated over the ensuing decades, and job growth shows no signs of abating. In 2017, more than 234,000 NPs were licensed in the U.S., according to the American Association of Nurse Practitioners (AANP) — almost double the total from 2007. PAs numbered more than 115,000 in 2016, according to the National Commission on Certification of Physician Assistants, a 6.3 percent increase over the previous year.

The growing number of radiology practices with PEs on staff are reporting positive experiences.

"Every practice is different, but I have yet to hear of someone who took on a physician extender and regretted the decision," said Thomas A. Shin, MD, an interventional radiologist with the DuPage Medical Group in Lisle, IL. "They improve workflow, help manage the workload and generally improve the radiologist's day."

"We have an increasing workload due to the volume of cases and the unpredictability of scheduling residents and fellows," said Charles O'Malley, MD, a diagnostic radiologist at the Cleveland Clinic, Ohio, where PEs have been on staff in the abdominal section of the radiology department since last year. "PEs make everything run more efficiently. They have been very helpful to us."



Nationally, the radiology workload has increased over the past several years, particularly on the diagnostic side. (See, "Survey Shows Radiology Salaries Dipped Slightly in 2017," on Page 7).

#### PAs, NPs Have Interventional Focus

Each type of PE has a unique set of qualifications and scope of practice, as dictated by individual state regulations.

PAs are licensed health care professionals who directly provide medical care under physician supervision; NPs are registered nurses with advanced clinical training who provide medical assistance under physician supervision, or in some states, independently. Both PAs and NPs have obtained a master's degree as the minimum qualification, while many NP programs have transitioned to doctoral degrees. Both are licensed in all 50 states.

NPs and PAs have similar scopes of practice. Typically, both can conduct physical examinations, diagnose and treat illnesses and order radiologic studies, although duties vary according to state regulations, which also dictate whether PEs require direct physician supervision.

According to a literature review, the impact of PEs is evident in the interventional radiology suite, where they can assist radiologists by performing vascular access, drainages and other lower-level procedures, according to Vicki Sanders, MSRS, associate professor at Midwestern State University in Wichita Falls, TX, and president of the Society of Radiology Physician Extenders, one of several physician extender associations.

Along with Jennifer Flanagan, MSRS, Sanders authored the 2015 study, "Radiology Physician Extenders: A Literature Review of the History and Current Roles of Physician Extenders in Medical Imaging," in the *Journal of Allied Health*.

"The literature revealed that PAs are used mainly in interventional radiology, performing history and physical; evaluation and management; pre-procedure work-up; initial observations/reports; medication administration; and post-procedure follow-up," according to Sanders.

The study showed that NPs also work most often in interventional radiology and have similar duties to the PA.

#### Demand for RAs Growing

While PAs and NPs are in the midst of a boom cycle, RAs — advanced level radio-logic technologists — are also steadily gaining ground.

There are about 660 RAs practicing in the U.S. and eight schools offering RA programs, according to the American Registry of Radiologic Technologists (ARRT). Some RAs are optimistic that the position will follow the paths of NPs and PAs and continue to grow in prominence.





O'Malley







Flanagan

Nordeck

Continued from previous page

"There was an initial fear that RAs would replace radiologists," said Shaun Nordeck, MD, a recent graduate of the University of Texas (UT) Southwestern Medical School in Dallas who was an RA for several years before entering medical school. "Now, radiologists are seeing that RAs are very useful and are giving them more to do, so the demand is growing.'

"RAs are still too small in number, in my opinion," said Howard Forman, MD, a professor of management, radiology and public health at Yale University in New Haven, CT. "Radiologists have been perhaps too passive in adopting them.'

Dating back to the 1970s, RAs began gaining traction during the U.S. radiologist shortage of the early 2000s. The American Society of Radiologic Technologists (ASRT), the American College of Radiology (ACR) and ARRT drafted guidelines and standards for RAs in 2003. In 2010, ASRT developed the RA curriculum that is in existence today.

RA programs are similar to those of NPs and PAs, but with a specific radiology focus. Applicants must have a bachelor's degree and be a radiologic technologist with radiography (RT[R]) certification, along with relevant work experience. Most RA programs are master's degree programs.

"As a technologist, you learn how to position patients, and obtain diagnostic images and recognize common pathology," said Flanagan, an RA at UT Southwestern Medical Center in Dallas. "As an RA, our additional two-year graduate level education in radiographic pathology and pattern recognition allows us to tailor exams to specific patients and indications and to create preliminary radiographic and fluoroscopic observations."

RAs provide a variety of services in a practice. They consult with patients before a procedure, review medical histories and look for possible contraindications to imaging studies. They perform procedures like fluoroscopy, myelograms, joint injec\*\*Every practice is different, but I have yet to hear of someone who took on a physician extender and regretted the decision."

THOMAS A. SHIN, MD

tions and biopsies and a variety of interventional procedures.

"The RA always works under supervision of a radiologist," Sanders said. "We do not interpret images, but we do give initial observations to the supervising radiologist."

During procedures, radiologists are required to directly supervise RAs, which means they must be onsite but do not have to be in the room for the entire procedure. Patients covered by the U.S. federal Centers for Medicare & Medicaid Services (CMS), however, require supervision by a radiologist since RAs are not currently recognized as providers. While a proposed CMS rule modification is under review, radiologists still benefit from RAs providing patient management.

"Our responsibilities include verifying indications/contraindications, interviewing the patient and obtaining patient history, performing the exam, reviewing the exam with the radiologist for completeness and counseling the patient with the radiologist's input," Flanagan said. "Due to our high patient volume, our role improves the efficiency and productivity of the radiology department."

The radiology-specific training of RAs offers some advantage over PAs and NPs, including experience with certain aspects of imaging that may not be included in the other PE's curriculum. RAs also potentially make a practice less vulnerable to turnover.

"A PA could leave radiology to go work for another physician like a cardiologist or vascular surgeon," Sanders said. "NPs could hang their own shingle. But RAs have to stay within the sphere of radiology."

#### Choosing a Physician Extender

RA leaders say changes in state and federal regulations are key to broadening acceptance beyond the 31 states where RAs are currently recognized.

Once RAs are able to work under a level of supervision commensurate with their training and experience, the field will experience rapid growth in education and job opportunities, which will benefit radiology practices, Dr. Nordeck predicted.

'When it comes to choosing a physician extender, the PA or NP currently offer advantages in general medicine knowledge, practice autonomy and prescribing, while the RA offers advantages in procedural training, imaging knowledge, communication and safe use of ionizing radiation/fluoroscopy," Dr. Nordeck said. Dr. Nordeck suggests that practices looking to add a physician extender should carefully research the educational differences, consider the benefits and drawbacks of each, consider their state's laws regarding scope of practice and use of ionizing radiation/fluoroscopy, and choose the extender who will best fill needs of the practice. 🔣

#### WEB EXTRAS

Access the study, "Radiology Physician Extenders: A Literature Review of the History and Current Roles of Physician Extenders in Medical Imaging," in the Journal of Allied Health at ASAHP.org

# Radiology Salaries Dipped Slightly in 2017

Workload on the upswing for diagnostic radiologists, according to AMGA survey.

#### BY RICHARD DARGAN

While radiologists remain one of the highest paid medical specialists in the U.S., a new survey shows that compensation dipped slightly in 2017, even as productivity inched up for diagnostic radiologists.

Experts cite the downstream effects of the Affordable Care Act as one factor in the drop in compensation in the past year. In addition, salary increases for health care overall were the lowest in more than a decade, according to a recent survey. The survey by AMGA Con-

sulting, a unit of the American



Forman

Medical Group Association (AMGA), reports median compensation for diagnostic radiologists in the U.S. dipped by 3 percent, from \$503,225 in 2016 to \$487,239 in 2017. For interventional radiologists, median compensation dropped from \$610,500 in 2016 to \$588,471 in 2017.

Overall, radiology fared well in the survey. Median compensation for radiologists outpaced that of dermatology (\$460,238), neurology (\$302,060), internal medicine (\$258,027) and numerous other specialties. Median salaries for gastroenterology (\$529,880) and cardiology (\$497,888) came in slightly higher.

The fact that radiologist compensation has been holding up so well in the face of reimbursement cuts speaks to the vitality of the profession, according to Howard P. Forman, MD, a professor of management, radiology and public health at Yale University in New Haven, CT. "Radiology is a remarkably resilient specialty and remains consistent despite shifts in health care," Dr. Forman said.

#### **Reimbursement Drives Salaries**

The Affordable Care Act and resulting reimbursement cuts continue to be a factor in radiology compensation, Dr. Forman said. Since the law passed in 2010, an estimated 20 million Americans have gained insurance coverage, and many of the insured are now covered by Medicaid, which typically pays lower fees than commercial insurance and Medicare.

"While there are more covered individuals and the radiologist is seeing more work, the cash generated per RVU (relative value unit) will go down," Dr. Forman said.

In terms of workload, interventional fared relatively better than diagnostic radiologists in the survey. Work RVUs for diagnostic radiologists averaged 9,264 in 2017, up 0.6 percent from the 9,212 RVUs of 2016. However, the survey showed a drop of 8 percent in median productivity in interventional radiology to a rate of 7,604 RVUs in 2017.

Possible reasons for the decline in interventional radiology compensation and productivity include competition from vascular surgery and other fields and the downgrading of RVU work by coding changes, according to the AMGA report.

The decline in productivity on the interventional radiology side could be impacting diagnostic radiology, Dr. Forman said. Most practices still include diagnostic and interventional radiologists. And as interventional reimbursement has gone down, diagnostic compensation may be diverted to support colleagues who would otherwise face higher pay cuts.

Dr. Forman added that he anticipates further productivity gains as artificial intelligence (AI) expands into the specialty.

"As future practices embrace evergrowing and eventually more practical AI applications, productivity will likely accelerate – and faster than reimbursement can be reduced. This will result in a brief period of accelerating radiology compensation increases," Dr. Forman said.

Health care in general had something of an off year in terms of salary increases in 2017. Overall physician compensation increased by only 0.89 percent, the survey found, lagging below the 2017 inflation rate of approximately 2 percent. It was the first time in more than a decade that physician compensation did not increase by at least 2 percent.

Read the full report on 2017 radiology compensation at *RSNA.org/News*.





Images courtesy of AMGA Consulting

# RSNA 2018 to Highlight the Latest in 3D Printing

#### BY NICK KLENSKE

Radiology has been quick to embrace 3D printing for patient care because the technology is a natural fit for medical imaging.



Matsumoto



Chen

"3D printing is a part of medicine, and radiology is at the center of this impactful new technology," said RSNA 3D Printing Special Interest Group (SIG) Chair Jane Matsumoto, MD, assistant professor of radiology and co-director of the 3D Printing Lab at the Mayo Clinic, Rochester, MN. "Many radiologists see 3D printing as an evolving part of their practice; an innovative new way to display imaging, contribute to patient care and offer clinical value to their medical and surgical colleagues."

And as the technology continues to evolve, 3D printing could bring radiology to the next level in the health care industry.

"Being embedded in the health care system, radiologists are uniquely positioned to manage the entire digital workflow — from imaging acquisition to the eventual 3D-printed product," added SIG member Jenny Chen, MD, adjunct clinical faculty, Department of Radiology, Stanford Health Care.

As 3D printers become cheaper and the learning curve is less steep, radiologists are using the technology for more types of models and to simulate procedures than ever before.

For example, radiologists can now use a patient's own imaging data to print 3D anatomic models that serve as aids in



complex surgeries and for simulation training. 3D printing is also being used to create individualized osteotomy cutting guides to contribute to precision surgery. The technology has even started to find its way into such areas as renal sparring surgery, prostate cancer treatment, tracheal reconstruction and lung segmentectomy.

"Within radiology, there are biomedical engineering opportunities for the development of customized medical devices, prostheses and phantoms based on imaging data," Dr. Matsumoto said.

# 3D Printing & Advanced Visualization Showcase

Many of these developments will be highlighted at RSNA 2018.

"Daily didactic sessions will cover everything from the basics of starting a 3D printing lab within radiology to practical applications, quality assurance, research and education," Dr. Matsumoto said.

Highlights include a number of hands-on sessions and a U.S. Food and Drug Administration-led discussion on the agency's oversight of 3D printing. (See Sidebar, next page.)

The 3D Printing & Advanced Visualization Showcase will be located in on the Technical Exhibits floor in the South Hall. Previously, the showcase was located in the Learning Center.

This year's showcase will feature daily sessions, hands-on courses, poster presentations and a 3D printing demonstration area. Attendees can also explore 3D printing equipment and software as well as advanced visualization products including augmented reality, holography and virtual reality platforms. The 3D Printing SIG will offer a variety of lectures in the showcase throughout the meeting.

In addition, a variety of posters and education exhibits in all subspecialties including 3D printing content will be presented throughout the meeting.

To learn more, visit Meeting Central at *Meeting.RSNA.org.* 

The 3D Printing & Advanced Visualization Showcase is sponsored by TeraRecon.

Returning for RSNA 2018, the 3D printing and demo area will offer visitors a hands-on experience with the revolutionary technology.



# In Focus: The RSNA 3D Printing SIG

The RSNA 3D Printing SIG has grown rapidly since its founding in 2016. Today, its 380 active members include radiologists, engineers, physicists, technologists and representatives from the 3D printing industry. Some of the group's recent accomplishments include:

- Establishing 3D Printing Consensus Guidelines
- Developing 3D Printing Appropriateness Criteria for clinical use
- Integrating 3D printing STL files into DICOM
- Communicating with the FDA on their evolving oversight of 3D printing for patient care
- Working toward reimbursement
- Organizing educational opportunities for members, including meetings and conferences, a dedicated website and a bi-monthly newsletter.

Learn more: RSNA.org/3D-Printing-SIG

# 3D Printing Courses at RSNA 2018

# RSNA 2018 offers a range of informational sessions and opportunities to get hands-on experience with 3D printing technology:

#### Sunday, Nov. 25

- Teaching Congenital Heart Morphology with 3D Print Models II: Understanding Surgical Procedures in Congenital Heart Diseases with Illustrations and 3D Print Models (Hands-on)
- 3D/VR/AR Imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology (Hands-on)
- Introduction to 3D Medical Printing

#### Monday, Nov. 26

- Creating Patient-Specific Anatomical Models for 3D Printing and AR/VR (Hands-on)
- Image to 3D Prints: How 3D Printing Works (Hands-on)
- 3D Medical Printing Applications I

#### Tuesday, Nov. 27

- 3D/VR/AR Imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology (Hands-on)
- 3D Medical Printing Technologies
- 3D Printing Hands-on with Open Source Software: Introduction (Hands-on)

#### Wednesday, Nov. 28

- 3D Medical Printing Applications II
- Image to 3D Prints: How 3D Printing Works (Hands-on)
- Creating Patient-Specific Anatomical Models for 3D Printing and AR/VR (Hands-on)

#### Thursday, Nov. 29

- Virtual Reality and 3D Printing
- 3D Printing Hands-on with Open Source Software Introduction (Hands-on)
- Transpositions of the Great Arteries in Your Hands (Hands-on)

### Learn About the 3D Printing Special Interest Group at RSNA 2018

#### Interested in knowing more about 3D printing for your practice?

Visit the RSNA 3D Printing Special Interest Group (SIG) kiosk located in the Informatics Community in the Learning Center to learn about medical 3D printing and the basics of setting up a lab. Attendees can also learn about the SIG's activities, access 3D printing resources and learn how to connect with the medical 3D printing community.

\*\*3D printing is part of medicine, and radiology is at the center of thisimpactful new technology.\*\*JANE MATSUMOTO, MD



# New Research Shows PI-RADS Version 2 Effective in Prostate Cancer Diagnosis

#### BY MIKE BASSETT

While researchers have been studying MRI of the prostate for decades, it has only been in the last 10 years that multiparametric (mp) MRI has emerged as an effective tool to detect prostate cancer in men with raised serum PSA levels.



Images of a lesion (*arrow*) in a 73-year-old man with a serum prostate-specific antigen level level of 4.08 ng/mL. A, Axial T2-weighted MR image shows the 1.1-cm lesion in the left apical anterior transition zone. B, Apparent diffusion coefficient map shows marked diffusion restriction in this same lesion. C, Diffusion-weighted (DW) MR image (b = 2000 sec/mm2). D, Dynamic contrast-enhanced (DCE) MR image shows early enhancement. The lesion was assigned a Prostate Imaging and Reporting Data System (PI-RADS) score of 4 with T2-weighted and DW MR imaging and had an overall PI-RADS score of 4. Fusion MR imaging and transrectal US-guided biopsy revealed Gleason 3+3 prostate cancer within this lesion. Thai, J., et al., Radiology 2018;288;2 © RSNA 2018 In 2012 the European Society of Urogenital Radiology (ESUR) published the Prostate Imaging Reporting and Data System (PI-RADS) — which included a scoring system — with the objective of standardizing the acquisition, interpretation and reporting of prostate MRI for cancer detection.

Clinical trials showed that PI-RADS v1 was able to improve the diagnosis of intermediate- to high-grade cancers compared to the standard of care TRUS biopsies. However, experience also showed that there were limitations associated with v1, and the American College of Radiology (ACR), ESUR and the AdMeTech Foundation established a steering committee to update and improve PI-RADS. The result was the development of PI-RADS version 2 (v2), which was introduced at RSNA 2014 and subsquently published in 2016.

Since then, researchers worldwide have been working to validate PI-RADS v2.

In a recent 2018 online study in *European Urology*, members of the PI-RADS Steering Committee concluded that the evidence from validation studies, systematic reviews and professional guidelines for mpMRI — shows that PI-RADS v2 retains higher accuracy over systematic transrectal ultrasound (TRUS) biopsies for prostate cancer diagnosis.

And while PI-RADS v2 does not detect all cancers, it does detect the majority of tumors that can be harmful to patients.

"When you perform an mpMRI, with the interpretation using PI-RADS — and it is done well — it is very beneficial to the diagnosis of the patient and the therapeutic



JELLE O. BARENTSZ, MD, PHD



Barentsz



Choyke



Turkbey



Padhani

process," said Jelle O. Barentsz, MD, PhD, a professor of radiology and chair of the Radboud Prostate MR-Reference Center of Radboud University Medical Center, the Netherlands, senior author of the *European Urology* article.

# *Radiology* Study Focuses on Prostate Transition Zone

In an August 2018 *Radiology* study, author Peter Choyke, MD, and colleagues sought to determine the association between PI-RADS v2 scores and prostate cancer in patients undergoing biopsy of lesions in the prostate transition zone.

The prostate transition zone — a less frequent site of cancer compared to the peripheral zone —surrounds a part of the urethra that passes through the prostate and is a very complex environment, said Dr. Choyke, program director, Molecular Imaging Program, Center for Cancer Research at the National Institutes of Health, Bethesda.

"The prostate transition zone is also prone to hyperplasia and hyperplastic nodules," Dr. Choyke said. "And the subcommittee was very concerned about whether PI-RADS v2 would work as well in the transition zone as it was predicted to work in the peripheral zone. And it turns out it is a pretty good predictor."

Specifically, Dr. Choyke and his colleagues found that higher PI-RADS v2 scores are associated with a higher proportion of clinically significant cancers in the transition zone.

In the study, the researchers identified 634 transition zone lesions in 457 patients from a prospectively maintained database of patients undergoing prostate MRI and determined the proportion of cancer detection for all cancers, as well as clinically significant cancers for each PI-RADS v2 category.

For PI-RADS category 3, 4 and 5 lesions, the overall proportion of cancers was 22.2 percent (78 of 352), 39.1 percent (43 of 110), and 87.8 percent (129 of 147), respectively. In addition, the proportion of clinically important cancers was 11.1 percent (39 of 352), 29.1 percent (32 of 110), and 77.6 percent (114 of 147), respectively.

"We targeted those higher category lesions and sampled them," said senior author Baris Turkbey, MD, associate research physician of the Molecular Imaging Program at the National Cancer Institute. "Specifically, those PI-RADS Category 5 lesions, which have more clinically significant cancers."

For PI-RADS Category 2 lesions, the overall proportion of cancers was just 4 percent.

"And none of these were clinically significant," Dr. Turkbey said. "This implies that these lesions probably should not be biopsied."

# Higher Quality Standards, Training Necessary

In their *European Urology* study, the PI-RADS Committee noted that mpMRI and MRI-directed biopsies using PI-RADS improves the detection of prostate cancers likely to cause harm, while decreasing the detection of those that will not.

"Nevertheless, the keys to success are high-quality imaging, reporting and biopsies by radiologists and urologists working together in multidisciplinary teams," Dr. Barentsz said.

That means higher quality standards are needed in the both performing and interpreting prostate MRI scans, Dr. Barentsz said.

"And that quality assurance has to be everything in the diagnostic process, including the machines, the components of the scan, the readings and how that information gets communicated to urologists," said lead author Anwar Padhani, MBBS, head of imaging research at the Paul Strickland Scanner Centre, Mount Vernon Cancer Center, London.

Dr. Barentsz said the biggest concern is the quality of the diffusion-weighted images. Because mpMRI is a relatively new modality, many radiologists were not exposed to it during their residency and fellowship training. Training is necessary, he said.

"Not every radiologist knows how to use PI-RADS," Dr. Barentsz said. "Which is probably why courses on prostate MRI at RSNA are so popular. Many radiologists want to learn from the experts how to make the images and how to read them."

Dr. Barentsz has organized a popular hands-on prostate MRI course at RSNA for several years and will offer it again at RSNA 2018.



#### RSNA 2018 Offers Hands-on Prostate MRI Courses

Jelle O. Barentsz, MD, PhD, will present courses on hands-on prostate MRI at RSNA 2018 on Monday, Tuesday, Wednesday and Thursday, 8–10 a.m. Add these and other RSNA 2018 courses to My Agenda at *Meeting.RSNA.org.* 

#### WEB EXTRAS

☑ Access the *Radiology* study, "Validation of PI-RADS Version 2 in Transition Zone Lesions for the Detection of Prostate Cancer," at *RSNA.org/Radiology*.

Access the European Urology study, "Prostate Imaging-Reporting and Data System Steering Committee: PI-RADS v2 Status Update and Future Directions," at Europeanurology.com.

# Gary D. Luker, MD, Named Editor of Radiology: Imaging Cancer

New specialized journal to launch in fall 2019.

Gary D. Luker, MD, will become editor of the new online RSNA journal, *Radiology: Imaging Cancer*.

Dr. Luker is professor of radiology, microbiology and immunology and biomedical engineering at Michigan Medicine in Ann Arbor, MI, where he serves as associate chair for clinical research in the department of radiology. He is also an attending physician at C.S. Mott Children's Hospital in Ann Arbor.



Luker

"I am delighted that RSNA is founding a new journal dedicated to cancer imaging," Dr. Luker said. "I want this new journal to become a must-read, not only for imaging specialists, but also for people outside the field who want to advance imaging science and research for drug development and precision medicine in cancer. I am honored to be selected as editor."

Dr. Luker earned his medical degree in 1991 from Washington University School of Medicine in St. Louis, where he completed his diagnostic radiology residency. Following his residency, Dr. Luker pursued his postdoctoral training in pediatric imaging through a fellowship at Mallinckrodt Institute of Radiology in St. Louis, where he was an instructor of radiology from 1996 to 2002 and an assistant professor from 2002 to 2004.

From1996 to 2004, Dr. Luker was an attending physician at both St. Louis Children's Hospital and Barnes-Jewish West County Hospital, St. Louis. He moved to the University of Michigan, Ann Arbor, MI, in 2004 as an assistant professor of radiology, microbiology and immunology. In 2010, he was named associate professor at the University of Michigan and in 2012, an associate professor of biomedical engineering.

Dr. Luker has served in editorial positions and provided peer review for a number of journals, including *Journal of Immunology, Journal of Nuclear Medicine, Integrative Biology, the Proceedings of the National Academy of Sciences,* and on multiple editorial boards, including *Pediatric Radiology* and *Tomography.* 

#### Vast Knowledge of Cancer Research

As an esteemed researcher, Dr. Luker has authored or coauthored more than 145 peer-reviewed articles and three book chapters. He has given numerous invited lectures and seminars. In 2008, Dr. Luker was granted a patent on his invention, "Imaging Regulated Protein-Protein Interactions in Cells and Living Animals by Enhanced Luciferase Protein Fragment Complementation."

"Gary Luker's dedication and vast knowledge of cancer research makes him the ideal person to helm RSNA's new journal, Radiology: Imaging Cancer," said Mary C. Mahoney, MD, RSNA Board liaison for publications and communications.

#### WEB EXTRAS

Learn more about the suite of RSNA journals at RSNA.org/Journals.

"I am delighted that RSNA is founding a new journal dedicated to cancer imaging," GARY D. LUKER, MD

"The RSNA Board eagerly anticipates the launch of this exciting new journal."

Dr. Luker has received numerous awards and honors. In 1996, he received the Covidien/RSNA Research Fellow Grant. He was a 2005 Sidney Kimmel Scholar. In 2012, Dr. Luker received the Distinguished Investigator Award from the Academy for Radiology & Biomedical Imaging Research (formerly the Academy of Radiology Research), and in 2012 he received the New Investigator Award from the Association of University Radiologists. An accomplished researcher, he has received grant funding for more than 30 projects as principal investigator, primarily from the National Institutes of Health (NIH) and the U.S. Department of Health and Human Services.

Dr. Luker has served with a number of professional societies in many capacities. In addition to being a former member of the RSNA Molecular Imaging Committee, he has served on review committees for NIH and the Society for Molecular Imaging, where he served on the Board of Trustees and as a council member. Dr. Luker currently serves on the molecular imaging committees of the American College of Radiology and the American Board of Radiology.

A longtime member of RSNA, he has been a member of numerous professional societies and associations, including the Society for Pediatric Radiology, the American Association for Cancer Research, the World Molecular Imaging Society, Society of Nuclear Medicine and the American Society for Clinical Investigation.

*Radiology: Imaging Cancer* will cover the best clinical and translational cancer imaging studies across organ systems and modalities, including leading-edge technological developments. The journal will foster communication across radiologic subspecialties and support collaborations within the broader oncologic research and clinical communities. It will be published bi-monthly, exclusively online. RSNA members will receive a complimentary subscription as a member benefit. Original research and editorial submissions to *Radiology: Imaging Cancer* will be accepted beginning early 2019.

Read more about all of RSNA's new online journals on Page 13.

# RSNA's Prestigious Journals Continue to Lead the Field

#### Three New Online-Only Journals Moving Forward

Two of RSNA's new online-only journals are seeking submissions. *Radiology: Artificial Intelligence* is currently accepting submissions and *Radiology: Cardiothoracic Imaging* will accept submissions beginning Oct. 1. Submissions for RSNA's third new online journal, *Radiology: Imaging Cancer*, will be accepted in early 2019. (See Page 12.)

*Radiology: Artificial Intelligence* is seeking manuscripts that show the impact of AI to diagnose and manage patients, extract information, streamline radiology workflow or improve health care outcomes.

*Radiology: Cardiothoracic Imaging* is seeking manuscripts that emphasize research advances and technical developments in medical imaging that drive cardiothoracic medicine.

The three new online-only journals will publish in 2019.

For more information on RSNA's new online journals, go to RSNA.org/Journals.



Radiology: Artificial Intelligence



Radiology: Cardiothoracic Imaging



### RSNA Journals in the Spotlight at RSNA 2018

RSNA 2018 attendees will have a number of opportunities to connect with editors of RSNA's prestigious, peer-reviewed journals, *Radiology* and *RadioGraphics*.

RSNA Journals Sessions at RSNA 2018 • *Radiology* editor, David A. Bluemke, MD, PhD, will present "The Best of *Radiology* in 2018" during a Sunday, Nov. 25, session. Dr. Bluemke will review new research that could impact your practice. Invited speakers will discuss published research, innovations and upcoming developments in cardiothoracic imaging, breast imaging and neuroimaging.

• *RadioGraphics* editor, Jeffrey S Klein, MD, will host a Thursday, Nov. 29, session, "*RadioGraphics*' Publication Information for Potential Authors," providing details about submitting for print versus interactive online presentations and the criteria used to render decisions on peerreviewed papers.

Drs. Bluemke and Klein will present the session, "How to Turn Your Abstract into an Award-winning Publication: Tips from the Editors of the RSNA Journals," on Wednesday, Nov. 28. The editors will discuss the publishing process and how to develop a manuscript for potential consideration in RSNA journals.

For more information on these and all RSNA 2018 sessions, go to *Meeting,RSNA.org.* 

# Explore Publisher's Row at RSNA 2018

RSNA 2018 attendees can meet RSNA journals editors and staff in the RSNA Publications Booth in Publisher's Row in the Technical Exhibits Hall.

Staff can answer questions about the submission process for any of the *Radiology* suite of journals or for *RadioGraphics* and also about subscriptions, advertising or permissions. Visit the RSNA Publications at Booth 1011 in the South Technical Exhibits Hall.



### Learn About RSNA's New Online Radiology Journals in the Discovery Theater

Join the managing editors of *Radiology: Artificial Intelligence, Radiology: Cardiothoracic Imaging* and *Radiology: Imaging Cancer* in the Discovery Theater at RSNA 2018 for an update on the scope, vision and timing of RSNA's three new online-only journals. A brief question and answer session will follow the presentation.

"RSNA is Publishing More! Three New Journals Launching in 2019," will take place in the Discovery Theater on Monday, Nov. 26 at 9 a.m.

# Study Analyzes Cost-Effectiveness of Colorectal Cancer Screening Modalities

#### BY MELISSA SILVERBERG

Because colorectal cancer screening is done on such a large scale, costeffectiveness — along with other variables — is a factor when deciding on singlemodality screening for the disease.



Stoker



Lansdorp-Vogelaar

Nevertheless, data using actual screening results to compare the cost-effectiveness of CT colonography and colonoscopy screening has been lacking, said researcher Jaap Stoker, MD, chair of the Division of Radiology & Nuclear Medicine, Radiotherapy and Rehabilitation Medicine at the University of Amsterdam.

"Until now, research on the cost effectiveness of CT colonography in colorectal cancer screening was based on assumptions," Dr. Stoker said. "This, to our knowledge, is the first study to use actual screening results."

In a recent *Radiology* study, Dr. Stoker and colleagues used screening results in the Netherlands to examine the cost-effectiveness of two colorectal cancer screening modalities: colonoscopy and CT colonography screening.

The Netherlands — like most of Europe — screens for colorectal cancer on a nationwide basis.

Dr. Stoker has been part of a research group examining colorectal cancer screening in the Netherlands for several years.

Another author on the study, Iris Lansdorp-Vogelaar, MD, associate professor at the Department of Public Health of Erasmus Medical Center (MC) in Rotterdam, is part of a research group at the institution that was one of the first to develop a population-based decision model to evaluate the cost-effectiveness of cancer screening. The Erasmus MC group urged the Dutch government to introduce an organized colorectal cancer screening program in the country.



As part of that conversation, decision makers at a consensus meeting in 2004 sought to determine which test was optimal to implement nationwide. Pilot studies began in several areas: fecal occult blood testing, fecal immunochemical testing and sigmoidoscopy, CT colonography and colonoscopy.

Although colonoscopy is considered the gold standard, researchers noted that perceived burden of preparation for the test, cost and other drawbacks can deter patients from participating. Comparatively, CT colonography is a less-invasive screening with less-extensive preparation and lower risk of complications.

In 2012, a large randomized controlled trial in the Netherlands (the Colonoscopy or Colonography for Screening [COCOS] trial) was the first to compare the participation, yield and unit costs of CT colonography and colonoscopy in a dedicated screening setting.

#### CT Colonography Deemed More Cost-Effective

In the *Radiology* study, researchers used data from the COCOS trial to simulate situations with the Dutch population aged 25-85 using different CT colonography and colonoscopy screening scenarios. The participation rates for colonoscopy and CT colonography were 21.5 percent (1,276 of 5,924 invitees) and 33.6 percent (982 of 2920 invitees), respectively.

The model was used to predict colorectal cancer incidence and mortality, cost of screening and life years gained by screening for each scenario. Researchers were

> Graph shows modeled costs and quality-adjusted life-years (QALYs) gained per 1,000 invitees of CT colonography (CTC) strategies with 6-mm cutoff and colonoscopy with different starting and stopping ages and screening intervals, with 3 percent discounting, from a population's perspective. \* = CT colonography strategy as described in the diagram on page 15.

van der Meulen, M., et al., *Radiology* 2018:287;3 © RSNA 2018



Diagram shows the four simulated follow-up strategies for CT colonography (CTC ) screening that differ when 6-9-mm adenomas are found. In all four strategies, individuals with lesions of at least 10 mm at CT colonography were immediately referred for diagnostic colonoscopy, and individuals without lesions or with lesions measuring 1-5 mm at CT colonography returned to the screening program. Follow-up strategies differed in management of medium-sized lesions (6-9 mm) seen at CT colonography. Individuals with medium-sized lesions (1) were directly referred for diagnostic colonoscopy (ie, by using a cutoff of 6 mm); (2) were returned to screening program (ie, corresponding with a 10-mm cutoff); (3, 4) were offered follow-up CT colonography after 3 years, as was done in the Colonoscopy or Colonography for Screening trial, and referred to diagnostic colonoscopy if they at follow-up CT colonography had a medium or large lesion (3) or a large lesion (4). In the 4th strategy, persons with medium-sized adenomas continued to receive follow-up CT colonography, either until a large lesion was detected or until a medium lesion was no longer detected.

van der Meulen, M. et al., Radiology 2018:287;3 © RSNA 2018

then able to determine an optimal screening strategy based on costeffectiveness analysis.

Because of the 56 percent higher participation rates, CT colonography was determined to be more costeffective than colonoscopy screening, results showed. Yet results were different when factoring equal attendance.

'We found that with equal attendance, colonoscopy is more cost-effective than CT colonography," Lansdorp-Vogelaar said. "However, because the pilot study (COCOS) found significantly higher attendance for CT colonography compared to colonoscopy, CT colonography was more cost-effective than colonoscopy in that situation."

**Results Have Wide-Ranging Impact** Results showed that the cost-effectiveness of CT colonography is most applicable in a national screening program offering a single test modality, which is the case in most programs.

And while the study was conducted in the Netherlands, researchers sav the results are relevant for other populations.

"Although absolute participation rates and costs may differ among countries, the relative differences between CT colonography and colonoscopy primarily determine the comparative effectiveness," Dr. Stoker said.

The results could aid health care decision makers as they consider introducing screening methods and also serve as an important reminder for countries that do not offer nationwide cancer screening programs.

"I hope that clinicians and policy makers realize that the best test may not necessarily be the test with the best performance characteristics," Dr. Lansdorp-Vogelaar said. "Although colonoscopy is superior to CT colonography in detecting neoplasia, because fewer people accept it, on a population level it actually does not perform as well."

#### **RSNA<sup>®</sup> 2018** Tomorrow's RADIOLOGY TODAY NOVEMBER 25-30

#### **Colorectal Imaging Focus of RSNA 2018 Sessions**

- "Imaging of the Colorectum," will be presented on Tuesday, Nov. 27, from 4:30 to 6:30 p.m. Sessions include:
  - CT Colonography: Technique Update
  - CT Colonography: Strategies for Success
  - MRI Rectal Cancer Including Structured Reporting
  - MRI Anorectal Fistulas Including Structured Reporting
- "Science Session with Keynote: Gastrointestinal (Colorectal Imaging)," will be presented on Wednesday, Nov. 28, at 10:30 a.m.
- ◆ "ASRT@RSNA 2018: CT Colonography - The New Kid on the Block," will be presented on Wednesday, Nov. 28, from 2:20 to 3:20 p.m.

#### WEB EXTRAS

Access the Radiology study, "Colorectal Cancer: Cost-effectiveness of Colonoscopy versus CT Colonography Screening with Participation Rates and Costs," at RSNA.org/Radiology.

# RESEARCH & EDUCATION FOUNDATION DONORS

The RSNA Research & Education Foundation thanks the following donors for gifts made **June 20, 2018 through July 30, 2018.** 

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# R&E Foundation Website Enhances Donation Options

Scheduling a recurring donation to support radiologic research is easy and secure at the RSNA Research & Education (R&E) Foundation's updated webpage, *RSNA.org/Donate*. The refreshed site that now offers a monthly donation option has been optimized for mobile and tablet viewing.

An automatic monthly donation can make the process more manageable. For example, those who donate \$125 a month become part of the RSNA Presidents Circle, a dynamic community of supporters who make a minimum annual gift of \$1,500. These donors also have access to Presidents Circle benefits throughout the year.

For questions on the R&E Foundation and donation options, contact Bob Leigh, manager of fund development, at *rleigh@rsna.org*, or 1-630-590-7760



#### YOUR DONATIONS IN ACTION

#### Research Focuses on Advanced Imaging Assessment of Aortic Dissection

2018 RSNA Research Scholar Grant recipient **Nicholas S. Burris, MD**, and colleagues are investigating the use of 4D flow MRI for hemodynamic assessment of patients with type B aortic dissection. Using vascular deformation mapping (VDM), a novel technique for 3D assessment of aortic growth, Dr. Burris seeks to more comprehensively understand the impact of abnormal hemodynamics on the formation of aortic aneurysm.

Dr. Burris began his focus on MRI assessment of aortic dissection as the recipient of a 2015 RSNA Research Fellow Grant, when he used PET/MRI to perform a comprehensive evaluation of inflammatory and hemodynamic abnormalities that drive aneurysm formation.

"Donors to the Research & Education (R&E) program have been critical to the success of my early academic career by supporting my research as a trainee and allowing me to refine my research agenda as a junior faculty as I aim for NIH funding," Dr. Burris said.

R&E grants are designed to provide that time and space to further the goals of researchers, according to Umar Mahmood, MD, PhD, who is a member of the RSNA Board of Directors and the R&E Foundation Board of Trustees, and also a past R&E Research Resident Grant recipient.

"Such early imaging biomarkers may help guide which patients will most benefit from preventative endovascular repair and which patients can forgo invasive procedures," Dr. Mahmood said. "Refined risk prediction tools can save patients from unnecessary procedures and focus resources on those who are most likely to benefit."



Burris



Mahmood

### **In Memoriam**

#### Scott A. Walter

RSNA has lost a dear friend and colleague. Scott A. Walter, assistant director for grant administration with the RSNA Research & Education (R&E) Foundation, died unexpectedly on Sept. 4. His knowledge and expertise related to the Foundation's granting process was vast and his commitment to its mission was considerable.

"Scott was incredibly knowledgeable, helpful, sincere and nice to everyone at all levels," said Umar Mahmood, MD, PhD, RSNA Board of Directors member and trustee of the R&E Foundation. "He always focused on being the applicants' advocate, helped guide a generation of R&E grant reviewers and looked after a generation of grant recipients."

During his 18 years at RSNA, he forged genuine friendships with the staff and members and he left a lasting impression on everyone he met.

"We have all lost a valued family member," said James P. Borgstede, MD, chairman, RSNA Board of Directors. "The world was a better place because of Scott Walter. Now it's a little lonelier."



### **Radiology in Public Focus**

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

#### Children with Kidney Disease Show Blood Flow Changes in Brain



Contrast shown demonstrates regions where CBF in patients with chronic kidney disease (CKD) is greater than that in the control group. There were no regions where the control group showed greater CBF than patients with CKD. Liu, H.S., et al., *Radiology* 2018:288;3 © RSNA 2018.

Blood flow changes in the brains of children, adolescents and young adults with chronic kidney disease may explain why many face a higher risk of cognitive impairment, according to a study in *Radiology*.

Prior research has linked chronic kidney disease with subcortical ischemic lesions, atrophy and deficits in cognitive performance. While chronic kidney disease in adults is frequently associated with age-related disorders such as hypertension and diabetes, the disease in childhood often occurs congenitally, yet still affects brain development and cognitive function.

"It's not clear if the brain problems from kidney disease seen in adults are secondary to the hypertension produced by the disease," said coauthor John A. Detre, MD, professor of neurology and radiology, director of the Center for Functional Neuroimaging in Radiology and vice chair for research in neurology at the Perelman School of Medicine at the University of Pennsylvania in Philadelphia. "In our study, we wanted to look at patients with early kidney disease, before they've experienced decades of high blood pressure. In doing this, we could separate the kidney disease effects from those of chronic high blood pressure."

Dr. Detre and colleagues assessed blood flow in the brains of 73 pediatric kidney disease patients under 16 years old and 57 similarly aged control participants using arterial spin labeling MRI. Patients with kidney disease showed higher cerebral blood flow compared with controls in certain brain regions — a surprising finding, considering that decreased cognitive performance is generally associated with decreased blood flow in the brain, such as in aging and dementia.

"This technique provides a noninvasive way of quantifying cerebral blood flow that doesn't require use of contrast agent, which is contraindicated in patients with kidney dysfunction," Dr. Detre said.

#### WEB EXTRAS

Access the study, "Regional Cerebral Blood Flow in Children and Young Adults with Chronic Kidney Disease," at *RSNA.org/Radiology*.

# October Public Information Activities Focus on Breast Cancer Awareness

In recognition of Breast Cancer Awareness Month in October, RSNA is distributing public service announcements (PSAs) that focus on the importance of screening and the symptoms, risk factors and possible treatment options related to breast cancer.

# Media Coverage of RSNA

In June, 915 RSNA-related news stories were tracked in the media. These stories reached an estimated audience of 736 million people.

Coverage included Yahoo! Finance, WGN-AM (Chicago), WebMD, San Francisco Chronicle, Reuters.com, BBC.com, MedPage Today, HealthDay, Drugs.com, Diagnostic Imaging, DOTmed Business News, Auntminnie.com and Health Imaging News.

# New on RadiologyInfo.org

Visit *RadiologyInfo.org*, the public information website produced by RSNA and ACR, to read new patient information on Abdominal Contrast-Enhanced Ultrasound.



#### High-Strength MRI May Release Mercury from Amalgam Dental Fillings

Exposure to ultra-high-strength MRI may release toxic mercury from amalgam fillings in teeth, according to a new study in *Radiology*.

Previous research has found that exposure to the magnetic fields of MRI could cause mercury to leak from amalgam fillings. This concern has been heightened by the recent arrival of ultra-high-strength 7-T scanners in the clinic. The stronger magnetic field of 7-T MRI yields more anatomical detail, but its effects on amalgam dental fillings have not been studied.

The study's lead author, Selmi Yilmaz, PhD, a dentist and faculty member at Akdeniz University in Antalya, Turkey, and colleague, Mehmet Zahit Adişen, PhD, evaluated mercury released from dental amalgam after 7-T and 1.5-T MRI in teeth that had been extracted from patients for clinical indications.

The researchers opened two-sided

cavities in each tooth and applied amalgam fillings. After nine days, two groups of 20 randomly selected teeth were placed in a solution of artificial saliva immediately followed by 20 minutes of exposure to 1.5-T or 7-T MRI. A control group of teeth was placed in artificial saliva only.

When the researchers analyzed the artificial saliva, the mercury content in the 7-T, 1.5-T and control group was  $0.67 \pm 0.18$ ,  $0.17 \pm 0.06$  and  $0.14 \pm 0.15$  parts per million (ppm), respectively. At 0.67 ppm, the mercury content in the 7-T group was approximately four times the levels found in the 1.5-T group and the control group.

Further studies may be warranted and Dr. Yilmaz noted that her research team has three ongoing projects focused on phase and temperature changes of dental amalgam across different magnetic fields.



Sample tubes containing, top, tooth with dental amalgam in artificial saliva in preparation for testing and, bottom, artificial saliva only. Tube had previously undergone MRI, and the tooth was removed 24 hours after imaging.

Yilmaz, S., et al., *Radiology* 2018:288;3 © RSNA 2018.

#### WEB EXTRAS

Access the study, "Ex Vivo Mercury Release from Dental Amalgam after 7.0-T and 1.5-T MRI," at RSNA.org/Radiology.

#### New Study Confirms Higher Cancer Rate in Women with Dense Breast Tissue

Researchers using automated breast density measurements have found that women with mammographically dense breast tissue have higher recall and biopsy rates and increased odds of screen-detected and interval breast cancer, according to a large new study from Norway published in *Radiology*.

Previous studies on mammographically dense breasts have relied on subjective density assessments — most commonly, the radiologist's subjective interpretation using the American College of Radiology's Breast Imaging Reporting and Data System (BI-RADS). This approach introduces potential mammogram reader variability into density categorization, said the study's principal investigator, Solveig Hofvind, PhD, from the Cancer Registry of Norway in Oslo.

For the new study, Dr. Hofvind and colleagues used automated software to help classify mammographic density in 107,949 women ages 50 to 69 from BreastScreen Norway, a national program that offers women screening every two years. Researchers examined 307,015 digital screening examinations that took place from 2007 to 2015.

The automated software classified breasts as dense in 28 percent of the screening examinations. Rates of screen-detected cancer were 6.7 per 1,000



Mammograms show volumetric breast density classified as Volpara density grade 1, 2, 3, and 4 with automated volumetric breast density measurement. Moshina. N., et al., *Radiology* 2018:288;3 © RSNA 2018.

examinations for women with dense breast tissue and 5.5 for women with non-dense breasts. Interval breast cancer, or breast cancer detected between screenings usually by palpation — was 2.8 per 1,000 in the dense breast tissue group and 1.2 for women with non-dense tissue.

Mammographic sensitivity for detecting breast cancer was 71 percent for women with dense breasts, compared to 82 percent for women with non-dense breasts. Cancers detected at screening were more advanced among women in the dense breast tissue group. Average tumor diameter for screen-detected cancers was 16.6 millimeters (mm) in the dense breasts group, compared to 15.1 mm for the nondense group. Lymph-node-positive disease was found in 24 percent of women with dense breasts, compared with 18 percent for women with non-dense breasts.

"We need well-planned and highquality studies that can give evidence about the cost-effectiveness of more frequent screening, other screening tools such as tomosynthesis and/or the use of additional screening tools like MRI and ultrasound for women with dense breasts," Dr. Hofvind said.

"Further, we need studies on automated measurement tools for mammographic density to ensure their validity."

#### WEB EXTRAS

Access the study, "Automated Volumetric Analysis of Mammographic Density in a Screening Setting: Worse Outcomes for Women with Dense Breasts," at RSNA.org/Radiology. October 2018 | RSNA News 19

# **Journal Highlights**

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

# MRI Predictors of Posterolateral Corner Instability: A Decision Tree Analysis of Patients with Acute Anterior Cruciate Ligament Tear

Posterolateral corner (PLC) injuries of the knee most often result from high-energy trauma and are commonly associated with cruciate ligament tears. Clinical examination is the standard for the detection of posterolateral instability, but may be difficult in the acute trauma setting due to knee pain, joint effusion and diffuse tissue swelling. However, early diagnosis and treatment is crucial because untreated posterolateral instability is associated with poor clinical outcome, increases the risk for anterior cruciate ligament (ACL) graft failure and may lead to chronic instability.

In an article published online in

*Radiology (RSNA.org/Radiology)*, Lukas Filli, MD, Balgrist University Hospital, Zurich, and colleagues investigated the diagnostic performance of various MRI findings for helping to predict posterolateral instability in patients with acute complete



ACL tears. Researchers performed a decision tree analysis to identify the most significant MRI predictors of posterolateral instability.

The retrospective cohort study was performed in a consecutive series of 162 patients (mean age, 32.8 years) who underwent ACL reconstruction with or without concomitant PLC reconstruction between 2014 and 2017. MR images were evaluated by two radiologists.

Complete tear or avulsion of the lateral collateral ligament was the most significant predictor at MRI of posterolateral instability, according to results. Assessment of the smaller posterolateral corner structures did not improve diagnostic performance. Instability was correctly predicted in 147 of 162 patients (90.7 percent) by reader 1 and in 151 of 162 patients (93.2 percent) by reader 2.

"It is possible that some MRI findings may be indicative of higher subsequent ACL graft failure rates despite clinical testing negative for posterolateral instability at the time of surgery. Prospective longitudinal studies with long-term follow-up of graft failure rates will be necessary to test this hypothesis," the authors write.

Posterolateral corner injuries at the sagittal plane. Sagittal fat-saturated proton density-weighted image in a 50-year-old female patient from the anterior cruciate ligament (ACL)-only group (ie, ACL rupture without clinical evidence of posterolateral instability) one day after trauma. No popliteomeniscal fascicles are visible (*dashed circle shows the popliteal hiatus*). The partially displayed popliteus tendon (PT) shows a normal course. The lateral inferior genicular artery (\*) is accompanied by small veins (hyperintense round structures proximal) and surrounded by fluid. Bone marrow edema (*arrows*) is manifest in the anterior aspect of the lateral femoral condyle and in the posterolateral tibial plateau.

Filli, L., et al., Radiology 2018:InPress © RSNA 2018



Listen to *Radiology* Editor David A. Bluemke, MD, PhD, discuss this month's research you need to know. Podcasts summarize the importance and context of selected recent articles. Subscribe today at *RSNA.org/Radiology-Podcasts* and never miss a single episode.



#### Highlights include:

- Gadolinium Distribution in Cerebrospinal Fluid after Administration of a Gadolinium-based MR Contrast Agent in Humans," Berger F., et al.
- Timmediate Mild Reactions to CT with Iodinated Contrast Media: Strategy of Contrast Media Readministration without Corticosteroids," Park S.J., et al.
- Contrast-enhanced CT for Colonic Diverticular Bleeding before Colonoscopy: A Prospective Multicenter Study," Umezawa S., et al.

#### Fundamentals of Diagnostic Error in Imaging

With estimates of average diagnostic error rates ranging from 3 to 5 percent, there are approximately 40 million diagnostic errors involving imaging annually worldwide. Developing a comprehensive process to identify diagnostic errors, analyze errors to discover contributing factors and biases and develop interventions based on these contributing factors, is fundamental to reducing such errors.

In the October special issue of *RadioGraphics* (*RSNA.org/RadioGraphics*), Jason N. Itri, MD, PhD, of Wake Forest Baptist Medical Center, Winston-Salem, NC, and colleagues looked at ways to learn from diagnostic errors, including effective peer learning practices, supportive leadership and a culture of quality. Such methods have been shown to reduce diagnostic errors, improve patient outcomes and increase satisfaction for all stakeholders.

Understanding the types of interventions that drive quality improvement can help prevent diagnostic errors. Interventions relying solely on remediation and increased effort or vigilance are less effective because they assume that errors



Missed pulmonary embolus in a 44-year-old man with Crohn disease who underwent contrast-enhanced CT in the emergency department for abdominal pain and concern for obstruction. Axial images of 5-mm (a) and 1.25-mm (b) section thickness show an incidental pulmonary embolus in the right lower lobe (*arrow*), which is more apparent on the 1.25-mm-thick section. Itri, J., et al, *RadioGraphics* 2018:38;6 © RSNA 2018.

are due to individual failures, whereas modern approaches view errors as the result of organizational and environmental factors. Successful interventions are those designed to either help people do the right thing (e.g., follow standard workflow and avoid workarounds) or prevent them from doing the wrong thing (e.g., forcing functions and hard stops).

"It is critical to understand that

#### RadioGraphics diagnostic errors are predictable events with readily identifiable contributing factors, which lead to both perceptual and interpretive errors. Identifying contributing factors is key to developing interventions that reduce or mitigate diagnostic errors," the authors conclude.

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

# Impact Factors Stay Strong for RSNA Journals

The highly regarded RSNA journals *Radiology* and *RadioGraphics* scored strong impact factors in 2017, according to the 2018 edition of Journal Citation Reports. An impact factor is a measure of the yearly average number of citations to articles published in a journal.

The latest impact factor for Radiology,

edited by David A. Bluemke, MD, PhD, is 7.469 up from 7.296 in 2016, with 54,109 total citations up from 50,983. The impact factor for *RadioGraphics*, edited by Jeffrey S. Klein, MD, is 3.249, with citations increasing from 10,286 to 11,207.

Published regularly since 1923 by

RSNA, *Radiology* is ranked fourth among radiology, nuclear medicine and medical imaging journals.

Launched by RSNA in 1981, *Radio-Graphics* is ranked 29<sup>th</sup>.

Read more about the latest developments with RSNA journals on Page 13.



Listen to *RadioGraphics* Editor Jeffrey S. Klein, MD, and authors discuss the following articles from recent issues of *RadioGraphics* at *RSNA.org/RG-Podcasts*.



- "Updated Fleischner Society Guidelines for Managing Incidental Pulmonary Nodules: Common Questions and Challenging Scenarios," Bueno J., et al.
- Audio summary podcasts (also available on iTunes and Google Play) include these studies: "Imaging Evaluation of Pediatric Parotid Gland Abnormalities," Inarejos Clemente, E.J., et al.; "CT Findings of Acute Small-Bowel Entities," Sugi M.D., et al.; "MR Neurographic Evaluation of Facial and Neck Pain: Normal and Abnormal Craniospinal Nerves below the Skull Base," Chhabra A., et al.; and "Retroperitoneal Leiomyosarcoma," Marko J and Wolfman DJ.

### **Education and Funding Opportunities**

# Writing a Competitive Grant Proposal Workshop

March 8 – 9, 2019 RSNA Headquarters Oak Brook, IL Registration is open for the Writing a Competitive Grant Proposal Workshop designed for researchers in radiology, radiation oncology, nuclear

medicine and related sciences who are interested in actively pursuing federal funding.

The course fee is \$225. Register online at RSNA.org/CGP.

## NIH Grantsmanship Workshop

The NIH Grantsmanship Workshop, which introduces participants to the process of preparing a competitive research or training grant application, will be held Saturday, Nov. 24, from 1 to 5 p.m. at McCormick Place in Chicago. Workshop attendees must be registered for the RSNA annual meeting and can add the workshop to My Agenda at *RSNA.org/Annual-Meeting.* 

For more information, contact the department of research at *DOR@rsna.org* or 630-368-3742.

# Register Now for RSNA Artificial Intelligence (AI) Webinar Series

The second in the RSNA series of 60-minute webinars on artificial intelligence (AI) featuring internationally renowned experts will be held on Thursday, Oct. 25.

The webinar, "Current State and Future Perspectives of AI," will be moderated by Paul Chang, MD, professor of radiology and vice chair, radiology informatics at the University of Chicago. Other speakers include Luciano Prevedello, MD, MPH, and Abdul Halabi, global business development lead, NVIDIA, San Mateo, CA.

"These webinars help radiologists familiarize themselves with artificial intelligence and show how AI will affect the future of health care," said Curtis P. Langlotz, MD, PhD, RSNA Board liaison for information technology and annual meeting and professor of radiology and biomedical informatics at Stanford University. "RSNA wants to help radiologists understand how AI is likely to become part of their daily work, and dispel any concerns about being replaced."

Held in August, the first webinar, "Intro to AI and Machine Learning: Why All the Buzz" is available for purchase on-demand. Dr. Langlotz served as moderator and one of the speakers.

#### Additional webinars are:

#### "Future Applications of AI"

Dec. 11, 2018, 11 a.m. CT Moderator: Adam Flanders, MD; additional speakers: Charles E. Kahn, MD, MS, Marc Kohli, MD, and J. R. Geis, MD

"AI: An Ally or an Enemy? A Roundtable Discussion"

*Feb. 21, 2019, 11 a.m. CT Speakers:* Drs. Langlotz, Chang and Flanders "I just watched your RSNA AI webinar and wanted to let you know that I thought it was the best intro to AI that I've ever seen. The points you chose to discuss and the explanations were superb. I look forward to learning even more at RSNA's AI Spotlight course in Paris in a few weeks as well."

STEVE HERMAN, MD, TORONTO JDMI - TORONTO GENERAL HOSPITAL



Members can access the live webinars and the on-demand recordings for \$35 per webinar. Non-members can access both versions for \$50 per webinar. The live webinars offer CME credit and the on-demand versions offer SA-CME credit. To register for upcoming webinars and for more information, visit *RSNA.org/AI-webinars*.

### **Annual Meeting Watch**

RADIOLOGY TODAY

# **RSNA 2018 REGISTRATION PACKAGES**

#### Members Only:

#### Free Standard Registration until Oct. 26!

Register and reserve your hotel for RSNA 2018 online at *RSNA.org/Register*. RSNA offers several Active Member registration package options to best meet your needs:

# The Standard Package—\$0, includes everything you've come to expect from medical imaging's leading forum:

- 6 Full Days of Conference Access
- 430+ Educational Courses
- 1,700 Oral Scientific Presentations
- 2,500 Scientific and Education Posters
- Nearly 700 Technical Exhibits
- CME Credits
- Mobile App & Meeting Central
- Networking Opportunities

#### Add Virtual Meeting for your best experience!

The Deluxe Package—\$160, includes all the benefits of the Standard package PLUS complete Virtual Meeting coverage:

- 200 Live-Streamed and On-Demand Courses
- Select CME-Eligible Courses On-Demand
- Extended Access through April 2019
- · Cases of the Day, Educations Exhibits and More

#### The Premium Package-\$315, includes all the benefits

#### of the Deluxe Package PLUS a voucher to use toward:

- Five RSNA Bistro Tickets
- \$25 in Starbucks Gift Cards
- 25% Discount on RSNA Shop Purchases
- Priority Taxi Boarding

# The Virtual Only Package—\$160, offers an ideal solution when you cannot attend RSNA 2018 at McCormick Place:

- 200 Live-Streamed and On-Demand Courses
- Select CME-Eligible Courses On-Demand
- Extended Access through April 2019
- Cases of the Day, Educations Exhibits and More

\*Friday, October 26-Discounted Registration Deadline: The last day for discounted registration fees is Friday, October 26. Registrations after this date will incur an added \$160 fee for most categories.

# Plan Your RSNA 2018 Experience

Explore these features to make the most of your RSNA 2018 meeting experience in Chicago.

**Bistro RSNA** – The Bistro offers a full menu and ample seating for lunch during the meeting and brunch will be available in the Technical Exhibit Halls on Thursday. Reserve tickets in advance at *bistroticket.com/rsna*.

**Discovery Theater** – Offering a variety of programs from musical acts to educational presentations, the Discovery

Theater is a great place to relax and learn. Visit the online meeting program for a schedule of events.

Virtual Meeting – Offering more than 200 live-streamed and on-demand courses, scientific presentations and education exhibits. The Virtual Meeting also provides access to more than 2,000 education exhibits and scientific posters. CME credit is available for many sessions and registered attendees will have access to all content through April 2019. Visit *RSNA.org/Virtual* to learn more.



# Access the RSNA Meeting Program Online in 2018

RSNA will transition from a print to a digital meeting program beginning in 2018, offering the most important meeting information in these formats:

• Meeting Central (*Meeting*, *RSNA.org*) Explore the meeting program, review technical exhibitors and build your personalized schedule on My Agenda.

#### RSNA 2018 Meeting App

Browse the meeting program, access maps to McCormick Place and customize your daily meeting schedule with My Agenda. The app will be available in October via the App Store and Google Play.

RSNA will continue to publish the onsite Meeting Guide, an easy-

to-use reference to education and meeting information, McCormick Place floor plans and transportation and dining information. Subpsecialty and topic brochures are also available in print and online.

The Meeting App is sponsored by Google Cloud.

### **Annual Meeting Watch**

# Reserve Your Hotel Room Today

Let RSNA help plan your stay in Chicago for RSNA 2018 and take advantage of the best hotel room selection in downtown Chicago.

#### Advantages to booking your hotel through RSNA, include:

- Earn hotel loyalty points
- Choose from nearly 100 downtown Chicago hotels
- Secure great hotel rates
- Access the free shuttle service or Metra Electric rail system to/from McCormick Place

Find the hotel that best fits your needs by visiting *RSNA.org/hotel-reservations*. If you are traveling internationally to RSNA 2018, ESA Voyages and ACE Marketing are the official international travel agencies offering travel packages to the annual meeting. Contact RSNA hotel services at *housing@rsna.org* for additional information.

#### OBSERVE BEFORE YOU RESERVE!

Experient is the only certified partner to reserve your 2018 RSNA hotel rooms! Be aware of fraudulent and counterfeit websitesonly reserve your RSNA hotel reservations through Experient, our trusted partner since 1980.



# Save Up to 10 Percent with Exclusive Airline Discounts

United Airlines offers discounts

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from 2 to 10 percent off applicable fares to RSNA 2018. Discounts apply on United Airlines and flights operated by United or other airlines branded United Express. International discounts are allowed on flights operated and/or marketed on the following carriers, provided such flights are booked by a travel agency or United Reservations:

• Flights via the Atlantic: Air Canada, Austrian Airlines, Tyrolean Airways, Brussels Airlines, Lufthansa Airlines,Swiss International Airlines.Flights via the Pacific: United codeshare flights operated by All Nippon Airways.

Applicable terms and restrictions apply. Book online at *United.com/MeetingTravel* and enter offer code ZECR659898 or call United at 1-800-426-1122 and provide the offer code. A service fee applies for phone reservations. Delta Airlines offers special discounts on most fares:

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restrictions may apply.

Discounts are applicable to U.S./ Canada origination passengers. Book online at *Delta.com/Meetings* and enter Meeting Event Code NMS2L or call Delta at 1-800-328-1111 and provide the event code. A service fee applies for phone reservations.

# Register for RSNA 5k Fun Run Supporting R&E Foundation

Nov. 27 at 6:30 a.m



Registration is now open for the RSNA 5k Fun Run along the Chicago lakefront. If you are a runner, casual jogger or walker, you are invited to take part in this race in support of radiology research and education. Race spots fill up quickly, so register yourself or your team early to receive a limited supply commemorative T-shirt. All proceeds benefit the RSNA Research & Education (R&E) Foundation. Register at *RSNA.org/Fun\_Run*.

*The Fun Run is sponsored by Konica Minolta Healthcare.* 



# International Visitors

RSNA is deeply committed to serving all of our members and supporting the vital work being done in North America and abroad to further advance the science of radiology. The pursuit and exchange of science and education is an important part of our goal to improve patient care.

Over 10,000 international attendees participated in RSNA 2017 and RSNA continues to invite radiologists from around the world to take part in our programs and resources.

RSNA encourages all international travelers to the annual meeting and other educational programs to make travel plans as early as possible. Please visit *RSNA.org/Visas* for updated information on travel to the United States.

# *Reminder:* Badges and Ribbons Only Available Onsite

Attendee badge, ribbons and meeting materials are now only available onsite at designated registration areas throughout McCormick Place and at selected hotels. Badges and materials are no longer mailed. A valid photo ID is required to receive your badge.

Badges are equipped with beacon technology that eliminates the need to verify your attendance, simplifies the CME process and allows RSNA to gather data to improve future meetings. RSNA will never share, rent or sell the information collected by your badge. Attendees can opt out of this technology by visiting any registration location.

Badge ribbons for committee, council or group work are available at a self-serve ribbon wall in the Connections Center. If you are eligible for a ribbon, you will receive a personalized email from the RSNA Board of Directors detailing which ribbons you are entitled to and offering pick-up information. RSNA staff will be available onsite to assist.



# Experience the TravelStore Difference and Enter to Win Free Airfare

Book your trip with TravelStore and experience the personalized service that has made it one of the best travel management companies in the U.S. TravelStore has a special offer for RSNA attendees. Book air travel through TravelStore by Oct. 26 to be entered in a drawing for a \$500 USD travel credit toward future airfare on United Airlines. Call 1-310-752-9106 between 10:30 a.m. and 7 p.m. CT and mention code AM2018.



#### COMING NEXT MONTH

Next month, watch for the *RSNA News* Annual Meeting Preview, a double issue filled with everything you need to know about RSNA 2018.

# INTERNATIONAL — DAY OF RADIOLOGY

Increase awareness of radiologists' fundamental role in healthcare and the importance of radiology research, diagnosis and treatment for safe patient care. Find ready-to-use promotional materials at *RSNA.org/IDoR*.



Let's celebrate together!

internationaldayofradiology.com



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November 8<sup>™</sup>