



## The Survey Says: Your Hobbies are Rad

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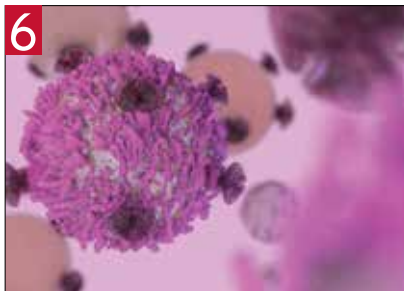
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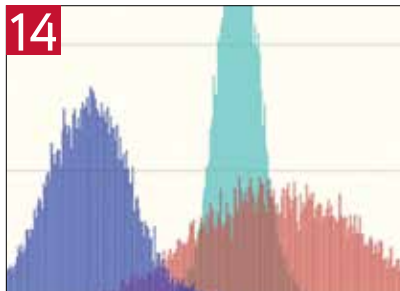
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# RSNA Announces 2017 Honorary Members

The RSNA Board of Directors has announced the Honorary Members who will be honored at the 103<sup>rd</sup> Scientific Assembly and Annual Meeting. They are:



**Hassen A. Gharbi, MD**  
Tunis, Tunisia



**Renato A. Mendonça, MD**  
São Paulo, Brazil



**Katrine Riklund, MD, PhD**  
Umeå, Sweden



## Emergency Radiology Focus of Sixth Annual International Day of Radiology (IDoR)



Join more than 140 radiology-related professional societies from around the globe on Nov. 8 in celebrating the advances that radiologic innovations have brought to patients worldwide.

IDoR 2017 is dedicated to emergency radiology and the essential role that radiologists play in the emergency room, increasing the quality of care and treatment of patients.

IDoR is sponsored by RSNA, the European Society of Radiology and the American College of Radiology, with a dedicated website ([IDoR2017.com](http://IDoR2017.com)) and social media activities.

Visit [RSNA.org/IDoR](http://RSNA.org/IDoR) for promotional materials you can customize for your practice or organization.



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## ARRT Ends Quality Management Certification Program

The American Registry of Radiologic Technologists (ARRT) has announced it will stop issuing new Quality Management (QM) credentials after June 30, 2018.

According to ARRT, those who already hold the QM credential — or who earn it before July 1, 2018 — can maintain it indefinitely if they choose. The last day to

apply to take the QM exam will be June 1, 2018.

ARRT made the decision after surveying QM practitioners nationwide, asking what tasks they commonly perform in their jobs. The ARRT has communicated directly with all RTs who hold the QM credential or are working toward earning the designation.

### Correction:

An announcement in the June issue incorrectly identified Paul M. Parizel, MD, PhD, as the vice chairman of radiology at the University of Antwerp in Belgium and as the immediate past president of the European Society of Radiology (ESR). Dr. Parizel is the chairman of the radiology department at the University of Antwerp in Belgium and serves as the current chair of the Board of Directors of ESR.

# RSNA Holds QIBA Annual Meeting



RSNA held the 2017 Quantitative Imaging Biomarkers Alliance® (QIBA) Annual Meeting in May in Alexandria, Va. Approximately 90 attendees gathered for the two-day meeting, representing all QIBA stakeholder groups: academic radiologists, physicists, clinicians, researchers, scanner manufacturers, pharmaceutical and software companies, as well as representatives from several government agencies and institutes, including the National Institute of Biomedical Imaging and Bioengineering (NIBIB), the National Cancer Institute and the Food and Drug Administration (FDA).

Plenary speakers discussed the benefits and current payment policies associated with quantitative imaging from the perspective of commercial payers. Krishna

Kandarpa, MD, PhD, director of research sciences and strategic directions at NIBIB, provided insight on how current NIH initiatives might benefit from QIBA biomarker development. NIH research priorities and high-profile initiatives include the Precision Medicine Initiative, Cancer Moonshot, Human Placenta Initiative, Human Connectome Initiative, and the Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) initiative.

Three panel sessions engaged participants in discussions on topics of cross-modality interest. Discussions included the clinical department chair perspective on integrating quantitative imaging (QI) into radiology, the challenges and rewards of QI algorithm performance challenges, and

Imaging Contract Research Organization perspectives on current QI initiatives. Reports from the four modality coordinating committees highlighted QIBA activities, accomplishments and challenges of the past year.

Ample time was dedicated to working meetings of the various biomarker committees in which members discussed groundwork projects, ways to advance their profile development and associated strategies for profile deployment and adoption.

Visit [RSNA.org/QIBA](http://RSNA.org/QIBA) for more information.

## ACR Recognizes Distinguished Achievement at Annual Meeting

Gold medals were presented to **Bruce J. Hillman, MD**, **John A. Patti, MD**, and **Jeffrey C. Weinreb, MD**, at the American College of Radiology (ACR) annual meeting held in May in Washington, DC.

Dr. Hillman is professor of radiology and medical imaging and public health sciences and former chair of radiology at the University of Virginia, Charlottesville. He received the RSNA Gold Medal in 2011 and was recognized as Outstanding Researcher in 2007. Dr. Hillman delivered the New Horizons Lecture at RSNA 1997.

Dr. Patti is a senior lecturer in radiology at Harvard Medical School and a thoracic radiologist at Massachusetts General Hospital, both in Boston. Dr. Weinreb is a professor and vice chair for strategic planning in the Department of Radiology and Biomedical Imaging at Yale-New Haven Hospital/Yale University School of Medicine in New Haven, CT.



Hillman



Patti



Weinreb

## Yee Appointed Radiology Chair at Montefiore Medical Center



Yee

Internationally recognized abdominal radiology expert **Judy Yee, MD**, has been appointed professor and university chair of the Department of Radiology at Montefiore Medical Center and Albert Einstein College of Medicine, N.Y. Dr. Yee succeeds Edward S. Amis, MD, who is stepping down from the position after 25 years.

Dr. Yee previously served as professor and vice chair of the Department of Radiology and Biomedical Imaging at the University of California, San Francisco (UCSF), where she was also director of the 3D Imaging Laboratory. Dr. Yee also served as chief of radiology at the San Francisco VA Health Care System.

An accomplished researcher, Dr. Yee is a renowned pioneer in the development of virtual colonoscopy,

which is now used globally for colorectal cancer screening and diagnosis. She has authored more than 150 publications on innovative techniques for liver, pancreatic and gastrointestinal tract imaging. Dr. Yee is the immediate past president of the Society of Abdominal Radiology.

Dr. Yee currently serves on the Editorial Boards of journals including *RadioGraphics*, *Abdominal Radiology* and *Journal of Computed Tomography*.

Dr. Yee is a member of the RSNA Public Information Advisors Network (PIAN) and past chair of the RSNA Public Information Committee (PIC). She currently serves as a track chair on the RSNA Refresher Course Committee.

## RSNA Spotlight Course in Colombia a Success

RSNA's second Spotlight Course: MSK Interactivo con Casos (MSK: Interactive Course with Cases), held in May in Bogota, Colombia, drew 187 professional attendees from 16 countries.

The Regional Committee for Latin America (RCLA), which is part of the RSNA International Advisory Committee, assisted in planning the course and recommended musculoskeletal (MSK) imaging as the topic based on the educational needs of RSNA members in Latin America. Course directors Jorge Soto, MD, and Gabriel Dib, MD, led the 2 ½-day program, which was conducted entirely in Spanish.



Participants used RSNA Diagnosis Live™ during the Spotlight Course.

Participants learned through interactive and case-based courses that included the popular Cases of the Day and used the RSNA Diagnosis Live™ quiz-based learning format to test their knowledge.

"I have only received positive comments and thank you notes," Dr. Soto said about the course. "Thank you to everyone who helped at RSNA, the course was a major success. It is very encouraging to see that Latin American radiologists embrace the efforts of the Society to bring education closer to their homes."



Soto



Dib

## Numbers in the News

# 10

The number of "love boxes" or Breast Cancer Toolkits created for patients at the Sibley Innovation Hub at Johns Hopkins Memorial Hospital. Read more about the patient-focused project on [Page 13](#).

# 211

Number of patients in a *Radiology* study examining the effectiveness of single- vs. double-needle US procedures for shoulder pain. Read more on [Page 23](#).

### IN MEMORIAM

#### David O. Cosgrove, MBCh



A preeminent leader in ultrasound, David O. Cosgrove, MBCh, passed away on May 16 in London. He was 78.

Born in Nairobi, Kenya, Dr. Cosgrove left his home at age 17 to attend Oxford University where he earned a bachelor's degree in physiology in 1961. After earning his medical degree at St. George's Hospital Medical School, London, he returned to Kenya to practice medicine at the Jomo Kenyatta Hospital in Nairobi in 1971.

He subsequently returned to London where he achieved world renown for his pioneering work in ultrasound. Dr. Cosgrove's contributions to ultrasound were so significant that even though he was not a radiologist, the Royal College of Radiologists in London named him an Honorary Fellow in 1998.

Dr. Cosgrove became a member of the Royal College of Physicians in 1967 and earned a Master of Science degree in nuclear medicine at the University of London in 1975. He served as consultant in nuclear medicine and ultrasound at Marsden Hospital from 1977 to 1993 when he moved to the Royal Postgraduate School at the Hammersmith Hospital, which later became a part of the Imperial College School of Medicine (ICSM). Dr. Cosgrove was awarded a personal chair as Professor of Clinical Ultrasound at ICSM.

Among his primary contributions to ultrasound, Dr. Cosgrove advanced the clinical role of "radiologic" (non-obstetric) ultrasound, furthered understanding of the basic mechanisms of the ultrasound image-forming process and of Doppler ultrasound, developed and advanced clinical applications of microbubble contrast agents and applied elastography to clinical diagnosis. He co-founded the International Contrast Ultrasound Society in 2008.

Dr. Cosgrove's research appeared in numerous scientific journals including *Radiology* and the *European Journal of Gastroenterology*.

As a respected teacher and mentor, he trained a generation of radiologists and sonographers. After retiring in 2004, Dr. Cosgrove became an Emeritus Professor at ICSM but remained active as a teacher and researcher until the time of his death.

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#### LETTERS TO THE EDITOR

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## My Turn:

# RSNA Resident & Fellow Committee Works to Engage Broader Scope of Trainees

BY COURTNEY TOMBLINSON, MD

Each year, the RSNA Resident & Fellow Committee (RFC) seeks new ways to engage trainees in RSNA activities and spread the word about the phenomenal educational resources available through RSNA. This year, two of our goals are to improve trainee engagement and to help prepare members-in-training for fellowships or their first jobs.

Seeking to engage a broader scope of residents and fellows across the country, the RFC created the RSNA Resident Representatives (R<sup>3</sup>) program in 2015 to serve as a bridge between RSNA and residents' respective institutions. Each program director can designate one R<sup>3</sup> representative (typically a second-year radiology resident) to serve a one-year term, acting as a liaison between individual training programs and the RFC. This arrangement allows for a two-way exchange of information and ideas.

Our RFC Communications Subcommittee sends out a monthly newsletter to R<sup>3</sup> representatives highlighting new opportunities, upcoming deadlines or specific resources available to trainees. For example, our most recent newsletter contained information pertinent to residents studying for the Core Exam, including the *RadioGraphics* ABR Core Exam Study Guide, a compilation of image-rich reviews organized by subspecialty and topic.

The R<sup>3</sup> representatives provide feedback on educational resources and RSNA programming, allowing us to tailor our materials and plans for the upcoming year — particularly the RFC Symposium held at the RSNA annual meeting. In addition, the R<sup>3</sup> program helps the RFC disseminate new information about RSNA opportunities, grants, scholarships and more to their peers in their individual

programs.

Since its inception, the R<sup>3</sup> program has grown from a small group of volunteers to 122 representatives across the country. We would like your help to expand even further, so that each training program has a representative. If you are not sure if your program has a representative, or would like to facilitate joining the R<sup>3</sup> program in coordination with your program director, please contact RSNA Customer Service at [membership@rsna.org](mailto:membership@rsna.org).

Residents and fellows are also invited to explore a recently updated RSNA resource: RSNA Career Connect.

Trainees preparing to enter a fellowship or their first job can visit RSNA Career Connect at [RSNA.org/Careers](http://RSNA.org/Careers) to access the enhanced fellowship and career portal. The new interface allows intuitive search methods with the capability to filter based on geography and keywords. Job seekers can also save potential jobs and create an alert for new career opportunities matching their search criteria.

The RFC is continually seeking feedback from members-in-training and from RSNA members overall on how we can collaborate and provide assistance to residents and fellows as they advance through training and enter the workforce. We are excited to see you at this year's RSNA annual meeting!



Tomblinson

### WEB EXTRAS

- Access RSNA's full library of trainee resources at [RSNA.org/Trainees.aspx](http://RSNA.org/Trainees.aspx).
- Access the *RadioGraphics* ABR Core Exam Study Guide at [RSNA.org/RadioGraphics](http://RSNA.org/RadioGraphics).

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*Dr. Tomblinson is chair of the RSNA Resident and Fellow Committee. She earned her bachelor's degree in biology and Spanish from Western Kentucky University, Bowling Green, and completed her medical degree at the University of Louisville School of Medicine, KY. She is a chief resident at the Mayo Clinic Hospital in Phoenix. Her Twitter handle is @cmtomblinson.*

# Precision Imaging:

## The Holy Grail for Predicting Cancer Treatment Response?

BY MIKE BASSETT

One of the key components of precision medicine — particularly in oncology — is gauging a patient's response to treatment.



Sala



Shields

Increasingly, researchers are beginning to understand that genomic heterogeneity exists among — and within — tumors, and that these differences profoundly impact how a patient will respond to treatment with a particular therapy.

Consequently, as pointed out in a recent study in *Precision and Future Medicine*, “the success of precision medicine requires a clear understanding of each patient's tumoral heterogeneity and individual situation.”

With this in mind, the evolving fields of radiomics and radiogenomics (also called imaging genomics) have garnered strong academic interest. Radiomics is the high-throughput extraction of quantifiable imaging characteristics and features from modalities such as CT, MRI and PET which are converted into high-dimensional data. The mining of this data to detect correlations with genomic patterns is known as radiogenomics.

“Studies show that there is quantitative information inherent in all of these images that is very important,” said Evis Sala, MD, PhD, chief of Body Imaging Service at Memorial Sloan Kettering Cancer Center and a professor of radiology at Weill Cornell Medical College, both in New York City. “And we can use quantitative information to actually describe heterogeneity.

“I don't think imaging can replace genomics,” she added. “But it should be integrated with genomic and histologic information. Ultimately, synthesizing all of this information will lead to potentially high-powered precision medicine. If we are actually able to devise an integrated system using this genomic, imaging and clinical information, we will be able to treat patients in a more personalized way.”

Getting to that point is the challenge researchers now face.

“Radiomics is difficult,” said Anthony Shields, MD, PhD, professor of oncology and medicine, Wayne State University, and associate director for clinical sciences, Karmanos Cancer Institute, both in Detroit. “The platforms are not yet standard and the way the images are obtained are not necessarily standard, so that will affect the results.

“It's an exciting field, but I'm not making any clinical judgments based on radiomics at the moment,” he said. “It's certainly an area of very active research, and we are hoping that it will lead to improved patient assessment and that it will provide early responses and better information. But it's going to take us a while to get there.”

### Predicting Tumor Response

Nevertheless, Dr. Sala pointed to important work that has shown the potential power of these developing fields. For example, she referred to a 2014 study in *Nature Communications* in which the researchers described the radiomics analysis of CT scans of more than 1,000 patients with lung and head and neck cancers.

The researchers found that certain tumor characteristics formed a signature that was able to capture intra-tumor heterogeneity and could predict how the tumor would react in individual patients.



*Editor's Note:* This is the second in a series of articles on the role of imaging in precision medicine. The next article will cover the role of cross-disciplinary science alliances.

“These data suggest that radiomics identifies a general prognostic phenotype existing in both lung and head and neck cancer,” the authors wrote. “This may have a clinical impact as imaging is routinely used in clinical practice, providing an unprecedented opportunity to improve decision support in cancer treatment at low cost.”

Dr. Sala also noted research exploring the promise of radiomics as a better way to predict response to therapy — an area where she envisions radiomics and radiogenomics making a huge difference.

“What is going to be more crucial than the distinction between a benign or a malignant tumor, or the aggressiveness of the cancer, is actually predicting resistance to treatment,” she said. “Because that is really the holy grail.”

Currently, if a patient is resistant to treatment it usually means that the cancer has reached the metastatic stage. “And you can’t turn your patient into a pin cushion — you can’t biopsy every single lesion you find,” she said. “But you can image every single metastasis and mine the quantitative data and possibly predict treatment response, and predict resistance and pseudo-progression.”

“This is all extremely important, and that is actually where I see the added value in radiomics and radiogenomics,” she said.

Dr. Sala also believes that radiomics and radiogenomics will help with immunotherapy and the concept of pseudo-progression, in which a tumor appears to be progressing after the start of

immunotherapy, but is actually in a state preceding a prolonged response to the therapy.

Even with pseudo-progression, an oncologist may continue treatment for weeks to months to see whether a tumor is truly progressing, Dr. Sala said. “That’s a long time to keep someone on immunotherapy, because it’s expensive and potentially toxic,” she added.

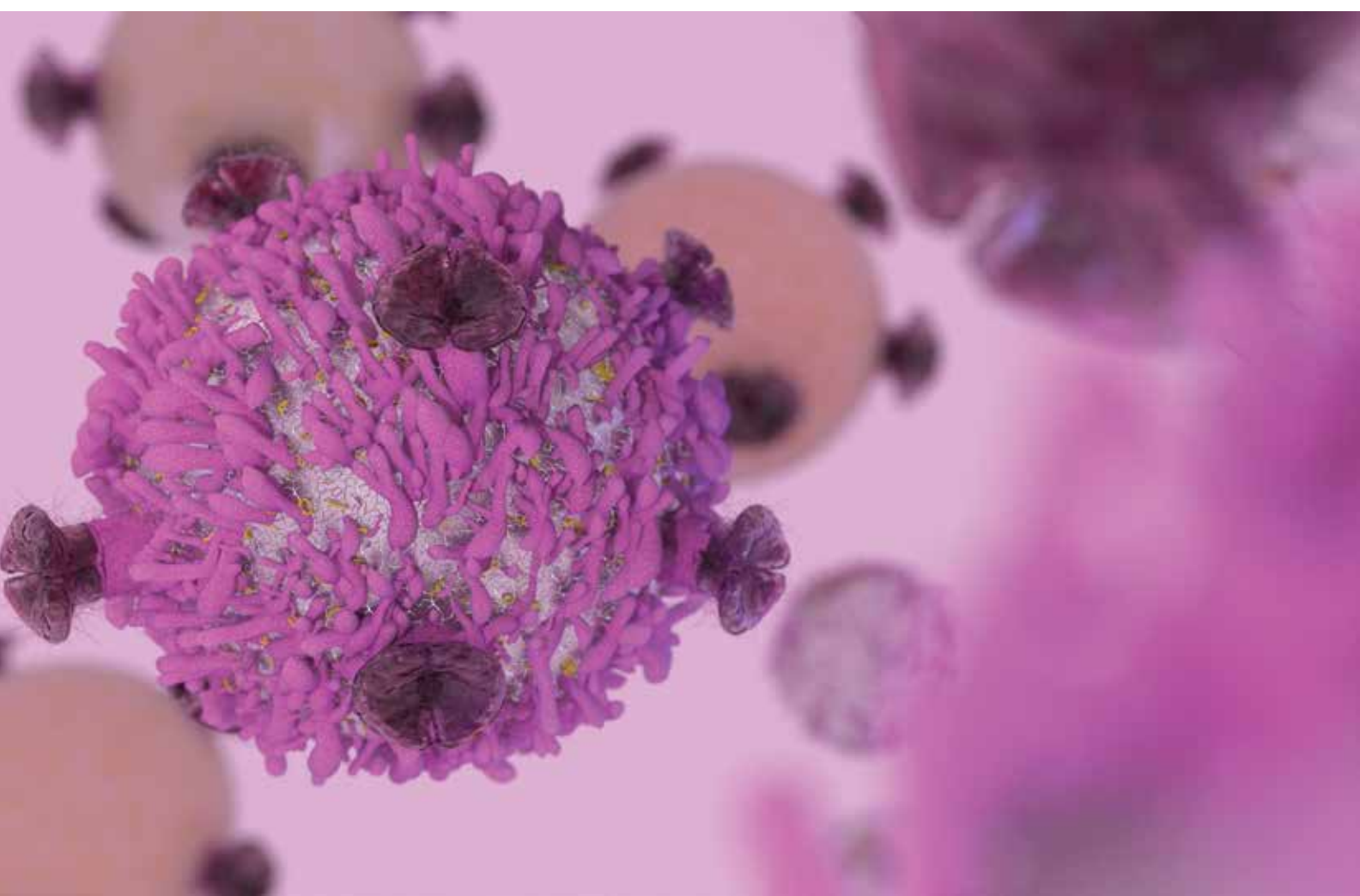
For that reason, researchers are seeking better ways to measure treatment resistance or pseudo-progression in the case of immunotherapy, she said.

Tumors exhibit genomic and phenotypic heterogeneity, which has a prognostic significance and could influence response to treatment.

There are differences within the tumor — with blood flow, metabolism and cell density — that can be probed with imaging, she said. “With imaging not only can we look at intra-tumor heterogeneity within one site, but we can also observe the differences between different sites. This is important, because during this resistance to treatment, various sites can become more heterogeneous, and those may be the ones that can drive resistance.”

So the potential is there to non-invasively quantify this heterogeneity within and between tumors in individual patients in order to select more effective therapies and inhibit treatment resistance, she said.

*Continued on next page*



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*“What is going to be more crucial than the distinction between a benign or a malignant tumor, or the aggressiveness of the cancer, is actually predicting resistance to treatment. Because that is really the holy grail.”*

EVIS SALA, MD, PHD

*Continued from previous page*

### **Progress Depends on Cooperation among Specialties**

Whether radiomics and imaging genomics will replace the current cancer staging system — tumor, node, metastasis (TNM) — which codifies the anatomic extent of disease at diagnosis in order to assess the prognosis of a patient’s cancer, is still unknown.

“While TNM staging is not yet a thing of the past, we can add more than TNM coding with radiomics and radiogenomics — and I think the data is emerging on that,” Dr. Sala said.


Dr. Shields agrees that more work needs to be done before TNM coding becomes obsolete.

“Our knowledge of the molecular biology of these tumors — even with gene panels and proteomics — is still not up to subdividing patients without knowing the TNM coding of the tumor,” Dr. Shields said. “Knowing that it’s a stage 1 tumor is still very different than knowing it’s a stage 4 tumor.”

He recalled a presentation in which he listed a number of factors that helped predict the patient’s prognosis, including details such as histology, weight loss, whether the patient had fevers and performance status.

“For the cost of one PET scan, you could get 20 different prognostic indicators that are really very helpful in defining what is going to happen with the patient,” he said. “So the molecular phenotype adds to that, as does the imaging. But the clinical element — just walking into a room and looking at a patient and noticing that he really looks sick —still has a role.”

Dr. Sala said that further progress in radiomics and imaging genomics will depend upon a certain degree of cooperation between radiologists, oncologists, molecular biologists and computer scientists.

“Unless we bring them all together we won’t be making any strides forward,” she said. “Oncologists have to be imaging friendly, while radiologists have to understand that they have to use artificial intelligence and deep learning. It all has to be integrated.” 

# Machine Learning Algorithm May Improve Risk Stratification in Pulmonary Hypertension

BY STEPHEN BENZKOEFER

Researchers using 3-D image modeling combined with machine learning (ML) demonstrated more accurate risk stratification of patients suffering from pulmonary hypertension than by using conventional imaging and biomarkers, according to new *Radiology* research.

Developed by London researchers, the complex algorithm was able to analyze and learn from MR images of the right ventricle, allowing doctors to better predict patient survival than with traditional biomarkers, and to identify regional changes in function associated with poor survival when they first present.

“We’ve essentially taken a conventional investigation — cardiac MRI — which is acquired routinely, and applied a machine learning approach to identify the information that is most relevant to patient survival,” said study author Timothy J. W. Dawes, PhD, a clinical lecturer at Imperial College London.

The study of 256 pulmonary hypertension patients in the U.K. concentrated on the function of the right ventricle, a key determinant of patient survival in this condition. Using conventional MR images, the team developed a high-resolution, 3-D model of the right ventricle for each subject, assessing ventricular function at almost 30,000 points.

The algorithm was able to discern the patterns of function that predicted poor survival from half of the subjects and tested the performance of these signatures in the remaining subjects. Researchers compared these findings to predictions using conventional prognostic markers, such as those derived from cardiac catheterization, functional assessments and conventional MRI analysis.

The process was repeated 1,000 times with random allocation of the subjects to the training and the testing groups. Prediction using 3-D models outperformed all other markers in predicting patient survival, according to results.

“The nub of the paper is that the computer was very good at predicting in the unseen group how well they would survive,” Dr. Dawes said.

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*“We had a great opportunity to combine optimization of data extraction and a very real clinical problem.”*

TIMOTHY J. W. DAWES, PHD



Dawes



O'Regan

The benefits of the ML model could extend well beyond its capabilities as an accurate prediction tool, he said.

“The research also gave us some insight into how functional adaptations in the right ventricle, even at first presentation, herald poor prognosis and what these adaptations really mean in the anatomical sense,” Dr. Dawes said.

According to the study, “Systolic function throughout most of the right ventricle and septum was influential in patient survival. Reduced longitudinal excursion throughout the basal and mid-ventricular regions was associated with poor outcome. A decrease in radial contraction in the septum and free wall also had prognostic significance. Mortality was also predicted by a global increase in circumferential function.”

Despite the improvements in imaging quality in the last 15 to 20 years, Dr. Dawes said the study demonstrates how much more information clinicians will be able to harness from imaging.


“We thought there was a real niche to

gather those data and use them in more efficient ways,” Dr. Dawes said. “We had a great opportunity to combine optimization of data extraction and a very real clinical problem.”

Next, the team plans to research the possibility of using advanced artificial intelligence technology to interpret cardiac images in seconds with no human intervention at all, said lead author Declan O'Regan, PhD, a senior clinician scientist and consultant radiologist at the MRC London Institute of Medical Sciences.


“By providing accurate predictions about patients’ health, machine learning could transform radiology,” Dr. O'Regan said. “This technology will enable clinical investigations, including advanced imaging, to more accurately guide management and make the best use of health resources.”

The research team plans to launch a trial later this year to validate these methods at different hospitals and assess the accuracy of its predictions.

“The ultimate goal is to improve patient outcomes by ensuring the best evidence is used to guide management,” Dr. Dawes said. 

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## WEB EXTRAS

 Access the *Radiology* study, “Machine Learning of Three-dimensional Right Ventricular Motion Enables Outcome Prediction in Pulmonary Hypertension: A Cardiac MR Imaging Study” at [RSNA.org/Radiology](https://www.rsna.org/Radiology).

# The Survey says: Your Hobbies are Rad

BY STEPHANIE EWING

As radiology continues to evolve in the 21<sup>st</sup> century, hobbies help radiologists manage the stresses of their work. It is easy to write off hobbies as trivial pursuits compared to the life and death consequences of practicing medicine, but hobbies may help radiologists feel healthier, happier and more productive.

*“Sometimes, work responsibilities must have priority. At other times, we have to make time to refuel and rewind, which is in the best interest of our work environment.”*

HEIKE E. DALDRUP-LINK, MD, PHD



Heike E. Daldrup-Link, MD, PhD, (above, with her husband, Thomas Link, MD, a radiologist at UCSF), spends her free time hiking in the beautiful mountains of northern California.

Respondents of a recent RSNA survey think so. Twenty-five radiologists and trainees from around the globe responded to the survey, distributed through social media in May, and shared thoughts about their hobbies — everything from singing and samba dancing to crocheting and cooking.

Of the radiologists surveyed, 22 out of 25 said they believe their hobbies benefit their work as radiologists through improved focus and concentration, renewed energy, better perspective and improvements to their overall physical and mental well-being.

Creative pursuits such as art, photography, writing and music were the hobbies most frequently listed by respondents, and research supports the perception that these hobbies improve radiologists' on-the-job performance.

According to a 2014 study published in the *Journal of Occupational and Organizational Psychology*, engaging in creative activities outside of work was positively associated with increased feelings of mastery and relaxation, as well as increased creativity while at work.

When he is not in the reading room, Ramin Abraham, MD, a body and orthopedic imaging radiologist at Washington Radiology Associates in Washington, DC, explores the world around him through colorful, imaginative abstract paintings and photography.

“Creative work gives me the sense of freedom from structure that balances my being. In art, for me there is no penalty for making a mistake. That allows me to take risks and push the envelope with my creativity,”

said Dr. Abraham.

Slavica Sotirovic-Senicar, MD, head of CT Diagnostics, Centre of Radiology, Clinicale Centre Vojvodina in Novi Sad, Serbia, paints furniture for herself and her friends and enjoys reading.

“My hobbies are relaxing, creative — pure joy! Sometimes, when I paint, I brainstorm about some of my radiology cases. Hobbies help you ‘reset’ your mind,” Dr. Sotirovic-Senicar said.

Survey respondents also indicated that their hobbies not only benefited them mentally, but physically. More than one-third of respondents' hobbies focused on physical activity, including yoga, walking, dancing and badminton.

Respondents said these physical activities energized them, helped them clear their heads and counteracted the often sedentary nature of radiology.

Firas Farhat, MD, radiology resident at Lebanese University, hikes on weekends and finds the outdoors particularly refreshing.

“For someone who works in a confined, dark place for long hours sitting in front of a computer screen, hiking in broad daylight in nature with friends and interacting with people balances things for me,” Dr. Farhat said.

Other survey respondents agreed. “Cycling complements my work physically and mentally. My attitude reflects onto my patients, which reassures them,” wrote one radiologist.

Aside from creative and athletic pursuits, other hobbies help radiologists learn and think about the world in different ways.

Continued on page 12

*Editor's Note:* This is the first of a series of articles on radiology burnout and how radiologists might improve work-life balance.



**On the cover:** Tugba Akinci D'Antonoli, MD, fell in love with Roman architecture when she moved to Rome from Istanbul, Turkey, in 2016, and now studies architecture to relax.



**Firas Farhat, MD,** often goes hiking on the weekend. "Hiking in broad daylight with friends and interacting with people balances things for me."

**On the cover:** Above: the painting, "Cuba," by Ramin Abraham, MD; right: Heike E. Daldrup, MD, PhD, skis in her downtime.



*Continued from previous page*

Tugba Akinci D'Antonoli, MD, a fellow in thoracic radiology research at A. Gemelli Hospital at the Catholic University of the Sacred Heart in Rome, Italy, fell in love with Roman architecture when she moved to Rome from Istanbul, Turkey in 2016.

"During the weekdays, after long and tiring work hours, I studied Roman architecture to relax. During the weekends, I followed the footsteps of emperors on Palatine Hill, fishermen in Ostia and traders in Pompeii," Dr. D'Antonoli said. "Knowing patterns will help you understand either ancient Roman structures or diseases."

Other hobbies more directly impact radiologists' work. Eric M. Baumel, MD, co-founder of Digital Imaging Diagnostics and founder of Softcode Systems LLC, was interested in computers since college, but taught himself app development when he could not easily access frequently Googled radiology reference material on his smartphone. He developed the app, Radiology Toolbox, which has been downloaded more than 80,000 times.

"Technology and radiology both are interesting because they're always changing, and radiology is on the cutting edge of technology," Dr. Baumel said.

Also an accomplished photographer, Dr. Baumel has studied with internationally known photographers. "Photography is more than writing with light," he said.

"It's sharing slices of time."

This different kind of thinking and relating to the world is valuable, not just to improve radiologists' sense of well-being, but to help them resist symptoms of burnout in a rapidly changing field. A 2016 Medscape survey, discussed in the June 2016 issue of *RSNA News*, found that 50 percent of radiologists reported feeling symptoms of burnout, including loss of enthusiasm for work, increased cynicism and a low sense of personal accomplishment.

"Hobbies are vital," Dr. Baumel said. "If I didn't have outside interests, it would be difficult to maintain enthusiasm while the volume and complexity of cases and financial pressures of practice continue to increase, as interactions with clinicians have decreased."

Though it can be difficult to find time for avocational pursuits when work and family demands on time are already high, survey respondents agreed it is important to make room for hobbies.


As a busy pediatric radiologist and researcher, Heike E. Daldrup-Link, MD, PhD, professor of radiology at Stanford University School of Medicine, makes the most of her time outside the office by hiking in the beautiful mountains of northern California with her husband, family, friends and colleagues. "Sometimes, work responsibilities must have priority. At other times, we have to make



**Ramin Abraham, MD, pushes the envelope with his creativity through colorful abstract paintings like, "Optimism Defeats Despair" (above).**



time to refuel and rewind, which is in the best interest of our work environment," she said.

Radiologist, painter and photographer Dr. Abraham agrees. "I believe everyone has a creative side," he said. "Nurturing and exercising that will bring balance to your life. We only live once; don't find excuses why you can't be creative. Just do it." 



**Photography is just one of the hobbies that help Eric M. Baumel, MD, explore his creativity. "Learning to see through the camera is a process of continual improvement. Composing an image allows you to show how you see the world."**

# Sibley Innovation Hub Adds Heart to the Patient Experience

BY ELIZABETH GARDNER

A stage 3 breast cancer diagnosis turned Robin Strickland's world inside out, as the 44-year-old mother of a toddler faced the full barrage of surgery, radiation and chemotherapy at Sibley Memorial Hospital in Washington, D.C. "I was shocked, scared and numb," she said.



Razavi

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*"We want our patients to maintain their dignity and not feel lost in the shuffle."*

POUNEH RAZAVI, MD

To help during this trying time, her Sibley treatment team presented her with a "love box," or Breast Cancer Toolkit, containing a personalized letter along with lists of resources, contact information for people who could answer her many questions, recipes for her family to use, a journal to keep track of her thoughts during treatment, spa gift certificates and an iPod Shuffle pre-loaded with playlists for various tastes, settings and moods.

"When they presented me with the love box, I felt cared for," Strickland said. "It truly warmed my heart."

The love box is one of the many projects developed at the Johns Hopkins Innovation Hub dedicated to improving patient care, empowering and engaging staff, and improving clinical care. The Hub is a 5,000 square-foot open innovation space in the center of Johns Hopkins Sibley Memorial Hospital, a 200-bed community hospital that is part of Johns Hopkins Medicine.

The Hub is staffed by a team of designers, engineers, technologists and project managers who coach internal staff-led projects. Other examples include a tranquility room for hospital staff that includes relaxing music, aromatherapy and celestial images.

## Through the Patient's Eyes

Physician input is critical to improving the patient experience. Pouneh Razavi, MD, director of breast imaging at Sibley Memorial Hospital, participated in developing the love box that is part of a larger effort called The Dignity Project, dedicated to elevating the patient care experience to a higher level.

"We want our patients to maintain their dignity and not feel lost in the shuffle," Dr. Razavi said.

Members of the Dignity Project team — clinicians, managers and the vice president of operations — engage in a process called Listen, Imagine, Do, a human-centered design process that creates a supportive environment for brainstorming, discussion and prototyping.

Team members listen to feedback from patients, physicians and other hospital staff to inspire new ideas that are quickly realized and tested at Sibley. For example, the love box began with Sibley staff getting feedback from patients and identifying common

motifs. Interview quotes and observations were shared via written Post-it notes, which were organized in categories and themes. The group then translated that information into a How We Might statement to flip the problem into a brainstorming platform. The resulting love box grew from feedback about patients' desire to feel loved, cared for and inspired during cancer treatment.

Dr. Razavi talked to dozens of patients and soon began seeing treatment through their eyes. She learned, for example, that a patient waiting for a mammogram is not always just sitting there. She may be reliving her ordeal with breast cancer, whether it was a year or a decade ago. "She becomes the cancer patient all over again," Dr. Razavi said.

For team members seeking to address patient concerns, no idea was too outlandish. "We even toyed with the idea of bringing in puppies," Dr. Razavi said, though ultimately the team decided that music would be equally calming and more manageable.

The first 10 love boxes were so successful that Sibley plans to continue the project.

The Listen, Imagine, Do method was unlike anything Dr. Razavi had experienced in her medical training.

"My life is shades of gray and white . . . very detail oriented and regimented, so when we first started throwing out ideas on Post-it notes, I had little faith that it was going to work," Dr. Razavi said. "I kept thinking, 'I could be reading mammograms right now!'"

The experience has also changed how Dr. Razavi approaches her practice in fundamental ways. For example, she now goes out of her way to make sure a patient's spouse has a chance to ask questions during office visits, as she is more aware that spouses must take time off work to come to the appointment and are signaling their commitment to the treatment. And when she must deliver news of an unfavorable pathology result over the phone, she first invites the patient to bring a spouse or another support person to join the conversation.

"People need someone to help them process the information, as they are getting hit with news that no one is ready to handle," Dr. Razavi said. ❧

# Stochastic Modeling Helps Predict Radiology's Financial Future

BY RICHARD DARGAN

While the field of advanced financial analytics may be foreign territory for many radiologists, experts in the field say they should make it their business to be educated on applying these tools in their everyday practices.

Hospital administrators must balance many factors and interests when making business decisions. Yet many radiologists do not have the background or training to communicate with hospital administrators on a business level, according to the authors of the recent *Radiology* article, “Financial Forecasting and Stochastic Modeling: Predicting the Impact of Business Decisions.”

Radiologists who want a voice in this process not only need a working knowledge of financial concepts and terms, but an understanding of analytics — including the modeling of future financial scenarios. Such models are relatively inexpensive and easy to implement, experts say.

“Most radiologists don’t have formalized business training,” said co-author Geoffrey D. Rubin, MD, MBA, the George Barth Geller Professor in the Department of Radiology, Duke University School of Medicine in Durham, NC. “But because financial considerations are key drivers of healthcare decisions, radiologists — and all physicians — should understand and participate in the process.”

Business decisions play an important role in the professional lives of radiologists, influencing where and how they practice, the tools available for image acquisition and interpretation, and ultimately their job satisfaction. Decisions on capital outlays like equipment are subject to financial modeling, an analytical approach that uses existing numbers to generate projections of future earnings. The vast majority of models rely on a deterministic approach, which defines inputs as fixed values based upon historical precedent or the best judgment of experts.



Rubin



Bhavik

“The problem with deterministic models is that even though these fixed value inputs could be highly principled and based on the informed opinions of bright people, at the end of the day they produce a single number,” said Dr. Rubin, a member of the RSNA Public Information Advisors Network. “They can’t accommodate for the uncertainty of projections into the future and therefore run the risk of being wrong.”

A better approach to modeling, according to the review authors, is the stochastic — derived from the Greek word for “capable of guessing” — method. Stochastic modeling accommodates for uncertainty by showing many possible future states and outcomes.

“The real world has uncertainty,” said review co-author Bhavik N. Patel, MD, MBA, from Duke University School of Medicine. “The stochastic approach gives you a wide range of probability, including the best-case and worst-case scenarios.”

By returning a range of values, a stochastic model can provide a much better idea of the risks behind a decision.

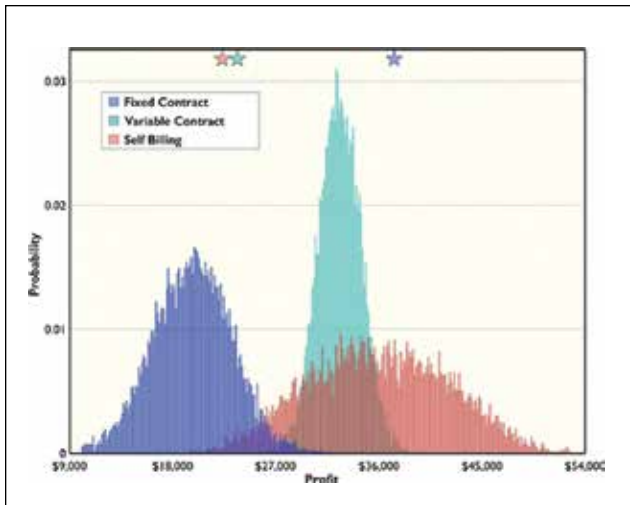
“Healthcare organizations are faced with limited resources,” Dr. Rubin said. “When they are attempting to decide how to allocate funds in the most effective manner, this type of financial modeling is critical.”

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*“The real world has uncertainty. The stochastic approach provides a wide range of probability, including the best-case and worst-case scenarios.”*

BHAVIK N. PATEL, MD, MBA





**Probability distributions of profit forecasts from 10,000 simulations for each of the three contract options. The base case values calculated (left) are indicated by stars at the top of the graph, illustrating the extent with which the base case model misrepresents the probability distributions of the stochastically forecast results. The fixed contract has substantially lower profit than the other two options. While the distribution for the self-billing contract appears to have the highest mean value, it also has a much wider dispersion, indicating substantially greater uncertainty associated with its forecast when compared with the slightly lower return, but more predictable variable contract.**

(*Radiology* 2017;283;2:342-358) ©RSNA 2017. All rights reserved. Printed with permission.

### Stochastic Modeling Offers Range of Financial Scenarios

The authors presented a scenario in which a radiology practice compares the annual profit from interpreting emergency CT scans at a remote hospital through fixed, variable or self-billing payment options. The deterministic model uses a single value that corresponds to the most commonly encountered or “expected” values. The results greatly overestimate the value of the fixed payment option, while underestimating the value of the variable and the self-billing options.

Rather than taking a single estimate for key variables, the stochastic model accommodates the spectrum of exams performed over the course of a year and create a distribution to accommodate for those factors. For example, if a minimum profit of \$30,000 was required, the stochastic model shows that the variable contract would achieve this return 95 percent of the time, while the self-billing option would achieve it only 84 percent of the time. However, when the model forecasts the difference between the returns of these two models, it reveals that the self-billing option provides superior returns to the variable contract in 70 percent of simulations.

“Ultimately the correct choice between these two options would depend upon the priorities and risk tolerance of the group,” the authors noted, “but it should be clear that stochastic models provide substantially greater information than the base

case deterministic models.”

Despite its strengths, stochastic modeling is rarely used in healthcare, Dr. Rubin said, partly due to misconceptions over its complexity.

In fact, stochastic modeling is easy to introduce, requiring only a personal computer, spreadsheet software and a spreadsheet-based predictive modeling application. Risk analysis software allows the user to add stochastic assumptions to spreadsheets and generate Monte Carlo simulations, which produce distributions of possible outcome values. The more Monte Carlo simulations are run, the closer the approximation is to the true distribution. The forecasted output distribution is used to assess the riskiness of the situation.

“This software is not esoteric or expensive; it’s readily available and a small investment will open the door to more effective financial modeling within the radiology environment,” Dr. Rubin said.

### Financial Modeling is the Future of Healthcare

Independent of the financial model, radiologists also need to have a strategic approach that incorporates robust financial analytics. For instance, a radiologist may see a new iterative reconstruction algorithm that promises to significantly reduce CT radiation dose without a change in image quality as a major boost for patient safety, but an administrator may balk at the expensive purchase price

and the need for a dedicated server.

“These financial tools allow you to speak the language and frame things in a way that makes sense to the person at the other end of the table,” said Dr. Patel. “If we show that radiation dose reduction can lead to fewer capital equipment costs, then the administrator might be inclined to say, ‘I don’t understand the science behind it, but I do understand the numbers.’”

The authors caution that financial modeling has limitations. The models are not representative of immutable facts, Dr. Rubin said, as they are subject to the veracity and accuracy of inputs. In addition, the mathematical relationships built into models are subject to potential biases.

But even with these limitations, financial modeling and, more broadly, an understanding of financial terms and concepts are increasingly important as the healthcare industry continues to undergo seismic changes.

“The goal here is to give radiologists a tool kit that will help them approach administrators and ask probing questions,” Dr. Rubin said.

“Future physician-leaders have to become familiar with these terms,” Dr. Patel added. “There are a number of courses out there and an abundance of literature, and once you get your feet wet, the intimidation factor goes away quickly.”

### WEB EXTRAS

Access the *Radiology* study, “Financial Forecasting and Stochastic Modeling: Predicting the Impact of Business Decisions,” at [RSNA.org/Radiology](http://RSNA.org/Radiology).

# The Campaign

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**INSPIRE**

## YOUR DONATIONS IN ACTION

### *Two-time Grant Recipient Furthers Research with \$2 Million in Additional Funding*

**Habib Rahbar, MD**, began his RSNA research journey as a trainee with his 2010 RSNA Research Fellow Grant, “Risk-Stratification of Ductal Carcinoma in Situ (DCIS): Development of a Predictive Model Incorporating Dynamic-Contrast-Enhanced and Diffusion Weighted MRI Characteristics at 3T for Discrimination of DCIS Subtypes.” Dr. Rahbar then furthered his research with a 2014 RSNA Research Scholar Grant, “Improving Treatment Outcomes of Ductal Carcinoma in Situ with Breast MRI.”

Now Dr. Rahbar, associate professor at the University of Washington and clinical director of breast imaging at the Seattle Cancer Care Alliance, has secured his first National Institutes of Health (NIH) Research Project (R01) grant of \$2 million over five years to continue his investigations on improving treatment outcomes of ductal carcinoma in situ of the breast with MRI.

“The RSNA Clinical Trials Methodology Workshop and the RSNA Advanced Course in Grant Writing gave me the opportunity to further refine my research skills and use the data gleaned from the RSNA grants to submit NIH-level grant applications,” Dr. Rahbar said.



**Make an inspired investment in innovation. Support the Campaign for Funding Radiology’s Future® today.**

## 5k Fun Run to Support the RSNA R&E Foundation

**Nov. 28 at 6:30 a.m.**

Run, jog or walk in the 2017 Fun Run to support education and radiology research. All proceeds benefit the RSNA R&E Foundation, so enjoy an outing for a good cause and join your colleagues along Chicago’s beautiful Lake Michigan shoreline. Add the Fun Run to your RSNA 2017 registration. Participants receive a commemorative T-shirt, while supplies last, and the fully tax-deductible donation benefits the RSNA R&E Foundation. In case of inclement weather, the Fun Run may be canceled. All Fun Run fees are non-refundable and non-transferable.



## Education and Funding Opportunities

### RSNA R&E Foundation Opens Grant Application Process in October

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.

While the online application process will open in October, candidates are encouraged to begin the process early. Start by identifying an intriguing research question, finding an appropriate scientific advisor/mentor, developing a hypothesis and a plan for testing the hypothesis and starting to write the detailed research plan.

Deadlines for applications begin in January. Visit [RSNA.org/Foundation](http://RSNA.org/Foundation) to read about current and past funded projects, discover the grants available and learn how to apply.



**2017 Research Resident Grant recipient Priya Rajagopalan, MBBS, MPH, (second from left) will investigate "Cerebral Perfusion Alterations in Cortisol Related Gene Carriers: A Potential Alzheimer's Disease Pathway." Dr. Rajagopalan is pictured with her research team, (from left): scientific advisor Andrew Saykin, PsyD, Shannon Risacher, PhD, Emrin Horgusluoglu, MS, PhD, and John D. West.**

### 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. 25, from 1 to 5 p.m. at McCormick Place in Chicago. Workshop attendees must be registered for the RSNA annual meeting and add the workshop to My Agenda at [RSNA.org/Annual-Meeting](http://RSNA.org/Annual-Meeting).

For more information, contact the department of research at [DOR@rsna.org](mailto:DOR@rsna.org) or 630-368-3742.

*Register Now:*

### Creating and Optimizing the Research Enterprise (CORE) Workshop

Registration is open for the 2017 Creating and Optimizing the Research Enterprise (CORE) workshop to be held Oct. 20-21 at RSNA headquarters in Oak Brook, IL. This free workshop focuses on strategies for developing and advancing imaging research programs in radiology, radiation oncology and nuclear medicine departments.

New sessions include "Big Data and AI: The Role for Radiology and How to Get Involved" and "Imaging Research Entrepreneurship."

The CORE program features a combination of presentations, case studies and group discussions.

For more information and to register, go to [RSNA.org/CORE](http://RSNA.org/CORE).

### New RSNA Online Education Platform to Launch in August

RSNA is upgrading its current online education platform in early August. In preparation for the launch of the new site, the current eLearn library will be unavailable from July 31 to Aug. 1. Users are encouraged to view the new platform on Aug. 2 by visiting [RSNA.org/Education](http://RSNA.org/Education). Changes include an enhanced, mobile-friendly user interface offering more than 600 online activities eligible for SA-CME credit.

Read more about the new online education platform in next month's issue of *RSNA News*.

## RSNA.org

### What's Your RSNA Connection? Tell us on *RSNA.org*

As an RSNA member, you have a story to tell, whether it is of your first RSNA annual meeting experience or a time you discovered a much anticipated answer in the pages of *Radiology* or *RadioGraphics*. Perhaps it is a unique networking opportunity realized through your membership or the competitive edge you gained as a volunteer for the Society.

Whatever your story, RSNA wants to hear it — and share it with your colleagues. Beginning this summer, RSNA is asking, “What’s Your RSNA Connection?” We want to tell your story in our brochures and on our website, at the RSNA annual meeting, or in *RSNA News*.

To share your story, visit [RSNA.org/Connections](http://RSNA.org/Connections). On this page, we provide examples from other members and a couple of questions to get you started, such as “How have you benefited as a member of RSNA?” and “What would you tell someone else to encourage them to join RSNA?”



We will ask for your contact information and permission to contact you for more details and a photo. We may also invite you to participate in the Member Spotlight section of *RSNA News*.

It's no secret that the stories of our members inspire others — to join, to get involved and to be a part of RSNA and all it has to offer. Take a few minutes to share your RSNA Connection today.

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*“RSNA membership has opened wide the windows of opportunity in the area of research, networking, mentoring and collaboration to work with experts in the field of radiology, thus enhancing my career progression and job satisfaction.”*

OMOLOLA ATALABI-OLADELE, MBBS, RSNA MEMBER SINCE 2003

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## Value of Membership

### Automatic Renewal Option Makes Membership Renewal Easy

Members can sign up for automatic renewal, a convenient feature that allows RSNA to charge a designated credit card for annual membership dues.

When you renew your membership for 2018, you can sign up for automatic membership renewal at the same time. Check the box on the payment page and fill in credit card information when renewing online, or check the “Automatic Renewal” box when completing credit card information on the 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/Membership](http://RSNA.org/Membership).



## For Your Calendar

### OCTOBER 13-16

Journées Françaises de Radiologie (JFR)

Paris, France  
Visit the RSNA booth  
• [JFR.radiologie.fr](http://JFR.radiologie.fr)

### NOV. 26 -DEC. 1

RSNA 103<sup>rd</sup> Scientific Assembly & Annual Meeting  
Chicago

• [RSNA.org](http://RSNA.org)

FIND MORE EVENTS AT  
[RSNA.org/Calendar.aspx](http://RSNA.org/Calendar.aspx).

## Journal Highlights

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

### Advanced Renal Cell Carcinoma: Role of the Radiologist in the Era of Precision Medicine

**Radiology** For the last decade, advanced renal cell carcinoma (RCC) has been at the forefront of oncologic innovation. While there is extensive imaging research on RCC, the important themes that could shape the future of RCC imaging revolve around the use of imaging as a biomarker to predict the make-up and behavior of the disease.

In an article published online in *Radiology* ([RSNA.org/Radiology](http://RSNA.org/Radiology)), Atul B. Shinagare, MD, of the Dana-Farber Cancer Institute, Boston, and colleagues review

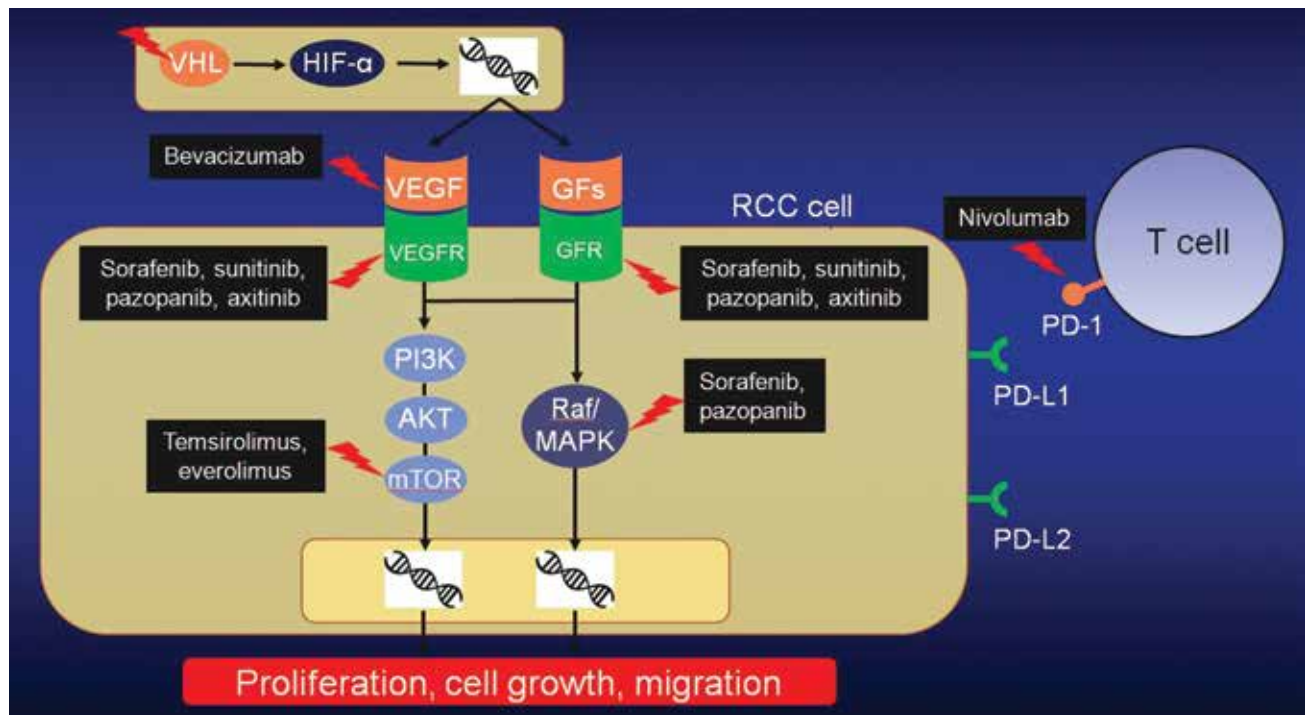
developments in management of advanced RCC from a radiologist's perspective with the aim of enhancing the specialty's value in clinical management. Specifically, the authors describe:

- How the underlying molecular mechanisms of RCC provide specific targets for novel anticancer agents
- The relationship between the mechanisms of action of the novel anticancer agents and the imaging appearance of tumor response
- Available tumor response criteria and their strengths and weaknesses

The authors also summarize the class- and drug-specific toxicities and complications associated with the novel anticancer agents and discuss the potential role of radiogenomics and texture analysis in the management of advanced RCC.

"State-of-the-art knowledge of the molecular basis of RCC, novel targeted therapies used for treatment of RCC and their response patterns and toxicities is essential in order for the radiologist to have an effective dialogue with referring physicians and remain relevant in the care of patients with advanced RCC," the authors write.

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



**Important intracellular pathways and targets for novel anticancer agents in renal cell carcinoma (RCC).** VHL = von Hippel-Lindau, HIF- $\alpha$  = hypoxia-induced factor, VEGF = vascular endothelial growth factor, VEGFR = vascular endothelial growth factor receptor, GFs = growth factors, GFR = growth factor receptors, PI3 K = phosphatidylinositol-3 kinase, mTOR = mammalian target of rapamycin, PD = programmed death receptor. (*Radiology* 2017;284:2:InPress) © RSNA 2017. All rights reserved. Printed with permission.



Listen to *Radiology* Editor Herbert Y. Kressel, MD, deputy editors and authors discuss the following articles in the June issue of *Radiology* at [RSNA.org/Radiology-Podcasts](http://RSNA.org/Radiology-Podcasts).



**The first podcast is a roundtable discussion with the authors of these articles:**

- “The Effect of Iodine-based Contrast Material on Radiation Dose at CT: It’s Complicated,” John M. Boone, PhD, and Andrew M. Hernandez, PhD.
- “The Effect of Contrast Material on Radiation Dose at CT: Part I. Incorporation of Contrast Material Dynamics in Anthropomorphic Phantoms,” Pooyan Sahbaee, PhD, W. Paul Segars, PhD, Daniele Marin, MD, Rendon C. Nelson, MD, and Ehsan Samei, PhD.
- “The Effect of Contrast Medium on Radiation Dose in CT: Part II. A Systematic Evaluation across 58 Patient Models,” Pooyan Sahbaee, PhD, Ehsan Abadi, MS, W. Paul Segars, PhD, Daniele Marin, MD, Rendon C. Nelson, MD, and Ehsan Samei, PhD.

**The second podcast features the study:**

- “MR Imaging for Diagnosis of Malignancy in Mammographic Microcalcifications: A Systematic Review and Meta-Analysis,” Barbara Bennani-Baiti, MD, and Pascal A. Baltzer, MD.



Listen to *RadioGraphics* Editor Jeffrey S. Klein, MD, and authors discuss the following article in the July-August issue of *RadioGraphics* at [RSNA.org/RG-Podcasts](http://RSNA.org/RG-Podcasts).



- “Imaging of Pregnancy-related Vascular Complications,” R. Scooter Plowman, MD, MBA, MHSA, and colleagues.

## An Interventionist’s Guide to Endocrine Consultations

Endocrinopathies are a heterogeneous group of disorders with complex and changing diagnostic and treatment algorithms. When the clinical scenario, laboratory testing and noninvasive imaging fail to aid confident identification of the source of hormone excess, endocrine venous sampling may localize obscure lesions to guide subsequent treatment.



In an article in the July-August issue of *RadioGraphics* ([RSNA.org/RadioGraphics](http://RSNA.org/RadioGraphics)), Eric J. Monroe, MD, of Seattle Children’s Hospital, and colleagues offer a practical guide for interventional radiologists to confidently field endocrine consultations and successfully perform endocrine venous sampling procedures. The authors also present a review of sampling techniques, results interpretation and acknowledgment of limitations in an organ-based approach.

A successful endocrine venous sampling program demands a collaboration among interventional radiology, surgical and medical subspecialists centered around an individual patient, according to the authors.

“Success in the angiography suite requires familiarity with normal and variant anatomy of the multiple organs of the endocrine system, patient preparation, stimulation and sampling techniques, specimen handling, and results interpretation,” the authors write.

*The article has an Invited Commentary by Anil K. Pillai, MD, and Alan Cohen, MD, Department of Diagnostic and Interventional Imaging, University of Texas Medical School at Houston, Texas.*



**Selective parathyroid venography in a 68-year-old woman with recurrent hyperparathyroidism after surgery. Digital subtraction venogram with catheter in the left thymic vein demonstrates a prominent left inferior thyroid vein. Parathyroid venous sampling demonstrated a parathyroid hormone (PTH) level of 2609 pg/dL from the left inferior thyroid vein. The PTH levels of the remainder of the sampled veins ranged from 68 to 174 pg/dL. Pathologic analysis after focused surgery revealed a single missed parathyroid adenoma.**

*(RadioGraphics 2017;37;4:1246–1267) © RSNA 2017. All rights reserved. Printed with permission.*

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

## Radiology in Public Focus

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

### Uterine Fibroid Embolization Helps Restore Fertility

Conventional and partial uterine fibroid embolization (UFE) may be safe and effective outpatient procedures for women with uterine fibroids who want to conceive, according to new Radiology research.

The study by João M. Pisco, MD, PhD, from the Department of Interventional Radiology at Saint Louis Hospital in Lisbon, Portugal, comprised 359 women. Researchers performed conventional UFE in 199 women between June 2004 and June 2009. Because some patients could not become pregnant in spite of evidence of a decrease in volume and complete ischemia of the fibroids, researchers hypothesized that a partial embolization could improve the pregnancy rate.

Consequently, researchers performed partial UFE in the next 160 patients from June 2009 to June 2014.

In conventional UFE, all uterine artery branches are embolized, while the partial procedure requires treatment of only the small vessels to the fibroids, leaving the corresponding larger vessels unaffected. Partial UFE may help reduce the risks of infertility associated with conventional UFE.

After an average follow-up of almost six years, 149 of the 359 women, or 41.5 percent, had become pregnant one or more times, and 131 gave birth to a total of 150 babies. It was the first pregnancy for more than 85 percent of the women who gave birth.

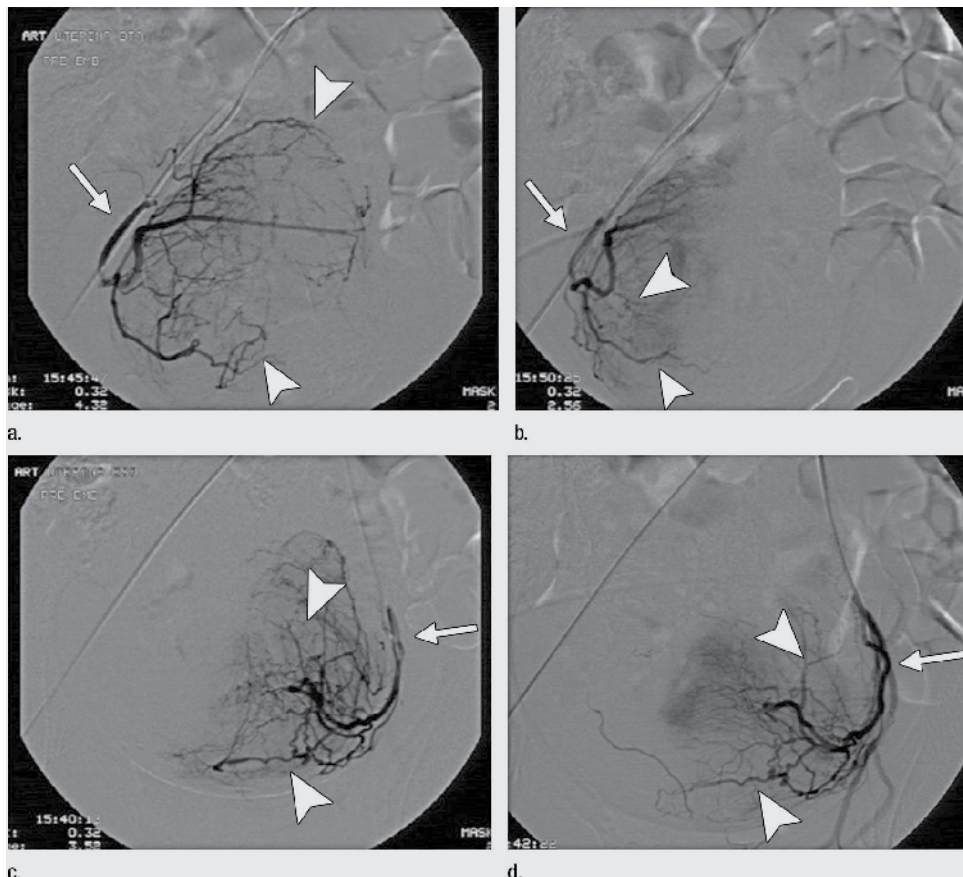
The procedures had a clinical success rate of approximately 79 percent for fibroid-related symptoms. Complication rates were 14.6 percent for partial UFE

and 23.1 percent for conventional UFE. The procedure was repeated in 28 patients whose fibroids had not been fully treated, as shown by MRI, and 11 of those patients subsequently got pregnant.

“Our findings show that UFE is a fertility-restoring procedure in women with uterine fibroids who wish to conceive, and pregnancy following UFE appears to be safe with low morbidity,” Dr. Pisco said. “Women who had been unable to conceive had normal pregnancies after UFE and similar complication rates as the general population in spite of being in a high-risk group.”

#### WEB EXTRAS

Access the study, “Spontaneous Pregnancy with a Live Birth after Conventional and Partial Uterine Fibroid Embolization,” at [RSNA.org/Radiology](http://RSNA.org/Radiology).



Digital subtraction angiography images show partial uterine fibroid embolization (UFE). (a) Catheter is placed into right internal iliac artery with catheter tip in initial part of uterine artery (arrow); hypervascularization of fibroid is shown (arrowheads); (b) after partial UFE, uterine artery (arrow) is patent and there is some reduction of fibroid vessels, although some vessels are still shown (arrowheads); (c) catheter is placed into left internal iliac artery with catheter tip in initial part of uterine artery (arrow); hypervascularization of fibroid is shown (arrowheads); (d) after partial UFE, uterine artery (arrow) is patent and there is some reduction of small fibroid vessels, although some vessels are still shown (arrowheads).

(*Radiology* 2017;InPress) © RSNA 2017. All rights reserved. Printed with permission.



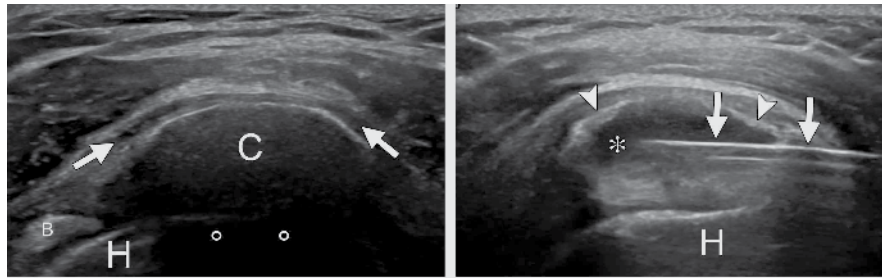
## Study Looks at Needles in Treatment for Shoulder Pain

Researchers found no difference in using the single- or double-needle procedure when performing ultrasonography (US)-guided percutaneous irrigation of rotator cuff calcific tendinopathy, new Radiology research shows.

Davide Orlandi, MD, PhD, of Ospedale Evangelico Internazionale, Genoa, Italy, and colleagues analyzed the difference between the use of one or two needles in the percutaneous procedure that involves injecting saline solution into the tendon to dissolve the calcium deposits and then extracting the calcium-filled solution.

The study comprised 211 patients (77 men and 134 women between the ages of 24 and 69) who underwent US percutaneous irrigation between 2012 and 2014. The patients were randomly assigned to have the one-needle or the two-needle procedure.

Ultrasound exams were performed on each patient to identify the exact location of calcium deposits in the tendons and whether the deposit appeared to be hard or fluid. For patients in the double-needle procedure group, 16-gauge needles were inserted inside the calcification under



**US images show supraspinatus calcification in a 29-year-old woman. (a) Calcific deposit (C) can be clearly seen with moderate acoustic shadowing (circles). Subacromial bursitis (arrows) can be seen. (b) End of treatment. Most calcific material was removed from calcification (\*) with single-needle procedure. Only a thin calcific wall (arrowheads) was left. Needle (arrows) is still inside calcification. B = biceps tendon, H = humeral head. (Radiology 2017;283:3:629-643) © RSNA 2017. All rights reserved. Printed with permission.**


continuous US monitoring, and the area was flushed with injections and extractions of saline until the tendon was free of visible calcium. The single-needle procedure utilized an 18-gauge needle for the injection and extraction.

Results showed no significant difference in short- and long-term clinical outcomes between single- and double-needle US-guided percutaneous irrigation of calcific tendinopathy.

“Procedure times were shorter and the

calcium dissolution was easier when using two needles for hard calcifications and one needle for fluid calcifications,” said researcher Luca Maria Sconfienza, MD, PhD, associate professor at the University of Milan and chair of the Department of Radiology at the IRCCS Istituto Ortopedico Galeazzi. “In terms of clinical outcomes after one year of follow-up, there was no significant difference between single- and double-needle ultrasound-guided irrigation.”

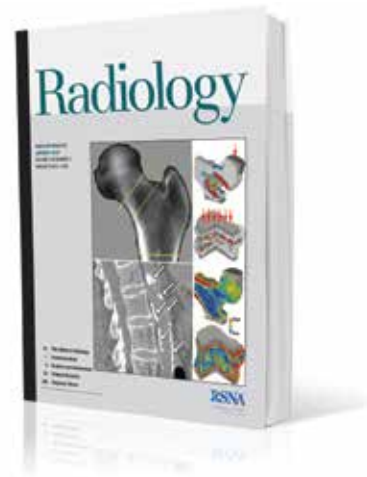
### WEB EXTRAS

 Access the study, “Rotator Cuff Calcific Tendinopathy: Randomized Comparison of US-guided Percutaneous Treatments by Using One or Two Needles,” at [RSNA.org/Radiology](http://RSNA.org/Radiology).

## Media Coverage of RSNA

In April, 348 RSNA-related news stories were tracked in the media. These stories had an estimated audience reach of 333 million.

Coverage included *The Huffington Post*, Yahoo! Finance, WGN-AM (Chicago), *Houston Chronicle*, *Philly.com*, ScienceDaily, *San Francisco Chronicle*, HealthDay, *Auntminnie.com*, *Drugs.com*, *Diagnostic Imaging* and *Health Imaging & IT*.



## Direct Your Patients to [RadiologyInfo.org](http://RadiologyInfo.org)

Did you know that RSNA and ACR developed [RadiologyInfo.org](http://RadiologyInfo.org) to provide your patients with easy-to-understand information about the procedures and exams you perform? Direct your patients to [RadiologyInfo.org](http://RadiologyInfo.org) for more than 230 patient-friendly articles that describe x-ray, CT, MRI, ultrasound, radiation therapy and more. Your patients will also find various disease/condition articles as well as screening and wellness topics.

Check out [RadiologyInfo.org](http://RadiologyInfo.org)'s newest additions: Venous Insufficiency (Varicose Veins) and Magnetoencephalography.

**[RadiologyInfo.org](http://RadiologyInfo.org)**  
For patients

## Annual Meeting Watch

### RSNA 2017 Registration Packages

RSNA offers several new registration options to best meet your needs. Visit [RSNA.org/Registration-Packages](http://RSNA.org/Registration-Packages) for a personalized registration recommendation.



### Important Dates

- July 18** Online Program is open
- Oct. 27** Registrations after this date will incur an added \$150 fee for most categories.
- Oct. 28** Canceling a hotel reservation as of this date will result in the forfeiture of the hotel deposit equal to the first night's room and tax.
- November 26 -December 1** 103<sup>rd</sup> Scientific Assembly & Annual Meeting

## Reserve Your Hotel Room Now Through RSNA

We're here for you before, during and after the event with discounted rates so you can enjoy your stay. Register at [RSNA.org/Register](http://RSNA.org/Register) to view hotel rates and availability.

**Secure your reservations early for the best selection and access to these great benefits:**

- Discounted rates
- Easily modified reservations
- Exclusive amenities
- Exceptional customer service
- Free transportation between hotels and McCormick Place

Hotel reservations booked through RSNA's official hotel partners are the only approved method to guarantee RSNA's discounted rates. Do not risk your credit card or hotel reservation — using unauthorized hotel solicitors can have unfortunate and expensive consequences. Please be aware of and report any unauthorized solicitation to [housing@rsna.org](mailto:housing@rsna.org).

#### RSNA's official hotel partners:

- Experient is the official hotel partner for the RSNA annual meeting. For more information, visit [RSNA.org/Register](http://RSNA.org/Register).
- E.S.A. Voyages is the official international travel partner for groups, providing a variety of international travel packages including airfare and hotel. For more information, contact [esa@esavoyages.fr](mailto:esa@esavoyages.fr).
- ACE is the official travel partner for groups coming from China and Taiwan, providing travel and hotel packages. For more information, contact [stephaniezhu@acemarketing.com.cn](mailto:stephaniezhu@acemarketing.com.cn).



**E.S.A. Voyages**

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# Plan your RSNA 2017 Experience

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



**Virtual RSNA 2017** — Register for the Virtual Meeting, offering more than 100 live-streamed and on-demand courses, scientific presentations and education exhibits. CME credit is available for many sessions and registered attendees will have access to all content until 4 p.m. CT on Feb. 28, 2018.



**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 for \$22 per meal at [bistroticket.com/rsna](http://bistroticket.com/rsna).



**5K Fun Run** — Run, jog or walk in the 2017 Fun Run to support education and radiology research. Your tax-deductible donation benefits the RSNA Research & Education (R&E)

Foundation and participants receive a commemorative T-shirt. In case of inclement weather the Fun Run may be canceled; all fees are non-refundable and non-transferable.

**RSNA Tours and Events** — RSNA partners with Hosts Chicago, a Hosts Global Alliance member, and Bloomingdale's to provide a variety of opportunities to experience all that Chicago has to offer. For more information visit [RSNA.org/Tours-and-Events](http://RSNA.org/Tours-and-Events).

**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.

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## Save Up to 10 Percent with Exclusive Airline Discounts

United Airlines offers discounts from 2 percent to 10 percent off applicable fares. 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](http://United.com/MeetingTravel) and enter offer code ZXNX941696, 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 originating passengers. Book online at [Delta.com/Meetings](http://Delta.com/Meetings) and enter Meeting Event Code NMPES, or call Delta at 1-800-328-1111 and provide the event code. A service fee applies for phone reservations.

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## 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 11,000 international attendees participated in RSNA 2016 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](http://RSNA.org/Visas) for information on visas and travel to the United States.

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## 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 Sept. 28 to be entered in a drawing for a \$500 USD travel credit toward future airfare on United Airlines. Call 1-800-850-3220 between 8 a.m. and 5:30 p.m. PST and mention code AM2017.

COMING  
NEXT  
MONTH

Next month, *RSNA News* explores the issue of cybersecurity and offers advice on protecting radiology departments from cyberattacks.



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*The Campaign*  
*for Funding Radiology's Future®*

INVEST

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