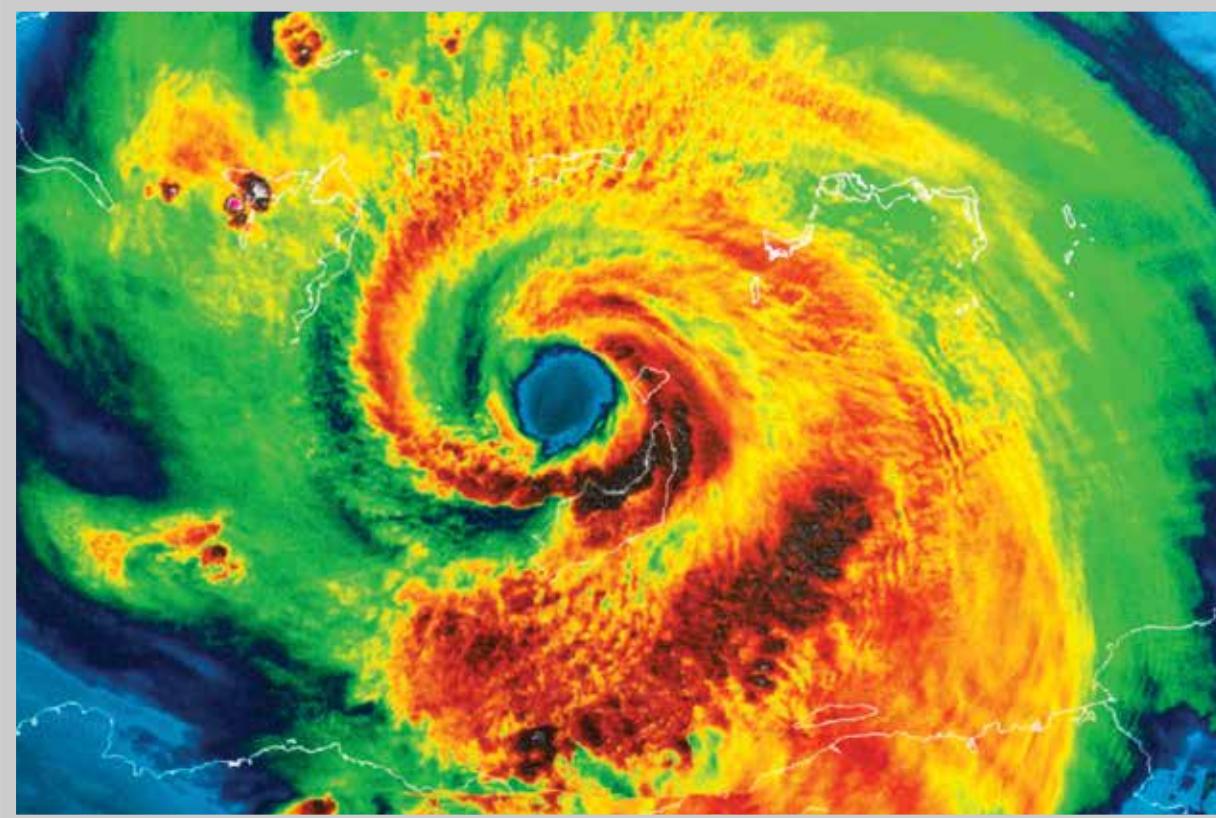


August 2018 Volume 28, Issue 8



Including Radiology in Emergency Plans is Critical

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- Interventional Radiology Progresses as a Specialty
- RSNA IVP Program Shares Education Globally
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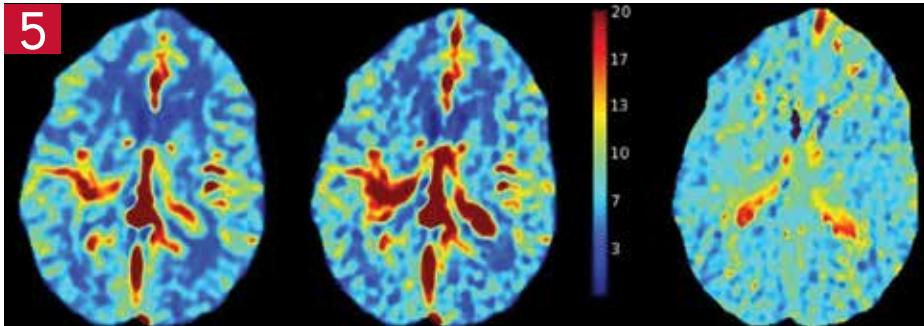
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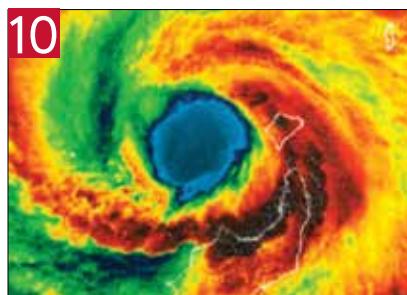
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Gary J. Whitman, MD

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RSNA Announces 2018 Gold Medalists

The RSNA Board of Directors has announced the Gold Medal recipients who will be honored at the 104th Scientific Assembly and Annual Meeting.



Sarah M. Donaldson, MD
Stanford, CA



William J. Casarella, MD
Atlanta



Deborah Levine, MD
Boston



Johnson Appointed Radiology Chair at MCG

Annette J. Johnson, MD, has been appointed chair of the Department of Radiology and Imaging at the Medical College of Georgia at Augusta University.

A neuroradiologist who specializes in brain tumor imaging, Dr. Johnson most recently served as chair of quality and patient experience in the Department of Radiology at Wake Forest University School of Medicine, Winston-Salem, NC. She has served as faculty and moderator for several RSNA annual meetings and is a former member of the RSNA Health Services Policy & Research Scientific Program Committee.



Johnson



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New RSNA Patient-Centered Care Modules Available for Radiology Residency Programs

RSNA has developed a curriculum of interactive patient-centered care learning modules designed for diagnostic radiology, radiation oncology and integrated interventional radiology programs to assist residents in meeting the Accreditation Council for Graduate Medical Education (ACGME)-mandated instruction in patient-centered care.

Developed by the RSNA Public Information Committee (PIC), the 13 modules center on the basics of patient-centered care, empathy/cultural awareness, communication safety and teamwork. Radiology residency programs are encouraged to create their own learning objectives for the

modules that are specific to their own learning environments and expertise.

Activities in each of the 13 interactive modules were built from the RSNA Radiology Cares® toolkits, which are designed to improve awareness of the essential role radiology plays in the patient care continuum.

To access the modules, visit RSNA.org/Education-Resources.



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11th Annual QIBA Meeting Held at RSNA Headquarters



Approximately 60 attendees gathered for the 2018 Quantitative Imaging Biomarkers Alliance® (QIBA) Annual Meeting held in May at RSNA Headquarters, Oak Brook, IL.

Stakeholders from academia, the medical device and pharmaceutical industries and government agencies including the National Cancer Institute/National Institutes of Health, National Institute of Standards and Technology and the U.S. Food and Drug Administration, attended the two-day meeting featuring plenary and panel discussions focused on the value of quantitative imaging (QI) in medicine.

Maryellen Giger, PhD, the A.N. Pritzker professor of radiology at the University of Chicago, discussed the role of QI in the era of machine learning, artificial intelligence and radiomics; Mark J. Ratain, MD, director of the Center for Personalized Therapeutics at the University of Chicago, spoke on the value of QI in clinical trials; and Ranga Krishnan, MB, ChB, dean of Rush Medical School, Chicago, addressed the value of QI in the assessment and treatment of brain disorders.

Panel discussions focused on sharing ideas for integrating QI and QIBA Profiles into clinical practice. Biomarker Committees discussed groundwork projects and ways to advance Profile development and associated strategies for Profile deployment and adoption.

In addition, representatives from the European Imaging Biomarkers Alliance (EIBALL) and the Japan Radiological Society (JRS) updated members on collaborative efforts with QIBA.

QIBA continues to grow and now has 18 Biomarker Committees and numerous Task Forces.

Visit RSNA.org/QIBA for more information.



Giger



Ratain



Krishnan

RSNA's New Journal, *Radiology: Artificial Intelligence*, Now Accepting Submissions

Submissions are being accepted for RSNA's new journal, *Radiology: Artificial Intelligence*, to be launched in early 2019. The journal will highlight the emerging applications of machine learning (ML) and artificial intelligence (AI) in the field of imaging across multiple disciplines.

The journal's editor, Charles E. Kahn, Jr., MD, MS, invites high-quality manuscripts that:

- Show the impact of AI to diagnose and manage patients, extract information, streamline radiology workflow or improve health care outcomes
- Demonstrate novel applications of AI in radiology
- Highlight innovative AI methodologies

The journal also seeks thoughtful, meaningful reviews and opinion pieces focusing on:

- Education about AI
- AI's role in educating radiologists, referring providers and patients
- The ethical, legal and social issues surrounding AI

The journal will be published bi-monthly and available exclusively online. RSNA members will receive a complimentary subscription. Institutions can receive free access through Dec. 31, 2019, by registering at RSNA.org/freetrial.

For more information on *Radiology: Artificial Intelligence*, go to RSNA.org/Journals.

McGinty Elected ACR Chair



McGinty

The American College of Radiology (ACR) Board of Chancellors has elected **Geraldine McGinty, MD, MBA**, as chair. Dr. McGinty is the first woman elected chair of the board in the nearly 100-year history of the ACR.

Dr. McGinty is a practicing radiologist in New York City and a faculty member at Weill Cornell Medicine, where she serves as the chief strategy officer and chief contracting officer for the Weill Cornell Physician Organization. She has served as faculty and moderator for several RSNA annual meetings.

Also elected were **Howard B. Fleishon, MD, MMM**, who will serve as vice chair, **James A. Brink, MD**, who will serve as president, and **Marta Hernanz-Schulman, MD**, who will serve as vice president. The new officers were elected at the ACR 2018 Annual Meeting held in Washington, DC.

Register for RSNA's First Artificial Intelligence (AI) Webinar in August

Beginning this month, RSNA will launch the first in a series of 60-minute webinars on artificial intelligence (AI) featuring internationally renowned experts. RSNA will offer three additional AI webinars throughout the year.

The first webinar, "Intro to AI and Machine Learning: Why All the Buzz," scheduled for 11 a.m. Central Time (CT), Wednesday, Aug. 29, will provide an introduction to AI.

Curtis P. Langlotz, MD, PhD, RSNA Board liaison for information technology and annual meeting and professor of radiology and biomedical informatics at Stanford University, will serve as a moderator and one of the speakers for the first webinar. Matthew Lungren, MD, MPH, clinician scientist in the Department of Radiology and associate director of the Center for Artificial Intelligence in Medicine and Imaging at Stanford, will also speak during the first session.

Upcoming webinars:

- "Current State and Future Perspectives of AI," Oct. 25, 2018, 11 a.m. CT; Moderator: Paul Chang, MD; additional speakers: Luciano Prevedello, MD, MPH, and Abdul Halabi
- "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

Each webinar is \$35 for members; \$50 for non-members. Visit RSNA.org/AI-webinars to register and for more information. The webinars will be available on-demand for purchase one month after the live session.

In Memoriam



Edgardo "Eddie" Angtuaco, MD

Edgardo "Eddie" Angtuaco, MD, professor of radiology and former chief, Division of Neuroradiology at the University of Arkansas for Medical Sciences, Little Rock, died May 28 in Little Rock. He was 69.

Dr. Angtuaco received his medical degree from the University of Philippines, Quezon City, Philippines. He completed his residency at Boston City Hospital, Boston and his fellowship at the University of Arkansas for Medical Sciences. His wife, Teresita L. Angtuaco, MD, is chief, Division of Body Imaging and professor of radiology, obstetrics and gynecology at the University of Arkansas for Medical Sciences.

A lifelong supporter of the importance of radiologic education and research, Dr. Angtuaco worked tirelessly for RSNA for many years. He served on the RSNA Research & Education (R&E) Foundation's Scholar Advisor Panel and was a Presidents Circle Donor, Visionary Donor and Centennial Pathfinder for the Foundation. In addition, Dr. Angtuaco served as chair of the RSNA Neuroradiology Education Exhibits Committee and as RSNA faculty at several annual meetings.

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LETTERS TO THE EDITOR

rsnanews@rsna.org
1-630-571-7837 fax
SUBSCRIPTIONS
subscribe@rsna.org
1-888-600-0064
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Numbers in the News

2,105

Number of women in a new study showing that optoacoustic imaging is effective in differentiating benign from malignant breast masses. Read more on [Page 13](#).

264

Number of individuals awarded ABR IR/DR certification as of June 2018. Read more about the progression of the new specialty on [Page 8](#).

200

Approximate number of patients brought before one radiologist during the terrorist attack in Nice, France, in 2016. Read more about how radiology departments are creating preparedness plans for a wide range of disasters and emergency incidents on [Page 10](#).

LOOK AHEAD

The Evolution of Emergency of Radiology – Past and Future

BY SUSAN D. JOHN, MD

“Emergency radiologists are poised to lead medicine into a future in which radiologists are key participants and leaders within clinical care teams.”

SUSAN D. JOHN, MD

Emergency radiology is relatively young as a subspecialty of diagnostic and interventional radiology compared to other imaging subspecialties. Although acute care imaging has been an integral part of radiology from the beginning, emergency radiology was not recognized as a distinct discipline until the 1980s. Changes in the ways that emergency care is practiced have escalated over the past 20 years, fueled by rapidly developing imaging and information technologies and changes in health care policy and reimbursement.

In response, radiology developed dedicated emergency radiology services, creating a new model of care in imaging practices and altering the way that imaging is provided beyond the emergency department. The practice of emergency radiology continues to evolve and faces new challenges and opportunities ahead.



SUSAN D. JOHN, MD, is professor and chair of the Department of Diagnostic and Interventional Imaging at the University of Texas (UT) McGovern Medical School at Houston. She serves as chief of Adult and Pediatric Imaging Services at Memorial Hermann Hospital TMC, Children's Memorial Hermann Hospital and Lyndon B. Johnson General Hospital in Houston. Dr. John has held the John S. Dunn Distinguished Chair in Radiology at UT McGovern since 2004. She is past president of the American Society of Emergency Radiology (ASER) and received the ASER Gold Medal in 2015. Dr. John chairs committees for the Society for Pediatric Radiology and the Society for Chairs of Academic Radiology Departments. She serves on the RSNA Public Information Committee (PIC)/Public Information Advisors Network (PIAN) and is currently the PIC vice chair.

Creating an Identity for a New Subspecialty

Accurate and prompt imaging is necessary to ensure the best outcomes in diagnosis and treatment of emergent and potentially life-threatening conditions of patients seen in our emergency departments and trauma centers, which creates a close working relationship between emergency medicine, trauma surgery and emergency radiology. As with all relationships, there have been growing pains and controversies. Emergency medicine was organized in the 1970s, spurred by rapid improvement in emergency care and renewed interest in improving public health.

Many parallels can be drawn between the development of the specialty of emergency medicine and the subspecialty of emergency radiology. Emergency departments were usually staffed by rotating staff physicians until emergency medicine residency programs were implemented beginning in 1970.

As advanced treatment methods emerged for life-threatening conditions such as trauma, acute myocardial disease and stroke, a need arose for physicians with more focused training in such emergent conditions. Similarly, emergency radiology services were originally provided by rotating general and subspecialty radiologists, and this practice continues in some facilities. John H. Harris Jr., MD, co-authored the first comprehensive textbook on emergency imaging in 1974. Dr. Harris is one of the radiologists instrumental in creating the American Society of Emergency Radiology (ASER) in 1987, which now has more than 1,500 members. Soon after, emergency radiology fellowship programs began to emerge at institutions with Level I trauma centers, and today there are at least 15 such fellowships.

Technological advances have contributed significantly to the reliance of emergency services on diagnostic imaging. The use of CT in emergency departments (EDs) increased dramatically over a period of 10 years, with a compound annual growth rate of 16 percent between 1995 and 2007, according to the 2011 *Radiology* study, "National Trends in CT Use in the Emergency Department: 1995-2007."

The value of ultrasound (US) for rapid diagnosis of conditions such as acute cholecystitis, hydronephrosis, ascites and abscesses was recognized

early in radiology, along with the special advantages of US for children and patients who cannot be transported to a CT scanner. Emergency medicine adopted US as a screening tool for fluid collections in trauma patients and has gradually incorporated other point-of-care US skills into their practices and training programs. As the volume of patient visits to EDs increased (141.4 million visits in 2014 with 8 percent resulting in hospital admission according to Centers for Disease Control), the need for rapid patient throughput became more urgent, enhancing the need for fast diagnostic tools.

The importance of contemporaneous interpretation of imaging during evaluation of patients in the ED became increasingly evident, requiring practices to expand radiologist staffing. Widespread implementation of PACS and the development of teleradiology provided some relief, but resident coverage of after-hours ED imaging in academic practices predominated until recent years. In 2007, only 10 percent of academic

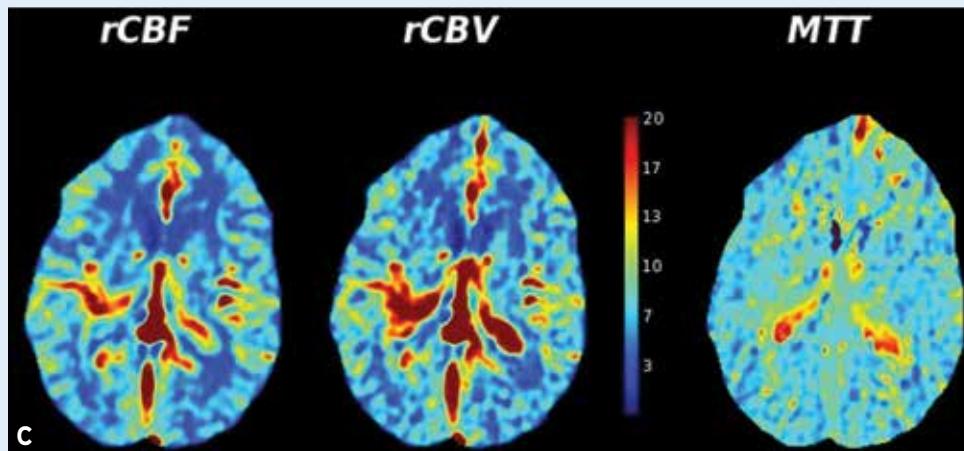
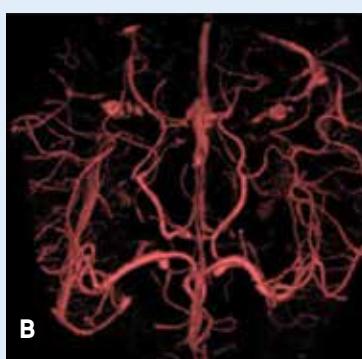
medical centers had in-house attending radiologists. These were exciting times for radiology, with some dark clouds lurking on the horizon. Radiologists and hospital administrators alike began to question the value of an onsite radiologist, diminishing the visibility of the emergency radiologist as a team member and promoting the commoditization of the specialty as a whole.

Expectations and Opportunities in Emergency Radiology

Emergency radiologists are poised to lead medicine into a future in which radiologists are key participants and leaders within clinical care teams. The current focus in medicine on quality and standardized care demands that imaging specialists have depth of knowledge and experience in more focused areas of clinical care. The American College of Surgeons Committee on Trauma provides guidelines for Level I Trauma certification, which include 24/7 availability of radiologists. Emergency radiology must continue to increase the number of fellowship



The complexity and intensity of the emergency center environment requires a different approach from radiologists.



Advanced imaging techniques, such as ultrafast MRI for appendicitis (A) and vascular and brain perfusion imaging for stroke (B, C), are becoming increasingly important for emergent diagnoses in emergency departments, leading to greater need for subspecialized radiologists.

Images courtesy of Susan D. John, MD.

positions to meet this growing demand.

The precise skill set required of an emergency radiologist is still not well-defined. ASER is working toward a more standardized curriculum in emergency radiology fellowship programs and has produced a comprehensive online core curriculum. As the number of radiologists who practice predominantly in emergency settings increases, the American Board of Radiology should ensure that certifying examinations are designed that reflect the distinct discipline of emergency radiology. We also must recognize that other imaging subspecialties will continue to play an important role in emergency imaging and will be expected to meet the same reporting standards. Some busy trauma centers are staffing neuroradiologists and body imagers 24/7 in addition to emergency radiologists, and others are hiring radiologists with dual subspecialty training to meet this need. Pediatric emergency imaging presents special challenges that need to be considered as after-hours care becomes more subspecialized.

Stephen Ledbetter, MD, MPH, current president of ASER, eloquently outlined the complexity that characterizes the practice of emergency radiology in a keynote speech at the 2011 ASER meeting. Each day, the emergency radiologist is responsible for patients with acute life-threatening conditions in an intense care environment. Volumes are sporadic and unpredictable, making appropriate staffing challenging. Emergency radiologists must deal with frequent interruptions and multiple communications and patient handoffs while working with little prior history and no comparison imaging.

Patients referred from other hospitals often arrive with imaging studies, requiring clear policies on second interpretations and formal reporting of outside imaging. We must also be prepared for the growing threat of mass casualty events that can overwhelm usual workflow in emergency imaging facilities without well-planned surge protocols. (See "Including Radiology in Emergency Plans is Critical on Page 10).

New Technology Presents New Challenges

Advances in artificial intelligence (AI) and image-guided interventions will undoubtedly change the landscape of emergency radiology, and radiologists must play a role in the development of AI tools to ensure that they provide the needed support. AI programs are being developed that will identify imaging studies with potential life-threatening pathology such as intracranial hemorrhage or infarcts, facilitating prioritization of those examinations over less urgent exams. Computer-based detection of injuries that should be reported but will not change patient management (e.g., exact number of rib fractures) will improve the efficiency and effectiveness of emergency radiologists. Emergency physicians and trauma surgeons will assume more direct responsibility for procedures that require a rapid response, including bedside US. Trauma surgeons will become more engaged in minimally invasive post-traumatic hemorrhage control as more emergency department hybrid OR/angiography suites emerge. Interventional radiologists will need to modify staffing and workflow to meet the expectation of rapid hemorrhage

interventions in the ED.

Emergent MRI indications will become standard of care as the technology becomes faster and more widely available in emergency departments. A growing body of evidence confirms the value of MRI for diagnosis of emergent conditions such as acute appendicitis in vulnerable populations such as pregnant women and children and acute spine and musculoskeletal conditions that require emergent intervention. CT angiography, already a vital tool for diagnosis of traumatic vascular injuries, will be used more broadly for acute vascular occlusive disease in the heart and brain. Perfusion imaging and other functional imaging techniques have the potential to improve stroke therapy in the acute setting.

A Unique Opportunity

Emergency radiologists have the opportunity to reframe the image of radiologists as active and caring participants in life-saving care of patients. Many incidental abnormalities are identified on imaging studies performed for non-related reasons in the ED. The emergency radiologist is the best physician to document such abnormalities and may be the only physician who can ensure that such findings are addressed once the patient leaves the ED. Emergency radiologists must actively participate in and even lead multidisciplinary collaborations to develop accurate and cost-effective diagnostic imaging protocols in the ED. More research is needed to validate the pivotal role that emergency radiology plays in improving patient outcomes in emergency care. ■

Interventional Radiology Progresses as New ABR Specialty

BY MIKE BASSETT

Nearly a year after the first interventional radiology/diagnostic radiology (IR/DR) certificates were issued by the American Board of Radiology (ABR), IR is making impressive gains as a unique specialty with its own distinct residency program.



Kaufman



Laszakovits

“We are truly now in the new era for IR/DR in terms of the certification and exam process.”

JOHN A. KAUFMAN, MD, MS

In fact, the ABR certification — many years in the making — represents the future of IR, leaders say.

“We are truly now in the new era for IR/DR in terms of the certification and exam process,” said John A. Kaufman, MD, MS, chair and the Frederick S. Keller Professor of the Department of Interventional Radiology and director of the Dotter Interventional Institute at the Oregon Health & Science University in Portland, and past chair of the ABR-Society of Interventional Radiology (SIR) Primary Certificate Task Force.

IR is one of four specialty certificates offered by the ABR, along with diagnostic radiology, radiation oncology and medical physics.

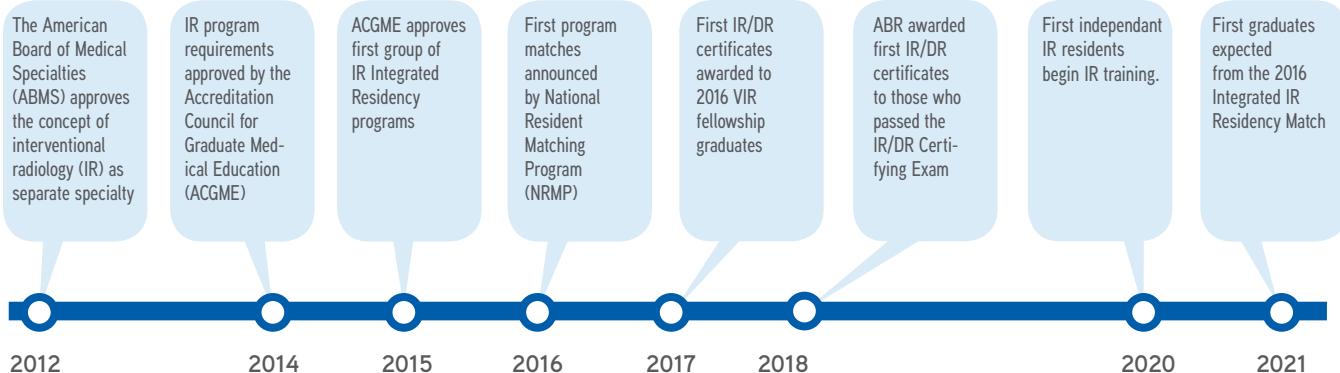
To date, ABR has awarded IR/DR certificates by examination to 264 individuals who passed the first IR/DR certifying exam in October 2017. The second class of candidates is gearing up for the next IR/DR certifying exams to be held in October 2018, in Tucson.

And as of May 2018, 78 institutions have received the Accreditation Council for Graduate Medical Education (ACGME) accreditation of their Integrated IR Residency programs. The ACGME will review more program applications at its October 2018 meeting.

Opportunity to Convert to IR/DR Certificate

The ABR approved the IR/DR certificate to recognize IR as a unique medical specialty in 2012

Timeline to Interventional/Diagnostic Certification





and the ACGME approved the first group of IR Integrated Residency programs in November 2015.

After issuing the final Vascular and Interventional Radiology (VIR) subspecialty certificate in 2016, the ABR last October offered physicians who held DR primary certification and VIR subspecialty certification the opportunity to convert to the new IR/DR specialty certificate.

Of the 2,679 individuals who were eligible to convert to the new specialty certificate, 2,601 completed the process. Those who did not convert to the new certificate primarily either do not practice IR or are nearing retirement, ABR officials said.

The ABR has also approved a temporary policy creating an IR/DR Transition Pathway for radiologists who completed an ACGME-accredited VIR fellowship 10 or more years ago but never pursued or earned a VIR subspecialty certificate.

"These individuals are not eligible for IR/DR certification within our conversion rules," said David Laszakovits, MBA, director of external relations for the ABR. "The existence of the IR/DR certificate is the reason that the ABR must make all VIR subspecialty certificates inactive. The American Board of Medical Specialties will not permit there to be two separate certificates offered by one board for a single discipline because it would be confusing to the public and credentialing bodies."

The ABR issued the last VIR subspecialty certificate in 2016. Beginning this year, those physicians certified in DR or general radiology who completed an ACGME-accredited fellowship more than 10 years ago, but were not certified in VIR, are eligible to take the oral component of the IR/DR certifying exam. If successful, those individuals will be awarded a continuous ABR specialty certificate in IR/DR.

This pathway is only available for a limited time, with applications being accepted until April 30, 2020. Dr. Kaufman suggests that

those eligible and interested should act as quickly as possible.

"There are only three opportunities to take this exam," Dr. Kaufman said, noting that if an eligible radiologist waits until 2020 to take the exam and fails, the transition pathway closes.

In addition, the International Medical Graduates Alternate Pathway — through which international medical graduates must satisfy a number of requirements to be considered as candidates for ABR certification — has been extended to IR/DR certification.

"The board is really trying to make this available to individuals who trained in other countries," Dr. Kaufman said. "It will give them a way to get their certificate without having to repeat all their training."

DR Certification Status After IR/DR Conversion

Converting to the new IR/DR specialty certificate has not been without contention, specifically among some individuals who hold lifetime DR certificates,

"When someone with a diagnostic radiology certificate earns an IR/DR certificate, we inactivate, or don't display, the diagnostic radiology certificate, and that's where some confusion occurred in the lifetime certificate holder group," Laszakovits said.

Those individuals, noting that the IR/DR certificate is not a lifetime certificate, were concerned that they might never get that lifetime DR certificate back if they decided they no longer wanted to practice IR.

Those concerns are unfounded, Laszakovits said.

"If somebody who had a lifetime diagnostic radiology certificate converted to an IR/DR certificate and at some point in the future — for whatever reason — decides they no longer want to be certified in IR, they can just let us know. We'll discontinue their IR/DR certificate and reissue and redisplay their lifetime diagnostic radiology certificate." 

IR Zone Planned for RSNA 2018

New for RSNA 2018, RSNA will feature a dedicated area for exhibitors with a focus on interventional radiology (IR). Located in the South Hall adjacent to the First Time Exhibitor Pavilion, the IR Zone will make it easier for interventional radiologists to locate and interact with companies offering products specific to their subspecialty.

Including Radiology in Emer

“During the hurricane, we had an army of radiologists reading reports from home-based work stations.”

TAMARA MINER
HAYGOOD, PhD, MD

BY RICHARD DARGAN

On the night of July 14, 2016, tourists and locals were celebrating Bastille Day along one of the beachfront promenades in Nice, France, when a terrorist drove a truck through the crowd, leaving hundreds of battered bodies in his wake.

Almost 200 of the injured ended up before radiologist Nicolas Amoretti, MD, at the University Hospital of Nice. Many patients were unconscious, others did not speak French, and some had no identification, forcing hospital staff to write identifiers on the patients' arms with markers. When the influx of information between the CT scanner and the operating room (OR) overloaded the system, transmissions were delayed by as long as 20 minutes. Radiologists used telephones to communicate with surgeons in the OR while reading from the screen.

Further problems ensued when a second CT scanner was utilized to handle the overflow of patients. “The second CT was on a different floor,” Dr. Amoretti recalled. “The staff bringing in patients didn't know where it was, so we had to write directions on paper.”

Despite the challenges, doctors performed 18 surgeries that night and no patients were misidentified. Dr. Amoretti and colleagues detail the experience in the May 2018 *Radiology* study, “Terrorist Attack in Nice, France, in July 2016: Massive Influx of Patients to a Radiology Department.” (See Web Extras.)

A Proactive Approach to Emergency Preparedness

From terrorism incidents and mass shootings to a string of natural disasters, emergency preparedness has never been more important in health care. While no health care facility can fully prepare for the unpredictability of such an incident, having an emergency/crisis plan in place is necessary to mitigate the impact.

Requirements for such plans vary by country. For example, the night of the terrorist attack, the University Hospital of Nice operated under its White Plan, an emergency preparedness procedure based on the broader nationwide framework known as the Orsan Plan.

In the U.S., the Joint Commission requires hospitals to have an Emergency Operations Plan describing how a facility will respond to and recover from all hazardous incidents. However, the Joint Commission does not require hospitals to include specialty departments, such as radiology.

For that reason, imaging may be left out when hospital administrators develop emergency preparedness plans, according to Ronald M. Bilow, MD, an emergency radiology director at UTHealth McGovern Medical School who is affiliated with Memorial Hermann Texas Medical Center, both part of Texas University Medical Center, Houston. Both facilities were in the path of Hurricane Harvey, which tore through Houston in August 2017.

“Most hospitals create plans through the emergency center,” said Dr. Bilow, who has held various leadership roles in the American Society of Emergency Radiology (ASER). “Some might include surgery and anesthesia, but traditionally many have not included radiology departments.”

That is likely to change as hospitals experience more disasters and realize the importance of including various specialties, including imaging. Radiologists are the best-trained to use imaging tools to quickly triage patients and provide surgeons with precise information on life-threatening injuries.

Dr. Bilow advises radiologists to take a proactive approach to emergency preparedness by seeking training including online courses offered through the Federal Emergency Management Agency (FEMA) Emergency Management Institute and attending workshops such as the ASER Mass Casualty Incident (MCI) Workshop which will be

gency Plans is Critical

offered for the first time at the society's annual meeting this fall. (See sidebar).

In his case, Dr. Bilow has done exhaustive research on the topic, completed online and live classroom courses and participated in drills/exercises at the Texas Medical Center. He has shared that knowledge through published articles and collaborations with ASER.

"Emergency preparedness is a constant work in progress," he said. "My motto is, 'Hope for the best, plan for the worst.'"

Valuable Lessons Learned from Harvey

Indeed, every disaster offers opportunities to learn and update the emergency plan where needed.

Hurricane Harvey, a Category 3 storm, showed how a powerful storm could derail staff plans put in place to handle emergencies.

Radiologist Tamara Miner Haygood, PhD, MD, was scheduled to be on-call in the musculoskeletal section of the radiology department at MD Anderson Cancer Center, Houston, the weekend the storm hit. MD Anderson, like many hospitals, had plans for a radiology ride-out team to stay and work during the storm, with a recovery team on standby to provide relief. Dr. Haygood was not on either team.

"I took a bike ride Saturday," she recalled. "It was a gorgeous afternoon. But when the forecast predicted such heavy rain overnight, I was sure I would not be able to get my car out of the driveway Sunday morning."

She headed to work at MD Anderson, fully prepared to stay the night, which was a fortunate decision. By Sunday morning, the Houston area had experienced devastating flooding, leaving many areas under water.

By the time a decision was made to call in the ride-out team, the roads were impassable, so staff on-site at the facility created their own ride-out team. As it turned out, Dr. Haygood was the only

attending radiologist in the hospital during the storm. She worked all day Sunday, slept over that night and worked half of Monday. While she was the sole attending radiologist in-house, other radiologists worked through the storm remotely.

"Electricity and internet were functional through the storm, so we were able to provide timely physician services," Dr. Haygood said. "During the hurricane, we had an army of radiologists reading reports from home-based work stations."

At Ben Taub Hospital, within the Texas University Medical Center campus, radiology residents Varshana Gurusamy, MD, and Joshua Carlton, DO, got a crash course in practicing during an emergency the weekend of Hurricane Harvey.

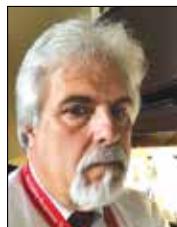
"I was on duty that night because it was my scheduled night rotation, but the staff/attending radiologists were part of the hospital's emergency plan," Dr. Gurusamy said. "They had backup staff in place who would help read reports from home and they also provided support to Dr. Carlton and me."

Dr. Gurusamy, now a third-year resident at Houston's Baylor College of Medicine, and Dr. Carlton found themselves hunkered down in the imaging area in the Emergency Department known as "the pit," throughout the weekend as the flood waters crept close to the hospital's front doors.

The two residents worked and rested in alternating four-hour shifts, although sleep was almost impossible because of the storm sirens and hospital noise. When Dr. Gurusamy needed to read a spinal cord compression MRI for the first time, she was guided through the exam remotely by the attending physician. She was finally relieved on Monday after almost two days of high-stress work with little sleep.

"There was still a lot of water on the roads when I left," she said. "I called my dad and made him stay on the phone with me so I wouldn't fall asleep while I was driving home."

Continued on next page



Perez



Bilow



Gurasamy



Haygood

Continued from previous page

Maintaining Power is Key

Hurricane Harvey demonstrates why radiology departments preparing for emergencies should be mindful of Dr. Bilow's words: Plan for the worst.

Take power, for instance. the Joint Commission practices strict oversight of hospital backup systems, requiring 30-minute generator tests every month and a four-hour test every 36 months. However, even approved generators can fail in the face of powerful forces like earthquakes.

Aftershocks from a 2011 earthquake centered near Christchurch, New Zealand, knocked out the generators at Christchurch Public Hospital and nearby Christchurch Women's Hospital, rendering CT unusable for several hours. Radiologists relied on portable x-ray and ultrasound, with only flashlights and headlamps at times to provide illumination.

During Hurricane Sandy in 2012, hospitals across the east coast struggled to maintain power and keep their doors open. NYU Langone Medical Center sustained major flooding and experienced power outages throughout the hospital, including losing the backup generator.

"My biggest concern was, how do I keep the department going, regardless of

the problem?" said Enrico M. Perez, RT, administrative director, Department of Radiology at NYU Winthrop Hospital in Mineola, NYU Langone Medical Center, N.Y. "How do you respond and maintain function when something like that happens in the middle of the night and the department's not running?"

Ultimately, NYU Langone Medical Center received \$1.1 billion in federal funds which were allocated not only for repairs and reconstruction, but for planning and mitigation projects to better prepare the facility to withstand future disasters.

Rethinking Disaster Plans

For hospitals that successfully endure such incidents, the lessons learned are invaluable for updating emergency preparedness plans, which remain a work in progress.

"After the terrorist incident, we determined that the main factors that need to be corrected are administrative and technical factors, such as management of patient identities and patient flow to imaging examinations," Dr. Amoretti said. "The failure to transmit CT results and reports to the surgical suites and resuscitation departments also proved to be a particular challenge."

In the after-action assessment, or "hot wash" routinely performed in the wake of disasters, Dr. Bilow suggested revising staff shifts for hurricanes for radiologists within the Texas University Medical Center. Previously, radiologists were required to make sure the relief person was there before they left. The new schedule requires a radiologist to stay until a second radiologist comes in.

"This way, there will always be two radiologists on site when a threat is imminent," he said.

Hospitals that have not actually experienced a disaster can still put in the extra work to plan ahead.

Dr. Bilow suggests hospitals conduct facility-wide drills designed to test emergency response and find potential flaws. For radiology, this is a good opportunity to practice evacuation of patients and the maneuvering of portable equipment through what may be very cramped spaces.

This kind of training may not be what radiologists envisioned when they started medical school, but it is an absolute necessity in today's world, according to Perez, who worked through the 9/11 terrorist attacks and Hurricane Sandy.

"We have to be ready for the people who need us," Perez said. "That's the guiding principle behind all of our plans." ☒

WEB EXTRAS

❑ View the video, "Riding out Harvey," by radiology resident Varshana Gurasamy, MD, at www.RSNA.org/News.

❑ Access the Radiology study, "Terrorist Attack in Nice, France, in July 2016: Massive Influx of Patients to a Radiology Department," at RSNA.org/Radiology.

Preparing for Emergencies

- The first ever Mass Casualty Incident (MCI) Planning hands-on workshop for radiology departments will be held during the American Society of Emergency Radiology Annual Meeting planned for Sept. 26-29, in McLean, Va. For more information on this session, go to www.ERAD.org.
- Access the article, "Emergency imaging after a mass casualty incident: role of the radiology department during training for and activation of a disaster management plan," by Dr. Bilow and colleagues, in the *British Journal of Radiology* at www.birpublications.org.
- Access the World Health Organization (WHO) Hospital Emergency Response Checklist, an all-hazards tool for hospital administrators and emergency managers, at www.who.int.
- Access Joint Commission emergency management resources including, "Emergency Management Debrief, Lessons Learned," at www.jointcommission.org.

Optoacoustic Imaging Tool Effective in Differentiating Benign from Malignant Breast Masses

BY MELISSA SILVERBERG

Undergoing a breast biopsy to determine whether a mass detected during routine imaging is malignant or benign can be a stressful and expensive process for millions of women — especially considering that the vast majority of those biopsies come back negative.

But a new imaging technology can drastically improve diagnostics and reduce the number of false positives experienced by patients, according to new research published in *Radiology*, “A Pivotal Study of Optoacoustic Imaging to Diagnose Benign and Malignant Breast Masses.”

Seeking to improve on the specificity offered by current technology, researchers evaluated the effectiveness of an optoacoustic device in differentiating between benign and malignant masses. The investigational device generates real-time images of grayscale US with fused color-coded optoacoustic (OA) features of benign and malignant breast masses.

“Using current technology, we are not always able to differentiate between benign and malignant masses, and we do not want to miss a cancer, so a biopsy is necessary,” said study author Reni Butler, MD, an assistant professor of radiology and biomedical imaging at Yale School of Medicine, who served as co-principal investigator on the research. “So the question is, how do we distinguish between the two so we don’t have to biopsy as many masses? And if we can improve our ability to tell the difference, we can avoid that extra anxiety, cost and discomfort for women.”

The 16-site study of 2,105 women with breast masses took place over three years (2012-2015) at both private and academic medical centers. The study compared Breast Imaging Reporting and Data System (BI-RADS) categories assigned by seven experienced blinded independent readers to benign and malignant breast masses using OA data fused with grayscale ultrasound (OA/US) vs. US imaging alone.

“While there was a lot of data about optoacoustic imaging in a pre-clinical setting, a large scale clinical study like this did not exist,” said study author Basak Dogan, MD, an associate professor of radiology, a Eugene P. Frenkel Endowed

Scholar in Clinical Medicine and director of breast imaging research at University of Texas Southwestern Medical Center. Dr. Dogan served as a site investigator for the study.

Optoacoustic Imaging Offers Color-Coded View

Optoacoustic imaging produces a grayscale image similar to conventional US, but also provides functional information about the amount of hemoglobin and degree of oxygenation of hemoglobin in and around breast masses, Dr. Butler said.

The technology, developed in part by Seno Medical Instruments, produces color maps that can help identify these elements in the image. For example, a mass that is slow growing and oxygenated would be color-coded green, while malignant masses that are growing more quickly or at varying rates, have abnormal vessel formation and are more deoxygenated would be color-coded red, she said.

“The two masses may look essentially identical on the grayscale image and have morphologic features that are very similar, but when you look at the optoacoustic color map, it’s clear that their tumor biology appears very different,” Dr. Butler said.

The study showed that using OA/US imaging resulted in a significant reduction of false positive assessment of breast masses. At a net reduction of 28.5 percent, more than a quarter of breast masses that would have been recommended for a biopsy could be downgraded, Dr. Butler said. The imaging specificity increased by 15 percent.

A New Tool for Radiologists?

Dr. Dogan said she was pleasantly surprised with the results of the study and the potential for clinical application since reducing the number of benign biopsies women receive after US is an important goal. A suspicious, or false positive US



Dogan



Butler

assessment can cause significant patient anxiety. Furthermore, breast biopsy is a costly procedure that adds to the growing health care costs. OA/US can save significant costs by decreasing the number of unnecessary biopsies.

Another benefit: OA/US imaging does not use ionizing radiation or require a contrast injection.

These results are just a tipping point for new research already underway.

Drs. Dogan and Butler are working together on another study using OA-US technology to investigate the clinical and pathophysiological characteristics of breast cancer, and whether the technology can help predict which tumors will be more or less aggressive.

“Ideally, we hope that this technology will become available to radiologists who interpret breast imaging to help them significantly reduce benign biopsies and improve the diagnostic accuracy of what we do,” Dr. Butler said. ■

WEB EXTRAS

Access the *Radiology* study, “A Pivotal Study of Optoacoustic Imaging to Diagnose Benign and Malignant Breast Masses,” at RSNA.org/Radiology.

RSNA IVP Program Shares Radiology Education Around the World

BY JENNIFER ALLYN

No matter where radiologists practice in the world, the objective — to get the clearest images to identify a disease or condition that is adversely affecting a patient — is always the same. However, in low-resource countries with limited radiologic resources, getting those images can be challenging.

To that end, RSNA International Visiting Professors (IVPs) visit countries around the world to interact with local radiologists and trainees and learn about the demands and challenges of learning and practicing radiology in developing countries.

The IVP program sends a team of radiology professors to visit radiology training programs in local hospitals and, when it coincides, to lecture at the annual meetings of international radiology societies. This year, IVP teams traveled to Uganda, Guatemala, Indonesia, Bosnia and Herzegovina and Tanzania. The final 2018 IVP trip is planned for Mexico in September.

In his second IVP trip, Jeffrey J. Peterson, MD, professor of radiology and vice chair for education at the Mayo Clinic Florida, Jacksonville, traveled to Indonesia. Dr. Peterson was also on the IVP team that traveled to Myanmar in 2011.

Dr. Peterson and Guilherme Dabus, MD, lectured during the Indonesian Society of Radiology's annual scientific meeting and participated in a series of

“Between webinars and Skype, I have kept in touch and worked with the students I met in Guatemala to discuss interesting cases.”

RAMON SANCHEZ, MD

hands-on teaching sessions with radiology residents.

Dr. Peterson noted the workflow that the Indonesian radiologists had developed to maximize the equipment, which was in high demand.

“Multispecialty hospitals serve a very large local population but have a limited number of scanners, so workflow efficiency and patient selection is very important,” Dr. Peterson said. “The strength of the health care community in Indonesia is based on the experienced, highly motivated radiology staff who eagerly seek knowledge and new techniques to improve care for their patients.”

Majority of Ugandan Radiologists Attend IVP Lectures

Andrea Laghi, MD, and Suresh K. Mukherji, MD, visited Uganda with the IVP program and was hosted by the Association of Radiologists of Uganda (ARU).

In Uganda, Dr. Laghi, professor of radiology at the University of Rome, Italy, spoke at Mulago Hospital and the Uganda Cancer Institute and visited a private outpatient MRI center and St. Francis Hospital, all in Kampala, the capital city of Uganda. He also lectured at the ARU annual meeting, which was attended by almost every radiologist in Uganda, approximately 50, as well as the only radiologist from Somalia.



Andrea Laghi, MD, discusses a case report with radiologists and radiology residents at St. Francis Hospital during the RSNA IVP trip to Uganda.



Jeffrey Peterson, MD, presents the opening lecture at the Indonesian Society of Radiology's annual meeting, which took place in Surabaya, Indonesia, during the RSNA IVP trip.



Ramon Sanchez, MD, consults with radiology residents about a pediatric patient in need of imaging at Hospital Regional de Occidente in Quetzaltenango, Guatemala, during the RSNA IVP trip.

Since heading back home, Drs. Laghi and Mukherji and the Ugandan radiologists have established an online discussion forum using WhatsApp, a free online messaging app.

“Since we left Uganda, the discussions on this app have been very robust,” Dr. Laghi said. “This is a good way to create a network for continuous education, which is important for all radiologists.”

Staying in Touch Through Technology

Ramon Sanchez, MD, clinical associate professor at the University of Michigan Health System, Ann Arbor, MI, who visited Guatemala with the IVP Program, echoes the importance of keeping in contact with the residents and radiologists he met.

“Between webinars and Skype, I have kept in touch and worked with the students I met to discuss interesting cases,” Dr. Sanchez said. “Improving the quality of work of radiologists with limited resources can ultimately improve the quality of their patient care.”

Dr. Sanchez, who had previously traveled to Mexico City with the IVP Program, visited Guatemala with Roy F. Riascos, MD, professor of diagnostic imaging and chief section of neuroradiology from the University of Texas, Galveston. They were hosted by Hospital Regional de Occidente, in Quetzaltenango, Guatemala. Eric E. Maldonado Muñoz, MD, a radiologist at the Universidad de San Carlos de Guatemala, worked to connect the visiting doctors with local radiology residents and radiologists.

“During their time at the Hospital Regional de Occidente, the doctors shared new concepts about MRI and ultrasound with radiology residents and radiologists,” Dr. Maldonado Muñoz said. “They also discussed how radiologists are an important member of any interdisciplinary team especially for the treatment of stroke and pediatric cardiac patients. We will work to implement this type of teamwork.”

The IVP trips are as beneficial for the doctors as they are for the residents and local radiologists.

“It is very interesting to meet the local radiologists and understand their way of working,” Dr. Laghi said. “They often face very different situations and diseases that I may have never experienced, so I can learn something too.” 



Sanchez



Laghi



Peterson



Maldonado Muñoz

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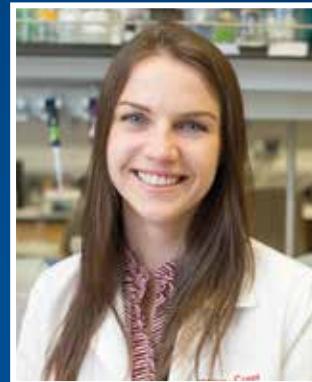
Quantification of Blood Spinal Cord Barrier Opening After MRI-guided Focused US

With limited therapeutic options, a spinal cord injury can leave patients with permanent paralysis. MRI-guided focused ultrasound (MRgFUS) is a novel non-invasive approach to disrupt glial scar formation, the reactive cellular process that occurs after injury to the central nervous system, and improve drug delivery to the injured spinal cord.

2018 RSNA Research Medical Student Grant recipient **Chloe Genevieve Cross, BSC**, will work with scientific advisors, **Yoshimi Anzai, MD, MPH**, and **Allison Payne, PhD**, to investigate quantification methods to assess permeability of the blood-spinal cord barrier opening after MRgFUS in rodents.

"I believe quantitative metrics in imaging remains an important factor to the future of radiology. I find these areas for application of quantitative imaging exciting and think these methods have wide-ranging potential. I am grateful to RSNA and its members for this grant and I look forward to this exciting research opportunity," Cross said.

"Thanks to the RSNA R&E Foundation, a brilliant medical student like Chloe can devote her summer to the establishment of a quantitative method for blood-spinal cord barrier," Dr. Anzai said. "The research will help the future investigation of effective drug delivery for this devastating condition."



Cross

RFAs for New R&E Education Grants Due Sept. 3

Request for Applications (RFAs) are now available for the new RSNA Research & Education (R&E) Foundation education grants. The pre-application process will close on Sept. 3. The grants, to be awarded in 2019, are intended to enhance radiology education for faculty, radiologists and radiology support staff through the development of innovative and fresh educational content and products. For more information on the grant topics and to access the RFAs and instructions for the pre-application process, go to RSNA.org/Foundation.

Education Innovation Grant

Amount: Up to \$175,000 per year for up to three years (\$525,000 maximum)

- Point-of-care education



Education Development Grant

Amount: \$30,000 to \$100,000 per year for up to three years (\$300,000 maximum)

Topics:

- Imaging cancer
- Patient education
- Physician burnout
- Gender, racial and ethnic diversity in radiology leadership



The RSNA R&E Foundation provides the research and development that keeps radiology in the forefront of medicine. Support your future—donate today at RSNA.org/Donate.

Journal Highlights

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

Determinants of Cognitive Impairment in Patients with Multiple Sclerosis with and without Atrophy

Multiple sclerosis (MS) is characterized by focal and diffuse damage in both the white matter (WM) and gray matter (GM). The relationship between structural damage and cognitive impairment is well established, with WM lesion volume, WM integrity damage and GM atrophy correlating with cognitive impairment. The large heterogeneity in cognitive symptoms, however, cannot be fully explained by GM atrophy alone.

In an article published online in *Radiology* (RSNA.org/Radiology), Anand J.C. Eijlers, MD, VU University Medical Center, Amsterdam, and colleagues investigated why some MS patients with no atrophy may still develop severe cognitive impairment, whereas other patients are able to maintain

preserved cognitive function in the presence of widespread atrophy.

The retrospective imaging study included MRI data from 2008–2012, including 332 patients with MS who then underwent extensive neuropsychologic evaluation and additional MRI. Cognitive impairment was present in 42 of 132 patients without atrophy and in 49 of 65 patients with atrophy.

In patients without atrophy, cognitive impairment was primarily determined by cognitive reserve (i.e., low level of education), but not by the amount of WM damage. An opposite pattern was visible in patients with GM atrophy, where patients with cognitive impairment showed a higher amount of concomitant WM damage than did patients with preserved cognitive function, with no effect of cognitive reserve. Regardless of these disparate effects of WM damage and cognitive reserve, all patients with cognitive impairment demonstrated a similar change in brain functioning: a more central position of the posterior cingulate cortex within the global functional brain network.

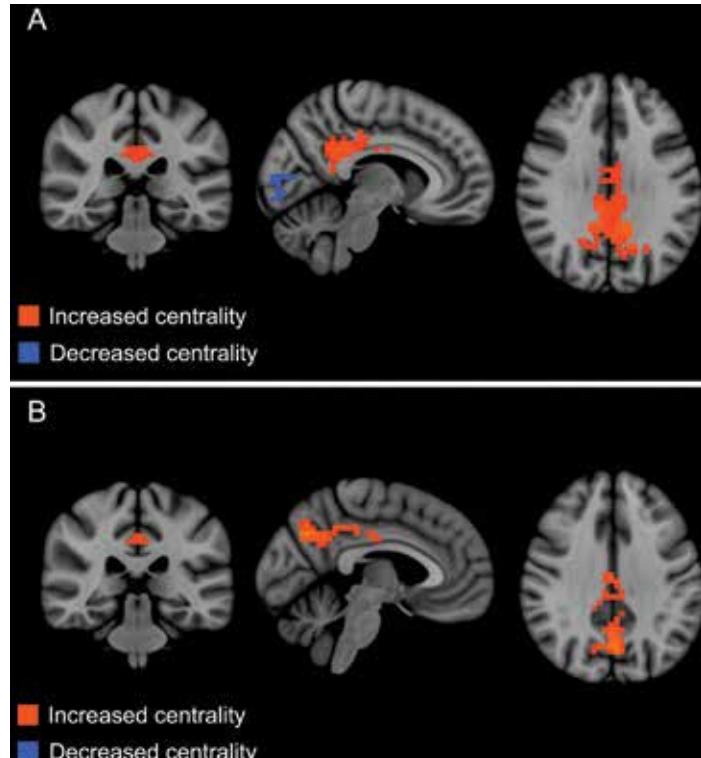
"Patients with MS and GM atrophy have cognitive impairment related to WM damage; however, in patients without atrophy, cognitive impairment was primarily determined by cognitive reserve (i.e., low level of education). Abnormalities detected by functional MRI could serve as a marker of cognitive impairment, independent of atrophy," the authors write.



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:

- "Reducing the Number of Measurements in Liver Point Shear-Wave Elastography: Factors that Influence the Number and Reliability of Measurements in Assessment of Liver Fibrosis in Clinical Practice," Fang C, et al.
- "Increased Pancreatic Echogenicity with US: Relationship to Glycemic Progression and Incident Diabetes," Hung CS, et al.
- "Renal Lesion Characterization with Spectral CT: Determining the Optimal Energy for Virtual Monoenergetic Reconstruction," Schabel C, et al.



Images show differences in white matter (WM) integrity between patient groups, measured with diffusion imaging-derived fractional anisotropy. A. Comparison between patients with preserved cognitive function with and without atrophy. B. Comparison between patients with cognitive impairment with and without atrophy.

Eijlers, et al, *Radiology* 2018;InPress © RSNA 2018.

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

Radiology
PODCASTS

Imaging of Acute Conditions of the Perineum

A wide range of acute conditions can affect the perineum, from self-limited disease to conditions that are potentially life threatening or contribute to substantial patient morbidity if not promptly diagnosed and appropriately treated. Imaging is essential in the clinical management of perineal disease because it allows accurate anatomic localization of the origin and extent of the disease to be determined.

In an article in the July-August issue of *RadioGraphics* (RSNA.org/RadioGraphics), Jihee Choe, MD, Brigham and Women's Hospital, Harvard Medical School, Boston, and colleagues discuss how familiarity with complex perineal anatomy, appropriate use of imaging modalities

RadioGraphics

and the spectrum of imaging findings seen in acute perineal conditions is crucial for radiologists to make a rapid and accurate diagnosis.

Various imaging modalities are available to evaluate acute perineal conditions, each with their own advantages and disadvantages. CT is used most commonly in the acute setting because of its widespread availability and rapid image acquisition. Ultrasonography could be used to evaluate superficial and palpable abnormalities and is especially helpful for diagnosis of genital injuries. MRI exhibits superior tissue contrast resolution, provides excellent characterization of conditions and lacks ionizing radiation. Its role is increasing in

the acute setting; however, MR imaging is not always readily available and is currently reserved for use as a problem-solving technique. Retrograde urethrography is the modality of choice for evaluating traumatic urethral injury.

"Patients with a wide range of acute conditions that affect the perineum present in the emergency department. Radiologists must be familiar with the complex perineal anatomy and various acute perineal conditions, because some of them can be associated with high morbidity and mortality if not promptly diagnosed and appropriately treated. Imaging is crucial to providing accurate anatomic localization of the origin and assessment of the extent of the disease," the authors conclude.



a.



b.

Perianal abscess in a 19-year-old man with a history of recurrent perianal abscesses who presented with rectal pain. Axial (a) and coronal (b) contrast material-enhanced CT images show a peripherally enhancing fluid collection in the right perineum (arrow). The patient underwent incision and drainage in the emergency department, with eventual placement of a seton.

Choe et al, *RadioGraphics* 2018;38:4 © RSNA 2018.

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



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

RadioGraphics
PODCASTS

- "Incomplete Cord Syndromes: Clinical and Imaging Review," by Vamsi K. Kunam, MBBS, and colleagues.
- "Pictorial Review of Digital Radiography Artifacts," by Alisa I. Walz-Flannigan, PhD, and colleagues.
- "Automated Three-dimensional Breast US for Screening: Technique, Artifacts, and Lesion Characterization," by Jan C. M. van Zelst, MD, MSc, and Ritse M. Mann, MD, PhD.

Radiology in Public Focus

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

High Prevalence of Atherosclerosis Found in Lower-Risk Patients

Researchers using whole-body MR angiography (MRA) have found a surprisingly high prevalence of atherosclerosis in people considered to be at low to intermediate risk for cardiovascular disease, according to a new study in *Radiology*.

Whole body MRA was used to quantify the burden and distribution of asymptomatic atherosclerosis in 1,513 people, average age 53.5 years old, who had a 10-year cardiovascular disease risk of less than 20 percent. Almost half of the participants (49.4 percent) had at least one vessel with stenotic disease and more than a quarter (27 percent) had multiple stenotic vessels.

"The key advantages of this MRA technique include the 'whole-body' approach, which detects systemic disease that would be missed by modalities assessing single vascular sites," said study co-author Graeme Houston, MD, from the University of Dundee in Dundee, Scotland. "The results offer a validated quantitative score of atherosclerotic burden, and the technique does not use ionizing radiation, which is an advantage over CT angiography."

Researchers assessed 31 arterial segments in each participant including left and right carotid, vertebral, subclavian and renal arteries. Each arterial segment was visually assessed for the region of greatest stenosis and was coded according to the maximum stenosis present within the vessel and the presence of aneurysmal dilation. The vast majority of arterial segments (94.7 percent) were assessed as normal.

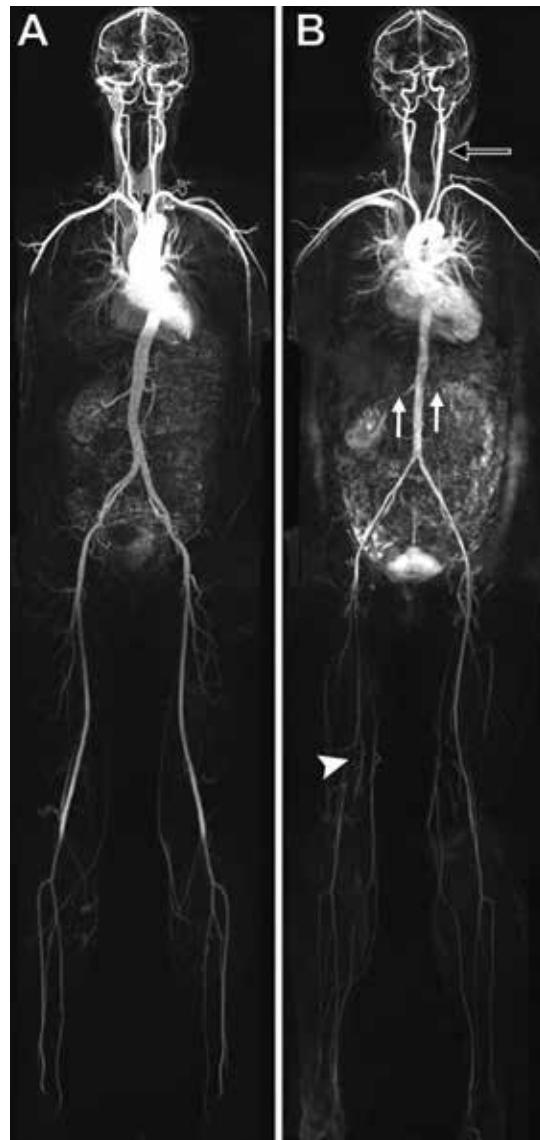
The plaque burden and number of narrowed vessels did correlate with age, blood pressure and cholesterol — all known risk factors for cardiovascular events like heart attacks. However, the prevalence of atherosclerosis in the study group was still unexpectedly high.

Early intervention can slow or reverse disease progression, but standard methods that evaluate only a single vascular territory, such as coronary calcium scoring and carotid intima-media thickness measurement, could have missed the disease.

"The results confirm the feasibility for MRA as an imaging method for detecting early atherosclerotic disease in individuals at low to intermediate risk of cardiovascular events," Dr. Houston said. "This approach could stratify individuals for the presence of disease burden, which could inform further preventative therapy in the future."

WEB EXTRAS

- Access the study, "Prevalence and Distribution of Atherosclerosis in a Low- to Intermediate-Risk Population: Assessment with Whole-Body MR Angiography" at RSNA.org/Radiology.



Images show examples of whole-body angiograms. A. Normal study with no disease evident in a 45-year-old woman. B. Evidence of extensive disease including left carotid bulb stenosis (black arrow), bilateral renal artery stenosis (white arrows), and occluded right superficial femoral artery (arrowhead) in a 53-year-old woman.

Houston, et al; *Radiology* 2018 © RSNA 2018.

Media Coverage of RSNA

In April, 1,279 RSNA-related news stories were tracked in the media. These stories had an estimated audience reach of 781 million.

Coverage included *U.S. News & World Report*, *Chicago Tribune*, WNBC-TV (New York), WGN-AM (Chicago), WebMD, Daily Mail (UK), *Philly.com*, HealthDay, WCAU-TV (Philadelphia), KXAN-TV (Austin), *Drugs.com*, *Seattle Post-Intelligencer*, *Milwaukee Journal Sentinel*, *Diagnostic Imaging*, *Auntminnie.com*, *Radiology Business Journal* and *Health Imaging & IT*.

Impaired Brain Pathways May Cause Attention Problems after Stroke

Damage to some pathways that carry information throughout the brain may be responsible for attention deficit in patients who have had a subcortical stroke in the brain's right hemisphere, according to a new study in *Radiology*.

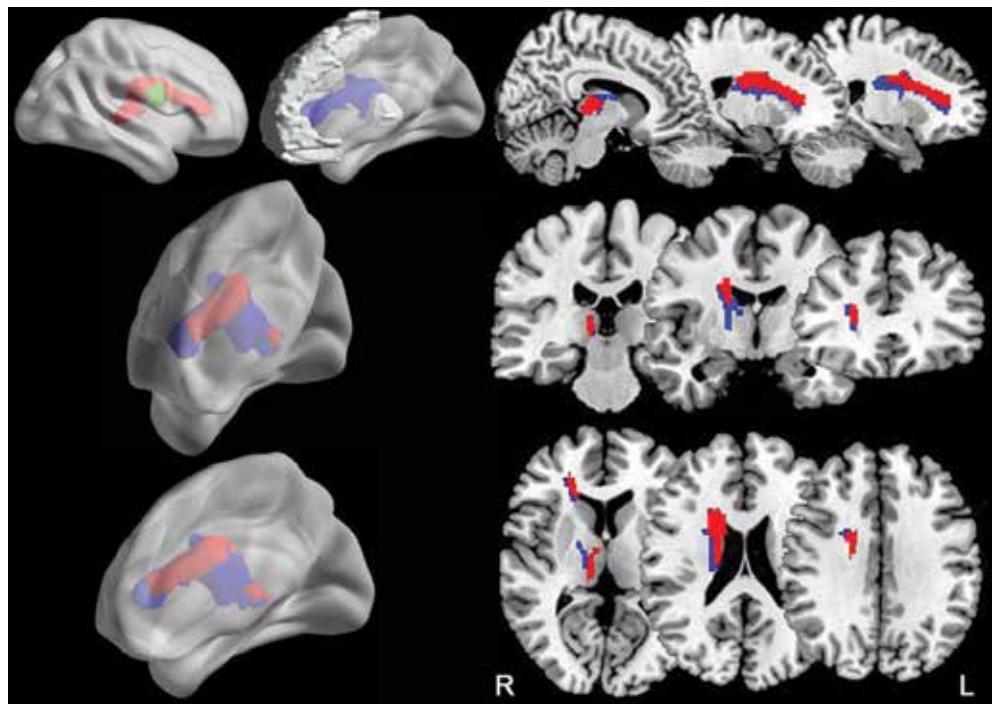
More than one-third of patients experience cognitive decline after a stroke, including attention deficit.

"Impairment of attention has been observed in patients with both cortical and subcortical stroke," said senior study author Chunshui Yu, MD, from the Department of Radiology at Tianjin Medical University General Hospital in Tianjin, China. "In cortical stroke, the direct involvement of cortical regions associated with attention may account for the deficit. However, the parts of the nervous and brain systems underlying attention deficit in subcortical stroke remain largely unknown."

To investigate the mechanisms underlying attention deficit in chronic subcortical stroke, Dr. Yu and colleagues combined voxel-based lesion-symptom mapping (VLSM) and diffusion tensor tractography (DTT) in 49 patients (32 men and 17 women, age 40–71) after subcortical stroke and 52 control patients (30 men and 22 women, age 40–68).

A modified version of the attention network test was used to assess visual attention function. VLSM was used to identify lesion locations related to attention deficit in the stroke patients. Then DTT was used to determine the responsible impaired brain connections at the chronic stage (> 6 months post-stroke).

Compared to the controls, patients with chronic stroke exhibited prolonged reaction time during the attention task. VLSM revealed that having an acute stroke lesion in the right caudate nucleus



and nearby white matter (WM) was correlated to the prolonged reaction time. By combining fiber reconstruction and WM integrity analysis, the researchers noted that the damage to the right thalamic-prefrontal pathway caused by a stroke lesion is a neural substrate underlying attention deficit in patients with subcortical stroke. DTT showed that the responsible lesion was located in the right thalamic- and caudate-prefrontal pathways in controls.

The right brain damage subgroup had significantly decreased fractional anisotropy (FA) in these pathways, which were correlated with the prolonged reaction time. Reductions in FA have been previously associated with advancing age and in cases of cognitive impairment.

Anatomic connections of the responsible lesion region (red) and the thalamic-prefrontal pathway (blue). Green denotes the seed region (responsible lesion region), gray indicates the origin (thalamus) and target (prefrontal) regions of the thalamic-prefrontal pathway.
Yu et al, *Radiology* 2018 © RSNA 2018.

WEB EXTRAS

Access the study, "Connection Disruption Underlying Attention Deficit in Subcortical Stroke," at RSNA.org/Radiology

RadInfo 4 Kids Project Takes the Fear Out of Pediatric Imaging

RadiologyInfo.org – the RSNA-ACR patient information website – is exploring a new initiative to help pediatric patients better understand necessary imaging exams or procedures. The RadInfo 4 Kids project explains tests and treatments to children in a relatable way. Made for kids by kids, the videos and other content help ease anxiety and take the fear out of routine exams.

Check out the first RadInfo 4 Kids video, "The Basketball Game: An MRI Story," written, illustrated and recorded by 12-year-old Ananya Ramji, daughter of Ramji Rajendran, MD, co-chair of the RSNA-ACR Public Information Website Committee.

Encourage your pediatric patients to share their stories with *RadiologyInfo.org*. Numerous formats are accepted, including videos, stories and drawings, and do not have to be perfectly polished. For more information, contact Joshua Nash at jnash@rsna.org.

Education and Funding Opportunities

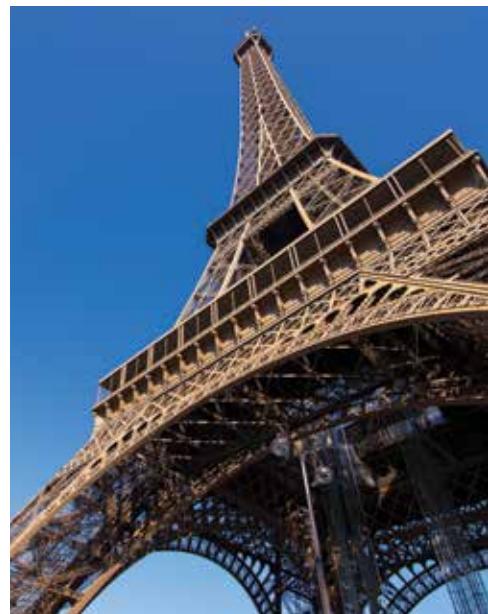
Register for RSNA Spotlight Course on Artificial Intelligence in Paris

Registration is open for the RSNA Spotlight Course, "Practical Applications of Artificial Intelligence (AI)," which will be held Sept. 23–24, 2018, in Paris, France.

This two-day course is for radiologists of all subspecialties who want to learn more about AI and its practical application to practice workflows and processes. Those completing the course will have a better understanding of how AI can help, not replace, radiologists.

With the journal *Radiology: Artificial Intelligence* launching in 2019, new AI webinars and expanding programming at the Society's annual meeting, RSNA is the recognized leader for radiologists who want to integrate AI with clinical practice.

For more information and to register, visit RSNA.org/Spotlight2018.



NIH Grantsmanship Workshop

The NIH Grantsmanship Workshop introduces participants to the process of preparing a competitive research or training grant application. Designed for junior faculty in academic centers who wish to pursue a career in radiologic research, this didactic workshop is led by faculty who are leading researchers and have

extensive experience in the grant application process. Topics covered include elements of a good grant proposal, understanding the review process, and planning the proposal.

The workshop takes place 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.

Value of Membership

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Automatic renewal is a fast and easy way to make sure your RSNA dues are always up-to-date.

When renewing online, check the automatic renewal box and fill in your credit card information or check the automatic renewal box when completing credit card information on the printed membership invoice.

Each October, RSNA will charge the designated credit card for annual membership dues based on the level of membership at the time of renewal, journal format choice and specified donation amounts.

For more information, go to RSNA.org/FAQ.aspx.



Annual Meeting Watch

RSNA 2018 Registration Open

RSNA offers several registration options to best meet your needs. Visit RSNA.org/Registration-Packages to choose a package that's right for you.

Important Dates for RSNA 2018

Oct. 26	Advance Registration Deadline; after this date rates increase \$160 for most categories
Oct. 27	Cancelling a hotel reservation as of this date will result in the forfeiture of the hotel deposit equal to one night's room and tax
Nov. 25 – 30	104 th Scientific Assembly & Annual Meeting



Plan Your RSNA 2018 Experience

When you plan your trip to Chicago, remember to add the extras that will make your experience complete.

Virtual RSNA 2018 – Register for the 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.

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

5K Fun Run – Race your colleagues and fellow attendees to the finish line of the RSNA 5K Fun Run on Tuesday, Nov. 27, at 6:30 a.m. Race spots fill up quickly, so register yourself or your team early to ensure you receive a commemorative T-shirt. All proceeds benefit the RSNA R&E Foundation. Fun run registration is open at RSNA.org/Fun-Run.

The 5K Fun Run is sponsored by Konica Minolta Healthcare.

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.

Access the RSNA Meeting Program Online in 2018

In order to reduce our environmental footprint, 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 the roster of technical exhibitors and build your personalized schedule on My Agenda.

- **The RSNA 2018 Meeting App** Browse the meeting program, access maps to navigate 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.

While the Program in Brief will no longer be available in print, RSNA will continue to publish the onsite Pocket Guide, an easy-to-use reference to course

and event information, floor plans at McCormick Place and transportation and dining, plus subspecialty content brochures in print and online.

The Meeting App is sponsored by Google Cloud.

Annual Meeting Watch

Reserve Your Hotel Room through RSNA

Begin planning for RSNA 2018 by reserving your hotel room in Chicago. RSNA has negotiated special room rates for meeting attendees. Additional savings can be earned by reserving your hotel room before Sept. 12. Hotel information is available at RSNA.org/hotel-reservations.

Why Reserve with RSNA?

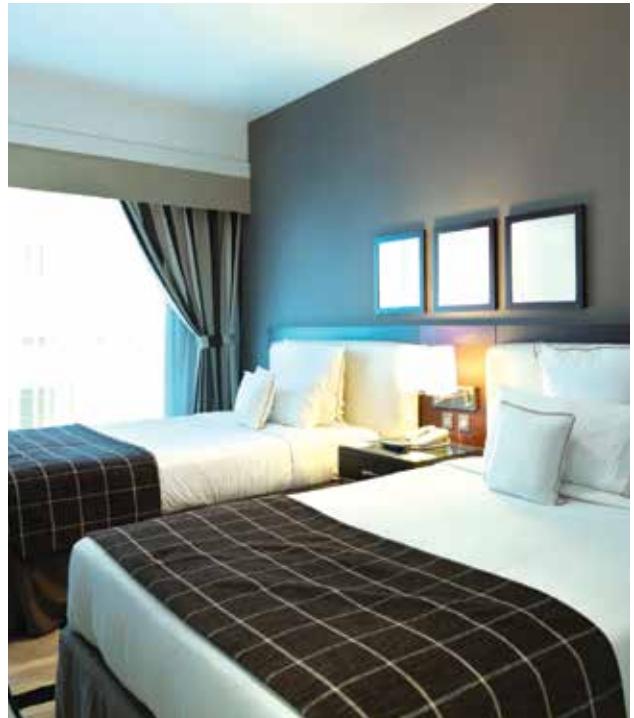
- Earn hotel loyalty points
- Choose from nearly 100 downtown Chicago hotels
- Secure great hotel rates
- Access the free shuttle service or Metra Electric rail system to/from McCormick Place

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RSNA has designated ESA Voyages and ACE Marketing as the official international travel agencies offering travel packages to the annual meeting. Contact RSNA hotel services at housing@rsna.org for additional information.



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. PST and mention code AM2018.



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Save Up to 10 Percent with Exclusive Airline Discounts

United Airlines offers discounts 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; 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.



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.

Exhibit in the Start-up Showcase at RSNA 2018

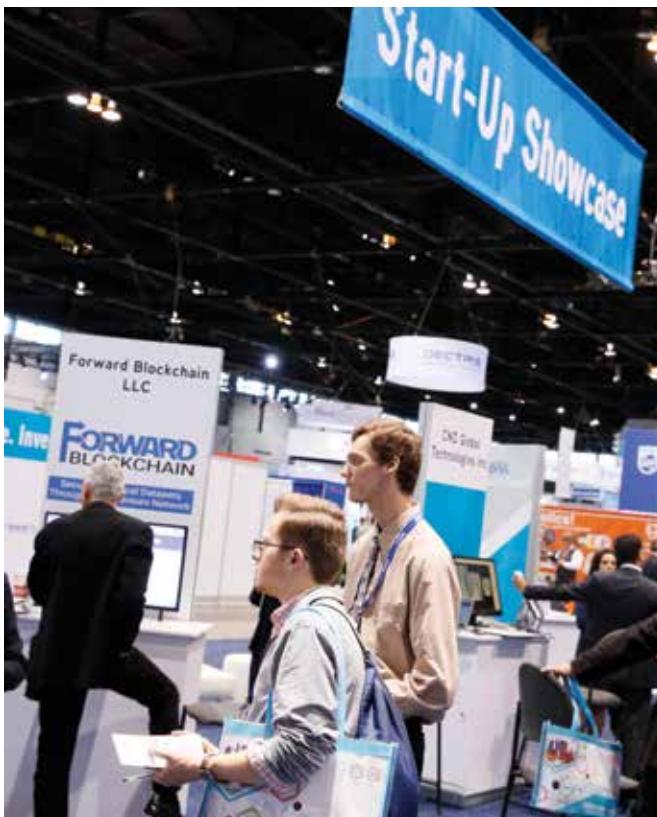
**Application Deadline
Oct. 31**

care industry? Engage with radiology professionals, network with industry experts and present your products or services to potential investors as part of the RSNA Start-up Showcase, comprised of 24 kiosks in a specially designated area of the Technical Exhibits Hall at RSNA 2018.

The Start-up Showcase gives emerging companies a turn-key experience to reach important decision makers. Applications are due by Oct. 31 and the showcase is limited to the first 24 participants. Information and eligibility requirements are available at RSNA.org/start-up-showcase.

For questions, contact the RSNA Exhibit Sales Team at sales@rsna.org or 1-630-481-1046.

Are you working for an emerging or start-up company in the health



**COMING
NEXT
MONTH**

Next month, the final article in the three-part series on Machine Learning (ML) will focus on the expanding role of ML at RSNA 2018 and offer a preview of annual meeting events and programs.



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