RSNA News™

April 2016 Volume 26, Issue 4

The Critical Role of Imaging in Precision Medicine

ALSO INSIDE:

Advance Registration and Housing Open April 27 — See Page 23

RSNA®
Radiological Society of North America

William R. Eyler Editorial Fellowship

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The Eyler Editorial Fellowship provides an opportunity for radiologists in mid-career to further their experience in radiologic journalism. Learn about manuscript preparation, peer review, manuscript editing, journal production, printing, and electronic publishing by working with the...

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for 2 days

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for 2 days

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Award

One fellow will be selected each year and will be awarded a stipend of $10,000 to cover the cost of transportation, lodging, and meals during the fellowship.

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- ✓ Have served as a reviewer for a major imaging journal
- ✓ Be affiliated with a national radiologic society in his or her country

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Learn more and download an application at ***RSNA.org/Eyler_Fellow*** or email ***editfellowships@rsna.org.***

Deadline for applications is May 1, 2016

The Fellowship Experience

Fellows prepare evaluations and follow-up reports on their experiences during and as a result of the fellowship.

See firsthand accounts at ***RSNA.org/Eyler_Fellow***

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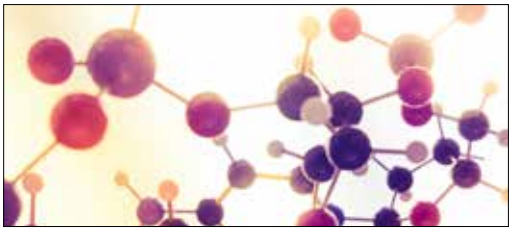
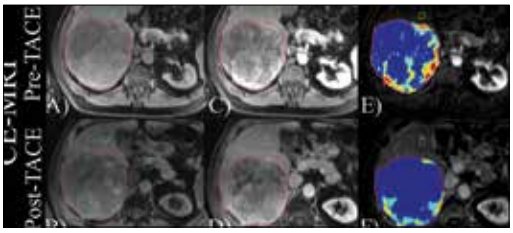
FEATURES





RSNA News™

UP FRONT

RADIOLOGY'S FUTURE

NEWS YOU CAN USE

RSNA MISSION

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

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

Emory Appoints Lewin to Multiple High Posts

Internationally recognized as a pioneer in interventional and intra-operative MR imaging, Jonathan S. Lewin, M.D., was named executive vice-president for health affairs at Emory University in Atlanta. Dr. Lewin also will serve as executive director for Emory's Woodruff Health Sciences Center, president and CEO of Emory Healthcare, and chair of the Emory Healthcare board of directors. He began his tenure Feb. 1.

Dr. Lewin is the current president of the American Roentgen Ray Society and president-elect of the Society of Chairs of Academic Radiology Departments. He is also immediate past-president of the Association of University Radiologists.

Dr. Lewin has served on RSNA's educational course faculty and as a session moderator at RSNA annual meetings. He was recognized as a 2012 RSNA Honored Educator and is a Sapphire Visionary Donor to RSNA's Research & Education (R&E) Foundation.

Prior to his appointment at Emory, Dr. Lewin served as senior vice-president for integrated healthcare delivery and as co-chair for strategic planning at Johns Hopkins Medicine. He also served as professor and chair of the Russell H. Morgan Department of Radiology and Radiological Science at Johns Hopkins University as well as the radiologist-in-chief at Johns Hopkins Hospital.

Lewin

SRU Honors Lyons, Charboneau, Potretzke with 2015 Awards

Edward A. Lyons, M.D., received the Distinguished Service Award from the Society of Radiologists in Ultrasound (SRU) during its 2015 annual meeting held recently in Chicago. SRU also honored **J. William Charboneau, M.D.,** with the Lawrence A. Mack Lifetime Achievement Award, and **Theodora A. Potretzke, M.D.,** with the Member-in-Training Award.

Read biographies of the award winners at *RSNA.org/News*.

Lyons

Charboneau

Potretzke

Apply by May 1 for RSNA Eyler Fellowship

Applications are being accepted for the RSNA William R. Eyler Editorial Fellowship.

The fellowship offers the opportunity to work with *Radiology* Editor Herbert Y. Kressel, M.D., in Boston and *RadioGraphics* Editor Jeffrey S. Klein, M.D., in Burlington, Vt. The fellow will visit the RSNA Publications Department at RSNA headquarters in Oak Brook, Ill., and will work with the *RadioGraphics* editorial team at RSNA 2016. The fellowship lasts one month.

Apply by May 1 to be considered for the William R. Eyler Editorial Fellowship. To learn more and to apply, go to: *RSNA.org/RSNA_Editorial_Fellowships.aspx*.

RadioGraphics

Radiology

Numbers in the News

48

Number of pounds lost by one patient undergoing gastric artery embolization, a technique that is showing potential as a safe, minimally invasive treatment for obesity. Turn to Page 13 to read more.

3,000

Number of submissions to the RSNA journal *Radiology* each year. Read more about the peer review process for *Radiology* and *RadioGraphics* on Page 7.

44

The number of residency programs using Diagnosis Live™—RSNA's interactive response system. Read more about the program's expansion and other highlights from RSNA's 2015 Annual Report on Page 24.

24

Number—in millions—of Americans who suffer from COPD, one of the diseases targeted through precision medicine, which allows physicians to tailor patient-specific treatment. Read more on Page 5.

Radiologists Travel to Philippines, Ghana through RSNA IVP Program

A 3-D printed model of the vascular system was a big hit with radiology residents during the IVP trip to Ghana.

Robert D. Harris, M.D., M.P.H., and Sheila Sheth, M.D., brought their medical expertise to the Philippines in February as part of the RSNA International Visiting Professor (IVP) Program. The radiologists were accompanied by Teresita L. Angtuaco, M.D., former chair of RSNA's Committee on International Radiology Education (CIRE), which administers the program.

Also in February, IVP team members Dorothy I. Bulas, M.D., and Anne C. Roberts, M.D., traveled to Ghana to offer their medical expertise.

The visiting professors gave presentations and taught intensive seminars to radiology residents, and attended conferences and meetings.

In addition, an IVP webinar was offered to radiologists from Lebanon in January. Maheen Rajput, M.D., and Sjirk J. Westra, M.D., presented the webinar, which was also attended by radiology residents in Nigeria with the help of a CIRE member located in the region.

The IVP program will conclude its 2016 calendar in the fall with trips to Mexico and Mongolia, and a webinar with Algeria.

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

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

Pictured at the University of Santo Tomas, the Philippines, from left: Jerome Gaerlan, M.D., first vice-president, Philippine College of Radiology (PCR), Stephanie Pe, M.D., Jolinda V. Almazan, M.D., Orestes P. Monzon, M.D., Mario T. Milo, M.D., Eduardo Angtuaco, M.D., former CIRE Chair Teresita Angtuaco, M.D., International Visiting Professor (IVP) team member Robert Harris, M.D., M.P.H., Jesus Valencia, M.D., IVP team member Sheila Sheth, M.D., Joie A. Cañal, M.D., president, PCR, Cartrini O. Cruz, M.D., and Hernan A. Olonan, M.D.

Nominate *Radiology* Articles for the 2016 Margulis Award

The Nominating Committee for the Alexander R. Margulis Award for Scientific Excellence is accepting nominations from readers for *Radiology* articles published between July 2015 and June 2016. The main selection criteria are scientific quality and originality. Please send your nomination, including the article citation and a brief note highlighting the reasons for the nomination, to Pamela Lepkowski, assistant to the editor, *plepkowski@rsna.org*. The deadline for nominations is June 10.

Image Wisely® Campaign Implements Changes

A number of changes have been made to the Image Wisely® campaign, which was founded in 2013 to increase awareness about adult radiation protection.

As of Jan. 1, 2016, individual and association/educational program pledges to Image Wisely must be renewed annually; they will expire Dec. 31 every year. Also, the requirements for facilities have been strengthened to make the pledge more meaningful. In order to take the Image Wisely pledge, facilities must participate in a dose index registry and be accredited by an organization that directly evaluates radiation dose indices and compliance with accreditation pass/fail dose thresholds, clinical image quality, phantom image quality and personnel qualifications.

The changes to Image Wisely coincide with a milestone achievement: On Jan. 12, the campaign received its 40,000th pledge. The majority of Image Wisely pledges are made by individuals involved with medical imaging; however, associations/educational programs and imaging facilities are also included in the pledge total.

Image Wisely is an initiative of the RSNA, the American College of Radiology, the American Association of Physicists in Medicine and the American Society of Radiologic Technologists.

Visit *ImageWisely.org* for more information about the program and pledging.

Image Wisely® reached a milestone on Jan. 12, when the campaign received its 40,000th pledge.

THIS MONTH IN THE *RSNA NEWS* ONLINE VERSION

RSNA News™

Get more of this month's news online at *RSNA.org/News*.

This month, view video interviews with Mubin K. Syed, M.D., discussing his RSNA 2015 research on the role of gastric artery embolization in treating morbid obestiy, and Ella Kazerooni, M.D., discussing her RSNA 2015 presentation on precision medicine.

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Technology Forum

Innovation and Interoperability Focus of IHE® Connectathon

The spirit of collaboration to improve patient care through high quality, interoperable health information technology (HIT) was in the air during the 2016 Integrating the Healthcare Enterprise (IHE®) North American Connectathon, held Jan. 25-29 in Cleveland.

More than 142 organizations and 600 HIT professionals attended the events during the week.

For the first time, the Connectathon included a week of training, education, and networking events, including an interoperability awards ceremony honoring vendors of ConCert by the HIMSS™ (Health Information and Management Systems Society) certified products. Education and training opportunities were customized to meet attendees' various backgrounds, experience and skill levels. Participants attended educational sessions that equipped them to achieve interoperability in their own environments, with hands-on advice from accomplished experts.

The Connectathon's testing event remains the cornerstone of the entire week uniting HIT companies and government entities to test the interoperability of their systems. This event accelerates the development and deployment of interoperable systems that include IHE Profiles based on international standards like DICOM, HL7® and W3C.

RSNA and HIMSS have been sponsors of the Connectathon since its inception in 1999. For more information, visit *RSNA.org/IHE.aspx* or *IHEUSA.org/Connectathon.aspx.*

More than 142 organizations and 600 health information technology (HIT) professionals attended the 2016 IHE® North American Connectathon held in Cleveland.
Image Courtesy of HIMSS.

IN MEMORIAM

John James Fennessy, M.D.

John James Fennessy, M.D., a pioneer in chest radiology and former RSNA first vice-president, died Jan. 3 in Hinsdale, Ill. He was 82.

A professor emeritus and former chair of the Department of Radiology at the University of Chicago (UC), Dr. Fennessy was a pioneer in using bronchial fiberscopes in the U.S. In 1966, he first described a technique for transbronchial biopsy of lung lesions using arterial catheters (the Fennessy brush) before fiberscopes had been developed.

Dr. Fennessy was known by colleagues at UC as the final authority on anything involving radiologic examination of the chest or abdomen, and the person other physicians turned to for interpretation of subtle diagnostic details on X-rays. With Torgny Holm of the University of Lund, Dr. Fennessy designed the UC radiology department's clinical facility in Mitchell Hospital, which opened in 1983.

Born in Clonmel, Ireland, in 1933, Dr. Fennessy received his Bachelor of Medicine and Bachelor of Surgery degrees at University College in Dublin before immigrating to America in 1959, settling in Chicago's Hyde Park community and completing his residency at UC Hospitals.

Dr. Fennessy joined the UC Department of Radiology in 1963, where he remained until his retirement in 2004, serving as chairman from 1974 to 1984. During his tenure as a UC professor of radiology, he was selected as a favorite faculty member nearly 30 times by his students.

Dr. Fennessy served as RSNA first vice-president in 1987. He was also a member of the RSNA Education Council and served as chair for the Technical Exhibits Committee.

A founding member of the Society of Thoracic Radiology, Dr. Fennessy was also a member of the prestigious Fleischner Society, an international, multidisciplinary medical society for thoracic radiology.

Imaging Plays Critical Role in Precision Medicine Explosion

BY MIKE BASSETT

Although President Obama first introduced a Precision Medicine Initiative in 2015, radiologists and other physicians have been working for quite some time to individualize each patient's healthcare based on his or her unique characteristics.

"We have been involved in this initiative on some level for quite a while," said Mitchell Schnall, M.D., Ph.D., chairman of the Department of Radiology at the University of Pennsylvania (Penn). "But over the last couple of decades, there has been an explosion in our ability to gather information and define an individual and that person's disease in a much more granular way, and with much more extensive information than before."

This has led to what Dr. Schnall calls the "aggressive promotion" of the idea that patients and their diseases can not only be characterized by traditional methods, but by using more advanced information tools as well.

"As a result, some people loosely think of or define precision based on molecularly driven medicine," he said. "I personally think—and we at Penn have tried to take a broader view—that precision medicine involves using any of the advanced diagnostic information that is available to help individualize care." And imaging plays a critical role in that process, Dr. Schnall said.

Precision Medicine Could Improve COPD Treatment

This emphasis on individualized care or precision medicine is being demonstrated in countless ways in radiology and medical imaging departments across the country.

In an RSNA 2015 session, Ella Kazerooni, M.D., professor of cardiothoracic radiology at the University of Michigan (UM), Ann Arbor, discussed how some of the concepts of precision medicine can be applied in her area of thoracic radiology—specifically constructive obstructive pulmonary disease (COPD).

When she was a medical student, Dr. Kazerooni said COPD was classified as a basic condition. "There was emphysema, there was asthma and there was chronic bronchitis, and that's all we knew about COPD," Dr. Kazerooni said. "And we treated patients based on how they fit into these platforms."

COPD is a very common disease that affects over 24 million Americans, according to the COPD Foundation. "That means there are tens of millions of data points around us, sitting in medical records and in our image repositories," Dr. Kazerooni said.

She and her colleagues at UM have developed a software tool for chest CT scans that allows physicians to better distinguish early-stage small airway disease (or pre-emphysema) from the more severe damage caused by emphysema.

Ideally, this will allow physicians to tailor patient-specific treatments. For example, this approach could help physicians more precisely identify patients with a severe disease who should be transplant candidates, or those with a less severe disease who are potentially treatable.

> "Over the last couple of decades, there has been an explosion in our ability to gather information and define an individual and that person's disease in a much more granular way."
>
> MITCHELL SCHNALL, M.D., PH.D.

Progesterone Receptors as Cancer Biomarkers

At the University of Wisconsin (UW), Madison, Amy Fowler, M.D., Ph.D., assistant professor in the breast imaging section in the Department of Radiology, is investigating molecular imaging biomarkers to assess early therapeutic response for breast cancer.

As Dr. Fowler points out, the majority of breast cancers express estrogen and progesterone receptors—important biomarkers used to determine prognosis and predict the benefits that come from endocrine hormone therapies for cancer patients.

But up to half of patients may not respond to endocrine therapy even though they have estrogen-positive breast cancer. The challenge is to determine more precisely whether a patient's breast tumor is endocrine-sensitive so physicians can apply the correct therapy to an individual patient as quickly as possible.

"Some of the imaging work we first tested using mouse models of breast cancer during my training at Washington University in St. Louis, which we are now developing for patients here at the University of Wisconsin, is looking at 'downstream' targets of estrogen receptors," Dr. Fowler said.

The idea is that changes in progesterone receptors as seen on imaging can serve as an early-response biomarker to endocrine therapy.

"When estrogen is activating a tumor, it results in proliferation, but it also turns on the gene for progesterone receptor," she explained. "We can look to see how functional an estrogen pathway is in a tumor by looking downstream at the progesterone receptor to see whether we can better predict response to therapy."

In a study published in the December 2014 issue of *Clinical Cancer Research*, Dr. Fowler and colleagues determined that PET imaging of estrogen receptor-positive breast tumors with the radiopharmaceutical [^{18}F]FFNP (to measure progesterone receptor [PgR] levels) before endocrine therapy and shortly after treatment was an effective approach to predict treatment response.

"In fact, using the [^{18}F]FFNP tracer was an effective way to see in real time whether the endocrine agent we were using was functional," Dr. Fowler said. "We could see changes as early as three days before we could see any size change in the tumor."

The ability to determine early which endocrine agents aren't working could be critical considering the list of agents is fairly long, said Dr. Fowler, who received a 2014-2015 Philips Healthcare/RSNA Research Seed Grant to research the impact of endocrine-resistant estrogen receptor-alpha variants on [^{18}F]Fluoroestradiol (FES) imaging of breast cancer.

"There are no good algorithms—particularly in a metastatic setting—for knowing which agent you should start with and which agent you should switch to if the first doesn't work," Dr. Fowler said. "So this may be one approach to learn quickly if another is not working," she added. "Or to explore more sophisticated tools—such as tumor genomics—to examine whether there is some mutation we don't expect and don't test for clinically that is causing resistances to the endocrine therapy."

Schnall

Kazerooni

Fowler

A Personalized Approach to Cancer Screening

At Penn, researchers are working to advance the concept of precision medicine as it pertains to cancer screening.

Dr. Schnall serves as a primary investigator for the Penn Center for Personalized Cancer Screening, which is pursuing three separate projects: the evaluation of the comparative effectiveness of new imaging technologies such as tomosynthesis and abbreviated MRI; the assessment of a new tool called the Breast Complexity Index to predict individual screening outcomes; and the development of an online decision aid to help women—together with providers—make informed decisions about when to undergo mammographic screening.

Cancer screening traditionally follows a "one size fits all" approach, but a more personalized approach should be possible considering the amount of information physicians have about their patients, Dr. Schnall said.

"Before patients even come in for a mammogram, we know a lot about these women," he said. "And if we have a single mammogram, we know a lot about the phenotype of their breasts. So if we know the risks a woman has of developing cancer, of having false positives, or false negatives due to breast density, we can potentially present them with likely outcomes given various sorts of screening."

More patients will be utilizing decision aids which may potentially lead to better shared decision making regarding screening. "Decision aids will be geared toward patients and primary care doctors," Dr. Schnall said. "They will help a woman understand where she fits in regarding likely screening outcomes, and help her make a decision about what screening is right for her."

Radiology Editor Urges Authors to Use Checklists to Improve Reporting Accuracy

> "Publishing quality research is about increasing value, reducing waste and disseminating more information."
>
> PATRICK BOSSUYT, M.D.

BY ED BANNON

Radiologists can publish more effective research and will more readily get published if they follow standard checklists of essential information to include in studies, according to *Radiology* Editor Herbert Y. Kressel, M.D.

Researchers should follow a checklist to ensure they include key information in their studies to show that their conclusions are reproducible and generalizable, said Dr. Kressel in an RSNA 2015 session.

"Researchers need to understand the importance of these checklists and how they can be used to improve the quality of the reporting of studies submitted to our journal," said Dr. Kressel, professor of radiology at Harvard Medical School. "The major focus has been on reproducibility of results."

Dr. Kressel provided examples. In working with original authors, a pharmaceutical company could only reproduce results on five of 53 key studies, he said. And in another review of studies, another company could only reproduce results in 25 percent of 63 studies, he said.

Checklists Raise the Standard of Publishing

To address similar problems in radiology research such as bias and applying an inappropriate analysis method, presenters offered an overview of various checklists, including Standards for Reporting Diagnostic Accuracy Studies, or STARD, and Preferred Reporting Items for Systematic Reviews and Meta-Analyses, or PRISMA. Dr. Kressel focused on STARD and PRISMA because they were developed for the most common types of studies that RSNA publishes.

Dr. Kressel noted that the National Institutes of Health (NIH) is increasingly concerned about the reproducibility of the results of NIH-funded studies and now requires grant recipients to make the data from their studies publicly available.

STARD is a checklist for reporting studies on the accuracy of a diagnostic procedure. It outlines the standard sections for a study and includes a checklist of more than 30 required items such as an index test, participants' eligibility criteria and where the full study protocol can be accessed.

It is better to consult PRISMA, an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses, if a researcher is conducting a systematic review of research or a meta-analysis, said presenter Matt McInnes, M.D., associate professor at the University of Ottawa who received the 2014 RSNA Eyler Editorial Fellowship.

The PRISMA checklist suggests including such items as presenting a full electronic search strategy for at least one database; discussing methods used for assessing risk of bias of individual studies; and discussing limitations at study and outcome level and at review level.

Other guides include CONSORT, a checklist for reporting randomized controlled trials, and STROBE, a checklist for reporting observational studies.

Although the checklists might seem burdensome, researchers should view them as tools to ensure the research is done correctly, said presenter Patrick Bossuyt, M.D., a clinical epidemiologist from the University of Amsterdam who helped draft the first STARD checklist 15 years ago. "Publishing quality research is about increasing value, reducing waste and disseminating more information," he said.

Senior Deputy *Radiology* Editor Deborah Levine, M.D., agreed, saying that raising the standard of publishing is good for the researchers. "Our goal is to help you build and optimize your research study and have the most clinical impact," she said.

WEB EXTRAS

Access STARD and PRISMA guides on the EQUATOR network website, *www.equator-network.org*, which includes a tool to help researchers determine which reporting checklist is best for their research.

Quality of the Peer Reviewer Impacts Quality of Journal

BY FELICIA DECHTER

Kressel

Klein

The quality of manuscripts published in a scientific journal relies heavily on peer review for assessing the strengths and limitations of the material and providing a nonjudgmental, objective critique of the submission, according to RSNA journal editors.

"We rely on the expertise of the reviewers to identify the best science and to help improve the quality of the work," said *Radiology* Editor, Herbert Y. Kressel, M.D. "The quality of a peer-reviewed scientific journal like *Radiology* is a direct reflection of the quality of the peer reviewers."

Dr. Kressel and Jeffrey S. Klein, M.D., editor of *RadioGraphics*, discussed peer review for their respective publications during the RSNA Publications Council-sponsored session, "Reviewing Manuscripts for the RSNA Journals," at RSNA 2015. *Radiology* has a research focus, while *RadioGraphics* has an educational focus.

Both doctors gave insights on the important roles served by peer reviewers and the types of information they should consider when given manuscripts. Peer reviewers are asked for their input as experts in the subspecialty and on the specific topic of the submission. A peer reviewer makes suggestions to the editor and author on methods to improve the paper.

"These comments provide a rationale for rendering decisions on the paper," said Dr. Klein, the A. Bradley Soule and John P. Tampas Green and Gold Professor of Radiology, University of Vermont College of Medicine. "Reviewers also indicate whether the paper covers materials recently published in *RadioGraphics* or other imaging journals, as ideally we would like our papers to add to our readers' existing fund of knowledge and practice."

Most of the material for *RadioGraphics* comes from RSNA annual meeting education exhibits, Dr. Klein said. Reviewers are typically experienced clinicians and have reviewed for the journal for many years. Many of the publication's reviewers are also authors and understand the important components of a high-quality submission, he said.

"Given their expertise and knowledge of the quality of submission we typically publish, the reviewers' assessment is the most important component of maintaining the high quality of our published material," Dr. Klein said.

Annually, *Radiology* receives nearly 3,000 submissions and publishes 360 to 380 manuscripts, Dr. Kressel said. Its active reviewer pool consists of approximately 1,000 experts from around the world. Submissions are pre-screened by one of the editors before peer review for suitability. In addition to scientific peer review, accepted research submissions undergo a separate statistical review.

Dr. Kressel asks reviewers to evaluate the quality of the science and the educational value of a manuscript, as well as the validity of its claims and conclusions.

Both *Radiology* and *RadioGraphics* rely heavily on peer reviewers.

> "We rely on the expertise of the reviewers to identify the best science and to help improve the quality of the work."
>
> HERBERT Y. KRESSEL, M.D.

"We ask *Radiology* reviewers to summarize the study, identify strengths and weaknesses as well as specific comments to improve the quality of the manuscript," Dr. Kressel said. "We also ask them to make sure that the criticism is constructive in nature and not harsh or insulting."

RadioGraphics reviews about 220 manuscripts annually, Dr. Klein said. The journal publishes about 180 educational papers annually and has approximately 750 reviewers; many review for both journals, he said.

Both journals can earn the reviewer credit. *Radiology* reviewers can request CME for their reviews at the time they are submitted. If the quality of the review is satisfactory the reviewer can receive three hours of *AMA PRA Category 1 CME Credit*™ for a reviewed manuscript, Dr. Kressel said. *RadioGraphics* offers three hours of *AMA PRA Category 1 CME Credit*™ for a review of adequate quality as assessed by the editor.

WEB EXTRAS

For more information on becoming a reviewer for *Radiology* or *RadioGraphics*, go to *RSNA.org/Journals*.

Radiologists, Referring Physicians Build Rapport with Patients

BY SUSAN KREIMER

As the move toward patient-centered care intensifies, more healthcare facilities are realizing the value of cross-departmental collaboration in improving outcomes and engaging patients in their own healthcare. And imaging is occupying a front-row seat as more radiologists are meeting regularly not only with referring physicians, but also one-on-one with the patients in their care.

"Images are very powerful and allow us to enhance how we can communicate to our patients about their state of health," said Garry Choy, M.D., M.B.A., a diagnostic radiologist at Massachusetts General Hospital (MGH), Boston.

In 2012, Dr. Choy and his colleagues launched a pilot program—the Radiology Consultation Clinic at MGH—in which patients who visit a primary care physician also review their images with a radiologist. While words convey a physician's advice to stop smoking or embark on a diet and exercise program, images emphasize those messages. The hope is to halt or even reverse progression of diseases such as atherosclerosis and emphysema, Dr. Choy said.

"I like to tell the patients or joke around in a lighthearted way, 'This is the ultimate selfie,' " he explained. "We're looking inside your own body and your heart, and these are the plaques inside your coronary vessels."

Since the pilot consultation clinic at MGH began, radiologists have been serving on the front lines as patient educators who advocate for better health, Dr. Choy said.

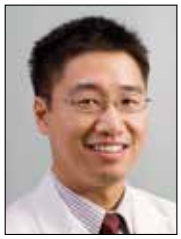
MGH Pilot Consultation Program Grows

The program originated when patients began asking to see their own images and speak with radiologists about terminology in reports. It began as one-on-one consultations based on requests from patients or referring physicians and mushroomed into a regularly scheduled clinic on Tuesdays embedded in primary care.

In the program, senior radiologists collaborate with Susan E. Bennett, M.D., a primary care physician at Internal Medicine Associates at MGH, to determine which patients on her schedule have undergone imaging scans revealing pathologic processes that may improve with lifestyle modification.

Dr. Bennett then offers these patients an opportunity to meet


Yee


Choy


Bennett

with a radiologist and discuss their results. "Usually, they say, 'yes,' they're interested," Dr. Bennett said. "We ask them ahead of time, 'Do you know what a radiologist does? How would you feel about having a radiologist inform you about the results of your imaging examination? Afterwards, we ask them how they experienced the consultation."

The program has been remarkably well-received. "With rare exception, patients have really been pleased to view their images with a radiologist," Dr. Bennett said. For most patients, it is the first time that a radiologist has shared images with them as opposed to forwarding the findings to the ordering physician.

Seeing the images enlightens patients in a number of ways. They are able to visualize findings such as coronary artery calcification, fatty infiltration of the liver and mild centrilobular emphysema that could develop into a more severe form. Or they may be reassured that a small nodule is not posing any immediate danger.

To establish benchmarks, the program measures satisfaction on the part of patients and referring physicians, as well as patient engagement in their own care. "In this field, there are emerging metrics in value-based care," Dr. Choy said. "We, as radiologists, can now also play a role."

A Paradigm Shift for Radiology

As medicine moves toward patient-centered radiology, programs similar to the one at MGH are of increasingly significant value, said Judy Yee, M.D., vice-chair of radiology and biomedical imaging at the University of California San Francisco, past-chair of the RSNA Public Information Committee (PIC) and a member of the RSNA Public Information Advisors Network (PIAN).

"It takes the radiologist out of this black box and puts him or her front and center as a physician who is invested in taking care of patients," Dr. Yee said. "It's a different paradigm, and it's a bit of a culture change for radiologists."

Allocating time and funding for these consultations can be challenging, but in competitive markets, it helps physicians build rapport with patients. Based on patients' experiences with mammography and interventional radiology, they tend to appreciate personalized interaction with radiologists, said Dr. Yee, also chief of radiology at San Francisco VA Medical Center.

Although Dr. Bennett has convenient access to radiologists at MGH, primary care physicians located in separate facilities or cities could offer patients virtual consultations with radiologists via video conferencing, she said.

"It's key that physicians understand that patients really like this," Dr. Bennett said. "At the end of the day, it's not what we feel comfortable with; it's what works best for patients."

> *"With rare exception, patients have been really pleased to view their images with a radiologist."*
>
> SUSAN E. BENNETT, M.D.

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TACE Advancements Benefit Patients Battling Liver Cancer

BY RICHARD S. DARGAN

Advancements in transarterial chemoembolization (TACE) are improving the odds for patients with a common type of liver cancer, according to researchers who have been studying the procedure for more than a decade.

In the interventional procedure, a catheter is threaded under imaging guidance to the artery or arteries in the liver that supply a tumor with blood.

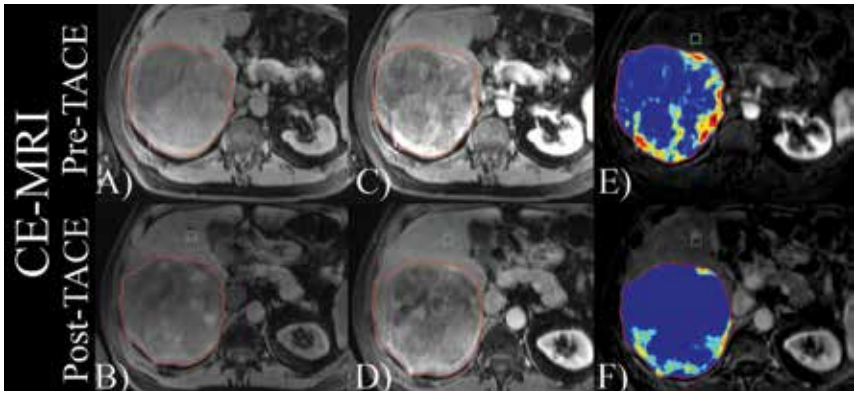
After having ensured that the catheter is in good position, chemoembolytic agents are released to destroy the tumor and partially cut off its blood supply.

Developed in Japan in the 1980s, TACE quickly produced benefits for patients with intermediate-stage hepatocellular carcinoma (HCC) that was too advanced for surgery. Despite its promise, TACE had a limited impact on medicine through its first decade of use, said Jean-François H. Geschwind, M.D., chair of the Department of Radiology and Biomedical Imaging, professor of radiology and oncology, Yale University School of Medicine, and chief of the Department of Radiology, Yale-New Haven Hospital, Conn., who presented a session on TACE techniques at RSNA 2015 and co-authored a January 2016 *Radiology* study on TACE.

That changed in 2002 when two major studies showed unequivocal survival benefits for HCC patients who underwent the procedure. HCC, the most common type of liver cancer, predominantly occurs in patients with cirrhosis. Five-year survival rates are low partly because the disease is often not discovered until its later stages, Dr. Geschwind said.

"The disease grows insidiously, often without symptoms, which makes it very difficult to diagnose," said Dr. Geschwind, who received a 2000 RSNA Research Seed Grant to study chemoembolization in the treatment of liver cancer.

The effectiveness of TACE in battling HCC is due to the unique vasculature of the liver, which has a dual blood supply courtesy of the hepatic artery and the portal vein. Healthy liver tissue receives blood flow mostly from the portal vein; however, most of HCC is nourished by the hepatic artery, making it possible to block the tumor-bearing parts of the blood supply without harming healthy liver tissue.



Images in a 66-year-old man with one hepatocellular carcinoma (HCC) tumor. Before the first transarterial chemoembolization (TACE) treatment, the primary index tumor volume was 1874 cm3, with an enhancing volume of 555 cm3 (29.6 percent of the tumor volume). After treatment, the tumor volume was 1370 cm3 (vRECIST) with an enhancing volume of 162 cm3 (qEASL [Vol]), or 11.8 percent of the tumor volume (qEASL [%]). Unenhanced T1-weighted MR images obtained: A, before and, B, after TACE show background signal intensity. CE T1-weighted MR images obtained: C, before and, D, after TACE in the arterial phase. The images in A and B were subtracted from C and D, respectively, to remove background signal intensity as shown in, E, and, F, with the qEASL color map overlay before and after TACE. The red outline shows tumor segmentation and the green box represents location of the 3-D region of interest used as the reference background for qEASL enhancement calculation. Note the heterogeneity of tumor enhancement as seen in E and F and the substantial changes after TACE.
(*Radiology* 2016: 278;1:275-284)

"We can exploit this to our advantage by delivering toxic chemicals and radiation beads through the artery for natural anatomic targeting of tumors," Dr. Geschwind said.

The targeted approach helps spare patients from the side effects of systemic chemotherapy, as evidenced in an October 2008 study in *Radiology* by Dr. Geschwind and colleagues. The researchers examined 190 patients with HCC and found that toxicity rates associated with TACE were considerably lower than those reported after treatment with systemic chemotherapeutic agents.

Technology Fuels TACE Advancements

Since the landmark TACE studies of 2002, improvements in everything from catheters to imaging technology have helped make the technique even more effective. MRI is typically used to plan TACE while the actual embolization is performed under X-ray guidance in the angiography suite. The X-ray tube rotates around the patient, obtaining CT-like images in two phases, while the software automatically segments the tumor and correlates it with blood vessels.

This technology creates something like a Google map of the roads you have to take to get to the tumor," Dr. Geschwind said.

Imaging advances also allow for more precise delivery of drugs to the tumors. The most commonly used drug is Lipiodol, a drug-bearing emulsion that sticks to the tumor cells. Imaging helps clinicians get as close to the tumor as possible and saturate it and the surrounding area to make sure the entire tumor is treated, according to Dr. Geschwind.

"This is where imaging tools really help you," he said. "Many times there is more than one vessel providing blood flow to the tumor, and the software allows you to see all the arteries involved."

Riccardo A. Lencioni, M.D., professor of radiology at the University of Miami Miller School of Medicine and director

> "Chemoembolization is continuously improving. Some studies show it could be equivalent to ablation in early stage liver cancer, and as the technology improves we are using it more frequently even in that context."
>
> JEAN-FRANÇOIS H. GESCHWIND, M.D.

of interventional oncology research at the Sylvester Comprehensive Cancer Center in Miami, recently published a major review of existing research on TACE using Lipiodol-based regimens in the treatment of HCC. The review study, which was co-authored by Dr. Geschwind and appeared in the January 13 online edition of *Hepatology*, concluded that in HCC, survival figures for patients treated with Lipiodol TACE were in line with those reported in the previous key clinical trials, and that no new or unexpected safety concerns were identified.

"This systematic review suggests that with refinements in techniques and more sophisticated approaches with imaging and catheters, treatment can be offered to a broader patient population than what was reported in 2002," Dr. Lencioni said.

Challenges Exist to Wider Adoption

Current challenges include the adoption of more accurate parameters for measuring the treatment's success. Relying on tumor size is problematic, Dr. Geschwind said, because liver tumors often do not shrink in response to TACE, even when the cancer cells are killed.

"The U.S. Food and Drug Administration (FDA) does not accept anything else but tumor size as a measure of success," Dr. Geschwind said. "Clinically we have to come up with new ways to assess response to therapy."

In 2000, a position paper of the European Association for Study of the Liver, co-authored by Dr. Lencioni, developed new guidelines based on contrast enhancement, with a lack of enhancement indicating cell death. Dr. Geschwind and colleagues affirmed the value of this approach in a 2009 study published in *Radiology* demonstrating a significant reduction in tumor enhancement within 24 hours after TACE that persisted for up to four weeks.

"The imaging technology has improved so much that we are now already using three-dimensional contrast enhancement as measure of the success of therapy," Dr. Geschwind said. "This is how far we have come."

Along with Lipiodol, other new and improved drugs are also being developed, including smaller drug-eluting beads with an improved elution profile. Researchers are working to make the beads radio-opaque so that they can be seen at the time of the procedure.

"The drugs currently used for TACE are cytotoxic agents," Dr. Lencioni said. "Several new anticancer agents, including molecular-targeted and immuno-oncology drugs, are currently available and will require proper investigation in the setting of TACE regiments."

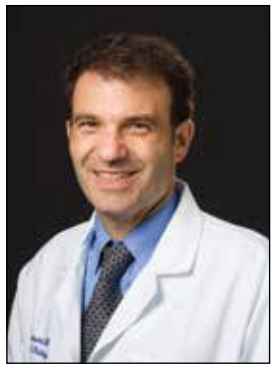
The January 2016 *Radiology* study by Drs. Geschwind and Lencioni examined TACE in combination with Sorafenib, a molecular targeted agent that is taken orally as a pill. Though no benefit to the addition of Sorafenib was shown, the approach was well tolerated by the patients and more studies are on the horizon.

"We still need to understand what is the best drug or combination of regimens that will result in the best outcome," Dr. Lencioni said.

The refinement to TACE points to a broader future role in HCC treatment. TACE could be an alternative for patients with early-stage HCC who are not eligible for radiofrequency ablation (RFA) or surgery, and it could be added to RFA in patients with early stage HCC for better local tumor control than RFA alone. TACE has advantages over RFA, according to Dr. Geschwind, since ablation is limited by the size and location of the tumor. TACE could also serve as bridge therapy for patients awaiting liver transplantation.

"Chemoembolization is continuously improving," Dr. Geschwind said. "Some studies show it could be equivalent to ablation in early stage liver cancer, and as the technology improves we are using it more frequently even in that context."

The continued evolution of TACE will be critical as there has been a doubling of the HCC age-adjusted incidence rates in the U.S., over the past three decades, possibly due to the increasing rate of hepatitis C. Mortality rates have increased faster for HCC than for those of other leading cancers, according to Dr. Geschwind.



Geschwind

Lencioni

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• The *Radiology* studies authored by Drs. Geschwind, Lencioni and colleagues are available at *RSNA.org/Radiology*.
• The *Hepatology* study authored by by Drs. Lencioni, Geschwind and colleagues is available at *AASLD.org*.

Imaging Plays Increasingly Critical Role in Fighting Obesity

BY PAUL LATOUR & ED BANNON

Two recent studies show the significant role imaging can potentially play in fighting obesity. In the first study, researchers demonstrated that gastric artery embolization may be a safe, less-invasive weight-loss technique for morbidly obese patients, potentially paving the way to a minimally invasive treatment for obesity that could be performed as an outpatient procedure.

Syed

"We think gastric artery embolization potentially can be a major treatment for obesity in the future," said Mubin I. Syed, M.D., who presented the pilot study at RSNA 2015. "This procedure really can transform medicine." Of the four patients who have undergone the procedure, one lost 48 pounds in a year, which was almost half of her excess body weight, said Dr. Syed, an interventional radiologist at Dayton Interventional Radiology in Dayton, Ohio. "This finding is equal to results typically offered by bariatric surgery, so this is a tremendous advancement," he said.

Another patient, a diabetic, lost 26 pounds in three months, Dr. Syed said. In addition, the patient's hemoglobin A1C levels dropped to normal rates.

Before the study, Dr. Syed confirmed that the Food and Drug Association (FDA) authorized a diabetic patient to undergo this procedure for the first time because of the link between morbid obesity and diabetes.

"We demonstrated that you can normalize or near-normalize blood-sugar levels as a result of this procedure, which is a huge achievement," Dr. Syed said.

Dr. Syed conducted the Phase 1 Trial through an Investigational Device Exemption (IDE) from the FDA. The FDA approved the pilot study—the Gastric Artery Embolization Trial for Lessening Appetite Nonsurgically (GET LEAN)—for four morbidly obese patients with a body mass index of 40 or higher, who had failed previous attempts at weight loss through diet, exercise and behavior modification. He is seeking his fifth patient and expects to be allowed to increase the trial size.

Although only two of the four patients showed significant weight loss, Dr. Syed believes the procedure is promising because the two patients who did not lose weight withheld parts of their medical history that would have excluded them from the study. Dr. Syed said the experience taught him how to refine his screening procedure.

Some patients experienced nausea and stomach pain, but no symptoms required hospitalization, Dr. Syed said. He added that superficial ulcerations occur in the embolization area but they heal within 30 days and are an expected part of the procedure.

Embolization for Obesity is New

Interventional radiologists have performed gastric artery embolization for decades as a way to stop bleeding in emergency situations, but the idea of performing the procedure to treat obesity is new.

The embolization technique suppresses the production of ghrelin, a hormone that stimulates appetite, by limiting blood flow to the area. This technique is less invasive and less traumatic than laparoscopic sleeve gastrectomy, Dr. Syed said.

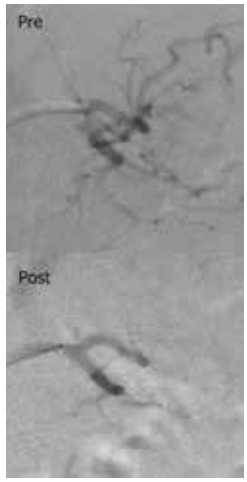
As opposed to surgically removing part of the stomach, the embolization technique only requires access via the radial artery. "That's a very safe access site even in a very obese patient," he said. Dr. Syed said he accessed the left gastric artery through the arm instead of the groin because the patients' fatty tissue makes those arteries difficult to locate in the first place and to later put pressure on to stop any bleeding.

The pilot study used Beadblock 300-500 micron particles for the embolization. Dr. Syed said smaller beads, which were used in previous studies on animals, might be more effective but the sizes used in this study were as small as the FDA would approve.

Study Links Fatty Liver and Heart Failure in Obese People

Using another noninvasive imaging technique, researchers in the Netherlands linked heart failure with fatty liver in obese people, according to a study recently published online in *Radiology.* Non-alcoholic fatty liver disease (NAFLD), also known as hepatic steatosis, carries a prevalence of up to 30 percent in the general population and between 70 percent and 90 percent among those who are obese or have type 2 diabetes.

Ralph L. Widya, M.D., and colleagues from the Leiden University Medical Center in Leiden,



Pre-and post-bariatric embolization images of the main trunk of the left gastric artery in a morbidly obese diabetic patient.

Embolization of the left gastric artery via radial artery approach in a morbidly obese patient.

Images courtesy of Mubin I. Syed, M.D.

> *"Our results may be of importance in cardiovascular risk stratification in obesity, because there is a large variation in the degree of hepatic steatosis in obesity."*
>
> RALPH L. WIDYA, M.D.MUBIN I. SYED, M.D.

the Netherlands, used proton MR spectroscopy to noninvasively measure hepatic triglyceride content and cardiac MRI to assess left ventricular (LV) diastolic function in 714 men and women aged 45 to 65 years. Of the 714 patients, 44 percent were categorized as overweight, and 13 percent were classified as obese.

Widya

The researchers found median hepatic triglyceride content was highest in the obese subgroup. Furthermore, the prevalence of the metabolic syndrome was markedly higher in the obese subgroup. Also, LV end-diastolic volume indexed to body surface area (BSA) and LV mass were higher in the obese subgroup.

"One of the unique aspects of our study is that we took all of the individual components of the metabolic syndrome into account as possible confounders in the association between hepatic steatosis and LV diastolic function, as the metabolic syndrome is associated with NAFLD and with cardiovascular disease," Dr. Widya said.

Results indicated that an increase in hepatic triglyceride content was associated with a decrease in mean LV diastolic function in the obese subgroup of the study population. The association between hepatic triglyceride content and LV diastolic function existed independently of the metabolic syndrome, suggesting that fatty liver itself could, at least in obese people, pose a risk of heart dysfunction above and beyond known cardiovascular risk factors that are clustered within the metabolic syndrome.

"Our results may be of importance in cardiovascular risk stratification in obesity, because there is a large variation in the degree of hepatic steatosis in obesity," Dr. Widya said. "Also, more emphasis should be put on dietary interventions to reduce or prevent hepatic steatosis."

Dr. Widya added that future research is required to study the effect of NAFLD on cardiovascular events and to investigate to what extent the association exists and differs among normal weight, overweight and obese persons.

"We are investigating the relationship of fatty liver and aortic pulse wave velocity and carotid intima media thickness as well in an even larger study sample," Dr. Widya said. "Furthermore, we look forward to the follow-up results of the Netherlands Epidemiology of Obesity study to analyze incident cardiovascular events in relation to fatty liver and biomarkers."

A doctor performing gastric artery embolization on a patient.

Obese Patients Present Unique Challenges for Radiologists

As the role of imaging in combating obesity continues to grow, radiologists will continue to face challenges specific to larger patients.

In terms of technology, radiologic services and equipment have yet to fully adapt to larger patients in many cases, said Mubin I. Syed, M.D. For example, the equipment in his practice, Dayton Interventional Radiology, Ohio, has table limits of 400 pounds, meaning radiologists are not able to image patients who weigh more than 400 pounds without purchasing new equipment.

And while CT works well with obese patients because the images allow better delineation of tissue and more contrast, obese patients require a higher dose of radiation to produce high-quality CT images. Patients who can't fit into the gantry necessary to have the exam could pose another hindrance, and the gantry for MRI is even smaller than for CT.

Still, most MRI systems are taking patient comfort during the examination into account and are already being built with wider bores, said Ralph L. Widya, M.D. He said most systems are suitable for patients up to approximately 550 pounds.

"That makes MRI an ideal imaging modality to study obese patients," said Dr. Widya, from the Leiden University Medical Center in Leiden, the Netherlands. "Moreover, MRI is preferred in the imaging of obesity because of the absence of radiation in contrast to CT."

Nevertheless, Dr. Syed doesn't foresee these challenges hampering future research or patient care.

"Imaging will need to keep adapting to meet the needs of the morbidly obese as interventional radiologists continue to fight this major public health problem," he said.

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• Go to *RSNA.org/News* to view a video of Dr. Syed discussing his RSNA 2015 research on gastric artery embolization.

• Access the *Radiology* study, "Association between Hepatic Triglyceride Content and Left Ventricular Diastolic Function in a Population-based Cohort: The Netherlands Epidemiology of Obesity Study," by Dr. Widya and colleagues at *RSNA/org/Radiology*.

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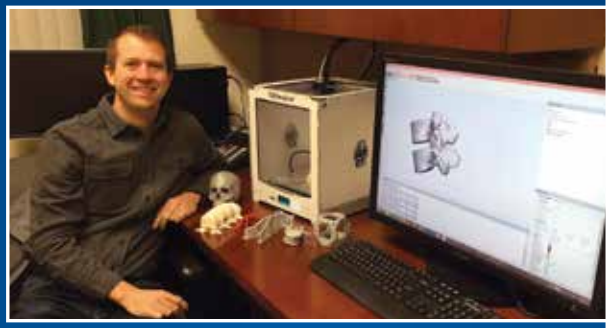
3-D Modeling and Printing of Spine Interventions: New Educational Tools for Teaching Complex Anatomy



Justin Cramer, M.D.

With a 2015 RSNA/AUR/APDR/SCARD Radiology Education Research Development Grant, Justin Cramer, M.D., proposes utilizing 3-D models to enhance understanding of spine interventions. The goals of Dr. Cramer and colleagues are to realize an interactive means for visualizing spine anatomy in the context of interventional procedures and to convey their practical experiences with starting a 3-D imaging lab. The models will be included as interactive objects in an eBook, with correlating fluoroscopic and CT images. A 3-D printer will produce models of the procedures that will be available to participants. The printable models will also be available for download via the eBook which will include photographs of the printed models. Participants will take a pre- and post-test to evaluate the efficacy of this teaching mechanism. Finally, knowledge gained about 3-D modeling software and hardware will be conveyed in the educational materials.

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Radiology in Public Focus

A press release was sent to the medical news media for the following article appearing in a recent issue of *Radiology*.

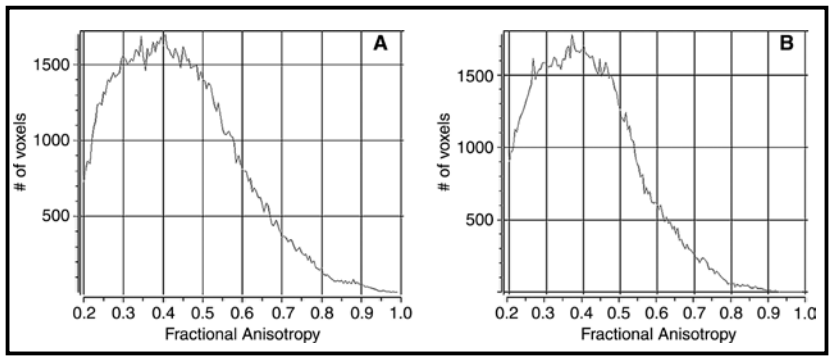
Technique Helps Predict Likelihood of Migraines in Concussion Patients

Shannon entropy (SE) analysis more accurately reveals mild traumatic brain injury (mTBI) than mean fractional anisotropy (FA), more accurately reveals those patients with mTBI who will develop post-traumatic migraines (PTM), and inversely correlates with time to recovery (TTR), according to new research.

Joseph Delic, M.D., of the University of Pittsburgh Medical Center, and colleagues obtained FA maps and performed neurocognitive testing in 74 patients with mTBI. Mean FA and SE were correlated with clinical variables and were used to determine the areas under the receiver operating characteristic curve (AUCs) and likelihood ratios for mTBI and development of PTM.

SE analysis of whole-brain FA histograms demonstrated outstanding diagnostic performance for distinguishing patients who have suffered a true concussive injury from control subjects and was further able to help distinguish those patients with mTBI with PTM. Lower SE also correlated with increased recovery time in patients with mTBI.

Based on information theory, SE measures the complexity of a data set: The larger the amount of information or complexity contained in a data set, the more data points that are required to characterize the data set, and the higher the SE.



Sample histograms for, A, a control subject and, B, a patient with mTBI. Despite the overall similar appearance of the curves, subjective differences in the complexity of the histogram shape are seen between the patient and the control subject. (*Radiology* 2016;279;3:InPress)

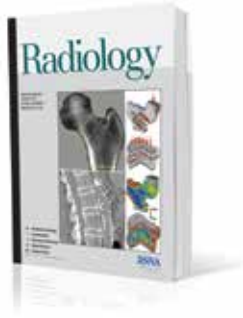
April Public Information Outreach Activity

In April, RSNA is distributing the "60-Second Checkup" audio program to nearly 100 radio stations across the U.S. The segments focus on radiation safety when imaging children.

Media Coverage of RSNA

In December, 4,342 RSNA-related news stories were tracked in the media. These stories reached an estimated 7 billion people.

Coverage included *The Huffington Post, Yahoo! News, Yahoo! Finance, U.S. News & World Report, The Washington Post, The Boston Globe, NPR.org, CNBC.com, MSN.com, The Denver Post, WGN America, Reuters, Bloomberg News,* KTTV-TV (Los Angeles), WBBM-TV (Chicago), WHDH-TV (Boston), KYW-TV (Philadelphia), WAGA-TV (Atlanta), *CNN.com, FOXNews.com, Philly.com* and *WebMD.*



Journal Highlights

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

Elbow Imaging in Sport

Elbow pain is a frequent presenting symptom in many athletes, particularly those participating in overhead throwing sports, because of the high valgus forces placed on the elbow in extension. Standard radiographs can identify fractures or dislocation in the acute setting and also detail unique patterns of disease secondary to chronic overuse.

In a State-of-the-Art article in the April issue of *Radiology* (*RSNA.org/Radiology*), Matthew D. Bucknor, M.D., Kathryn J. Stevens, M.D., and Lynne S. Steinbach, M.D., from the Department of Radiology and Biomedical Imaging, UCSF, review basic anatomy, the mechanisms of injury and imaging techniques related to elbow pain.

Radiographs of the elbow are recommended to evaluate for possible fracture or dislocation following acute injury. Radiography can also demonstrate the presence of a joint effusion after trauma, suggestive of an occult fracture. In the chronic setting, radiographs can also demonstrate soft tissue calcification, ossification, osteophyte formation, or osteochondral defects, which may suggest tendon or ligament injury as a consequence of repetitive microtrauma.

MRI is the recommended imaging modality for establishing specific patterns of acute and chronic osseous and soft tissue injuries of the elbow. MRI is also the most sensitive modality for diagnosing lateral epicondylosis, the most common cause of elbow pain, although US can be useful for guiding therapeutic procedures.

"Many injuries of the elbow present with overlapping symptoms, and prompt imaging evaluation helps to confirm the correct diagnosis and facilitate appropriate treatment," the authors write.

Coronal T2-weighted fat saturated (FS) MR image in a 20-year-old male varsity gymnast with an acute hyperextension injury demonstrates a proximal tear of the medial collateral ligament (arrow). A decision was made to treat this injury non-operatively.

(*Radiology* 2016;279;1:12-28:)

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

"Biliary Diseases with Pancreatic Counterparts": Cross-sectional Imaging Findings

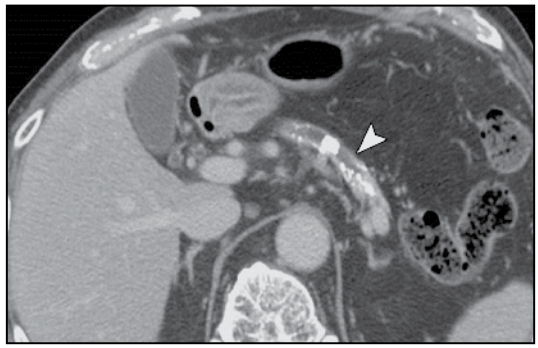
On the basis of the similarities in the histopathologic findings and the clinical-biologic behaviors of select biliary and pancreatic conditions, a new disease concept, "biliary diseases with pancreatic counterparts," has been proposed.

In an article published in the March-April issue of *RadioGraphics* (*RSNA.org/RadioGraphics*), Venkata S. Katabathina, M.D., of the University of Texas Health Science Center at San Antonio, and colleagues examine the relationship between certain biliary diseases and their pancreatic counterparts, to explore the proposed new disease concept.

For both biliary and pancreatic diseases, imaging plays a pivotal role in initial diagnosis, evaluation of treatment response, efficacy testing of novel drugs and long-term surveillance.

"Knowledge of this unified concept may assist in understanding the pathogenesis of pancreaticobiliary diseases and in the development of novel therapeutic agents," the authors write.

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



Simultaneous occurrence of peribiliary cysts and chronic pancreatitis in a 55-year-old alcoholic man. Axial contrast-enhanced CT image shows an atrophic pancreas with a dilated main pancreatic duct and calcifications (arrowhead), findings consistent with chronic pancreatitis. The patient also had peribiliary cysts (not shown).

(*RadioGraphics* 2016;36;374–392)

Access Online Tutorials for RSNA Journals

Go to *RSNA.org/Journals* to watch a number of related RSNA tutorials, including:

- **SA-CME Test Help:** How to Find and Complete the SA-CME Tests for *Radiology* and *RadioGraphics*
- ***Radiology/RadioGraphics* Features:** Learn how to navigate the homepage for *Radiology* and *RadioGraphics*, while discovering its useful features.
- **Managing your Account:** Learn how to access your account to add favorite articles, manage your alert and search settings, update your personal information and more.
- **RSNA Image Viewer:** Learn how to compare, magnify and archive images with RSNA's image viewer tool for both *Radiology* and *RadioGraphics*


Radiology EXTRA PODCASTS

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

- "Colorectal Polyps Missed with Optical Colonoscopy Despite Previous Detection and Localization with CT Colonography," B. Dustin Pooler, M.D., and colleagues.

In these podcasts, *Radiology* editors discuss two articles each:

Digital Compared with Screen-Film Mammography

- "Digital Compared with Screen-Film Mammography: Measures of Diagnostic Accuracy among Women Screened in the Ontario Breast Screening Program," Maegan V. Prummel, M.P.H., and colleagues.
- "Digital Compared with Screen-Film Mammography: Measures of Diagnostic Accuracy among Women Screened in the Ontario Breast Screening Program—Evidence that Direct Radiography Is Superior to Computed Radiography for Cancer Detection," Etta D. Pisano, M.D.

Shear-Wave US Elastography of the Shoulder

- "Elasticity of the Coracohumeral Ligament in Patients with Adhesive Capsulitis of the Shoulder," Chueh-Hung Wu, M.D., Wen-Shiang Chen, M.D., Ph.D., and Tyng-Guey Wang, M.D.
- "Quantitative Shear-Wave US Elastography of the Supraspinatus Muscle: Reliability of the Method and Relation to Tendon Integrity and Muscle Quality," Andrea B. Rosskopf, M.D., and colleagues.

RSNA Seeks Candidates for New *Radiology* Editor

RSNA is accepting applications for the position of* Radiology *editor, which has been held by Herbert Y. Kressel, M.D., since 2008. Dr. Kressel plans to step down from the position in 2017.

The *Radiology* editor is responsible for:

- Encouraging submissions of scientific manuscripts
- Setting high standards for scientific integrity
- Developing guidelines and mechanisms for peer review of submitted manuscripts
- Releasing accepted manuscripts on a timely basis for copyediting
- Reviewing and releasing edited manuscripts on a timely basis for publication
- Formulating and interpreting editorial philosophy and policies
- Cooperating with the RSNA Board of Directors and Executive Director in the production of a self-supporting, high quality publication with a strong impact factor

Radiology

A search committee chaired by Mary C. Mahoney, M.D., Board liaison for publications and communications, is assisting the RSNA Board of Directors in its search. The new editor will be selected in December 2016. Interested physicians are invited to send their curricula vitae (marked "confidential") to:

Mary C. Mahoney, M.D.
Radiological Society of North America (RSNA)
820 Jorie Blvd., Oak Brook, IL 60523

Or via email to *editorsearch@rsna.org*

Residents & Fellows Corner

RadioGraphics Offers ABR Core Exam Study Guide

Access the *RadioGraphics* American Board of Radiology (ABR) Diagnostic Radiology Core Exam Study Guide Article Index for help in preparing for the ABR Diagnostic Radiology Core Exams at *RSNA.org/RadioGraphics*. Users can click on the headings to open the outline and find RSNA journal articles chosen by experts in the field as covering material particularly relevant to each section of the exam. Bookmark an article to read later using the "Add to Favorites" link on the article page.

RadioGraphics

In 2016, ABR exams are scheduled in June, October and November. For more information on the ABR exam, go to *theabr.org*.

For Your Calendar

APRIL 28-MAY 1
Radiological and Diagnostic Imaging Society of São Paulo (SPR)
Visit the RSNA Booth
São Paulo, Brazil
• *JPR2016.org.br/en/*

JUNE 2-4
RSNA Spotlight Course: Radiología de Urgencias: Curso Interactivo Con Casos
Grand Fiesta Americana Coral Beach
Cancún Resort & Spa
Cancún, Mexico
• *RSNA.org/Spotlight*

FIND MORE EVENTS AT
RSNA.org/Calendar.aspx

Education and Funding Opportunities

RSNA Offers Spotlight Course on Emergency Radiology

RSNA will launch its first Spotlight Course, "Radiología de Urgencias: Curso Interactivo con Casos" ("Emergency Radiology: Interactive Course with Cases"), from June 2 to 4 at the Grand Fiesta Americana Coral Beach Cancún Resort & Spa.

The course supports RSNA's goal to provide quality education on important medical imaging issues in different worldwide regions. Emergency radiology was selected based on an assessment of the educational needs of RSNA members in Latin America.

During the 2 ½-day program presented entirely in Spanish, participants will explore the use of emergency radiology as part of daily practice. The course will include general and breakout sessions, Cases of the Day, and interactive RSNA Diagnosis Live™ sessions, and will offer credits for CME.

Presented under the direction of Jorge Soto, M.D., of Boston University School of Medicine, and Guillermo Elizondo Riojas, M.D., Ph.D., of the University of Nuevo Leon in Monterrey, Mexico, the course will be taught by renowned radiology leaders including instructors from Latin America who will discuss issues of special relevance to the region.

For more information, go to *RSNA.org/Spotlight.*

Challenge Your Diagnostic Skills with Online Cases of the Day

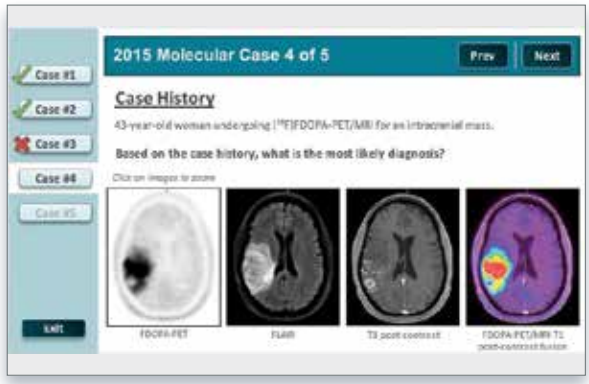
Give it your best shot—What is your diagnosis for this case?

Find the answer to this case and more by visiting *RSNA.org/Library* and navigating to Cases of the Day.

Submit your best diagnosis for some of the most challenging and unusual cases gleaned from RSNA 2015.

Relevant image and case history information is presented prior to each diagnosis. Each image can be enlarged for further study. Explore related slides, including imaging findings and case discussion points. Additionally, case references are provided for further study.

SA-CME credit is earned for a score of 80 percent or better. Users may re-attempt each case if a passing score is not achieved.



Relevant images and clinical history are provided prior to each Case of the Day to assist with diagnosis. Additional case information is provided afterward.

NEW FOR 2016:

RSNA/ASNR Comparative Effectiveness Research Training Program

Deadline for Application
April 30

RSNA and the American Society of Neuroradiology (ASNR) are jointly sponsoring an interactive course in comparative effectiveness research (CER), targeted to junior faculty and senior trainees in the imaging sciences.

The goal of the CERT program is to provide an introduction to the methodology and tools for performing CER. Led by a faculty of well-established leaders in the field, the CERT will cover technology assessment, risk benefit analysis, cost-effectiveness evaluation, decision analysis, meta-analysis and systematic review delivered in a combination of online modules, a 1.5-day, in-person workshop (Oct. 13-14, 2016), Web-based didactic lectures and small grou web-based grant proposal review discussions, over the course of a year, beginning in July 2016.

Applications are now being accepted. Accepted participants are responsible for travel expenses and on-site hotel accommodations. There is no fee for this course.

For more information, visit *RSNA.org/CERT*.

RSNA Advanced Course in Grant Writing

Deadline for Application
July 1

Applications are now being accepted for this course which is designed to assist participants—generally junior faculty members in radiology, radiation oncology or nuclear medicine programs—prepare and submit a National Institutes of Health, National Sciences Foundation, or equivalent, grant application. The course, held at RSNA Headquarters in Oak Brook, Ill., will consist of four 1.5-day sessions:

- Session I: Sept. 23-24, 2016
- Session II: October 28-29, 2016
- Session III: Jan. 27-28, 2017
- Session IV: April 7-8, 2017

Accepted participants are responsible for travel expenses for each session. Hotel accommodations will be provided by RSNA. There is no fee for this course.

For more information and to download an application, go to *RSNA.org/AGW*.

Questions about these programs can be directed to *dor@RSNA.org* or Rachel Nelson at 1-630-368-3742.

RSNA Clinical Trials Methodology Workshop

Jan. 7-13, 2017
Deadline for Application
June 15

Over the course of this 6½-day workshop, participants will learn how to develop protocols for the clinical evaluation of imaging modalities. Each trainee will be expected to develop a protocol for a clinical study, ready to include in an application for external funding. A dynamic and experienced faculty will cover topics including:

- Principles of clinical study design
- Statistical methods for imaging studies
- Design and conduct of multi-institutional studies
- Sponsorship and economics of imaging trials
- Regulatory processes

Applicants will undergo a competitive selection process for course entrance. Familiarity with basic concepts and techniques of statistics and study design is required. Trainees participate in group and individual learning, including preparative readings, didactic sessions, one-on-one mentoring, small group discussions, self-study and individual protocol development.

Accepted participants are responsible for all travel expenses and on—site hotel accommodations. There is no fee for this course.

Online application and additional information can be found at *RSNA.org/CTMW*.

Questions about the programs on this page can be directed to *dor@RSNA.org* or Rachel Nelson at 1-630-368-3742.

NEW FOR 2016:

Introduction to Academic Radiology for Scientists (ITARSc)

Deadline for Application
July 1

RSNA is expanding its Introduction to Academic Radiology (ITAR) program to include postdoctoral fellows in the imaging sciences and biomedical engineering, Postdoctoral fellows in these specialties who received their degrees within the past six years are invited to apply for this opportunity to participate in a dynamic program held during RSNA 2016.

Program objectives:
- Introduce participants to the scope of research in the radiologic sciences
- Highlight the important role of postdoctoral degrees in the radiologic sciences
- Identify keys to success for postdoctoral scientists in imaging research
- Introduce participants to successful radiology researchers who may serve as future mentors

The program consists of a combination of dedicated programming for ITARSc participants and shared sessions with participants of the ITAR program. Selected participants will receive a $1,000 stipend to offset travel and hotel costs as well as free registration for the RSNA annual meeting.

Application forms are available at *RSNA.org/ITARSc*.

RSNA/AUR/ARRS Introduction to Academic Radiology Program

Nominations/Application
Deadline: **July 15**

Sponsored by RSNA, the American Roentgen Ray Society (ARRS) and Association of University Radiologists (AUR), the Introduction to Academic Radiology program:

- Exposes second-year (PGY3) residents to academic radiology
- Demonstrates the importance of research in diagnostic radiology
- Illustrates the excitement of research careers
- Introduces residents to successful clinical radiology researchers

Successful applicants will be assigned to either a seminar held during the RSNA Annual Meeting in Chicago, Nov. 27 to Dec. 1, 2016, or the ARRS Annual Meeting in New Orleans, April 30 to May 5, 2017.

A $1,000 award will be made to the departments of accepted applicants to be used to help advance the applicant's academic career. There is no fee for this course.

For more information and to download an application/nomination form, go to *RSNA.org/ITAR*.

Annual Meeting Watch

News about RSNA 2016

Advance Registration and Housing Opens April 27

For more information about registering for RSNA 2016, visit *RSNA.org/Register,* e-mail *reginfo@RSNA.org,* or call 1-800-381-6660 or 1-630-571-2670 x7862.

International Visitors — Act Now For Visa

If you must apply for a temporary non-immigrant visa to attend the annual meeting, you are advised to apply as soon as travel to the U.S. is decided and no later than three to four months in advance of the travel date. RSNA offers a personalized official letter of invitation for RSNA 2016 attendees. Information is available at *RSNA.org/International_Visitors.*

RSNA® 2016

Important Dates for RSNA 2016

April 27	RSNA and AAPM Member Registration and Housing Open at 10:30 a.m. Central Time (CT)
June 1	Non-Member Registration and Housing Open at 10:30 a.m. CT
Nov. 4	Final Discounted Registration Fee and Housing Deadline at 5 p.m. CT
Nov. 5	Increased Registration Fee Applied, $150 for most categories
Nov. 27 – Dec 2	102nd Scientific Assembly & Annual Meeting

Registration Fees - On or Before November 4

ANNUAL + VIRTUAL MEETING PACKAGE *	ANNUAL MEETING ONLY	VIRTUAL MEETING ONLY	
$100	**Free**	**$100**	RSNA/AAPM Member
$25	**Free**	**$25**	RSNA Member-in-Training, RSNA Student Member
$300	**Free**	**$300**	Non-Member Student
$500	**$200**	**$300**	Non-Member Resident/Trainee
$500	**$200**	**$300**	Radiology Support Personnel
$1200	**$900**	**$300**	Non-Member Physician/Physicist
$1200	**$900**	**$300**	Hospital or Facility Executive
$625	**$325**	**$300**	One-day Technical Exhibits Only

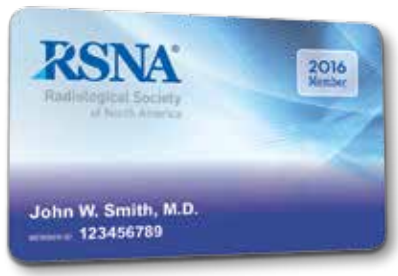
*Register for the RSNA Annual + Virtual Meeting Package and get access to both the physical meeting at McCormick Place and the Virtual Meeting.

Value of Membership

RSNA Membership Comes With Many Benefits

RSNA membership includes many benefits, such as a free subscription to *RSNA News* and:

- Advance registration to the world's premier radiology forum. Registration opens for members on Wednesday, April 27
- Subscriptions to the leading medical journals *Radiology* and *RadioGraphics*
- Thousands of opportunities to earn continuing education credit
- Informatics tools and technology to ease your workload
- Career-advancing grant opportunities and research courses
- Connections with colleagues from around the world



For more information, contact membership@rsna.org or 1-877-RSNA-MEM (1-877-776-2636) or 1-630-571-7873 outside the U.S. and Canada.

RSNA.org

2015 Annual Report Now Available Online

RSNA celebrated its 100th anniversary as a Society in 2015 and the turning of a page to a new century of innovation, education and discovery. For 100 years, RSNA has been the voice of the radiology specialty—keeping members informed, connected and moving forward with new innovations. To read the entire 2015 RSNA Annual Report, go to RSNA.org/Annual-Report.

Some 2015 highlights include:

101st Scientific Assembly and Annual Meeting— RSNA concluded its two-year Celebration of a Century, with RSNA 2015 focusing on the Society's 100th anniversary. Nearly 52,000 people gathered for the week-long event at Chicago's McCormick Place during the last week of November, taking part in educational courses, technical exhibits and networking opportunities. Many attendees and non-attendees participated in the Virtual Meeting as well.

Membership Strong at 54,000—RSNA membership as of December 2015 stood at 54,314, representing a global population from 140 countries. An impressive 11,362 of RSNA's members—or 21 percent—have been members for 25 or more years.

RSNA Diagnosis Live™ Expands to 44 Residency Programs—Diagnosis Live, an interactive response system, is available free of charge to institutions with a radiology residency program.

Visiting Professors Travel to Three Countries—RSNA has supported international education through its International Visiting Professor Program since 1986. This program, administered by the Committee on International Radiology Education, supports small teams of visiting professors to lecture at national or regional radiology meetings of societies in or serving developing nations, as well as at selected local hospitals with radiology residency training programs in those countries. In 2015, RSNA members visited the countries of Chile, Nicaragua and Mexico.

Research & Education (R&E) Foundation Awards 92 Grants—Grant recipients took home $3.6 million in 2015, equaling 2014's record-breaking giving year. With 25 percent of all grant applications funded, the Foundation continues its support of up-and-coming educators and researchers.

Inspire-Innovate-Invest: The Campaign for Funding Radiology's Future® Exceeds 50 Percent of Goal—The R&E Foundation announced late in 2015 that generous contributions from individuals, private practice groups, and corporate supporters have helped it reach more than halfway to its goal to raise $17.5 million.

***RadiologyInfo.org* Gets an Updated Look—**A complete update and redesign of *RadiologyInfo.org* provides a thorough and complete radiology information source for patients. The enhanced site attracted a record 11.5 million visitors in 2015.

RSNA Launches Image Share Validation Program— A conformity assessment program that will set the standard for consistency in the electronic image sharing marketplace, the new Image Share Validation Program will test the compliance of vendors' systems using quality standards determined most effective for accurate and efficient exchange of medical images including those used in the RSNA Image Share Network.

COMING NEXT MONTH

Next month, *RSNA News* features a report on the American Board of Radiology Interventional Radiology/Diagnostic Radiology certification program, including a timeline for implementing the initiative.

Interested in developing a protocol for your Imaging Clinical Trial?

Now accepting applications for the RSNA 2017 Clinical Trials Methodology Workshop!




January 7-13, 2017 | San Diego, California

Learning objectives

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

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

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

Application deadline:

June 15, 2016 (acceptance based on competitive selection process)

Prerequisites:

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

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

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

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

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

RSNA Education™