RSNA News™

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Telerobotic Ultrasound May Revolutionize Telemedicine

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See Page 23

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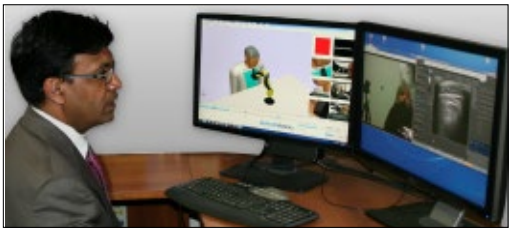
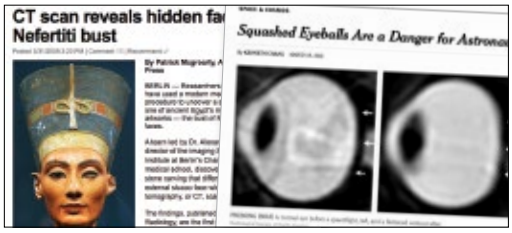
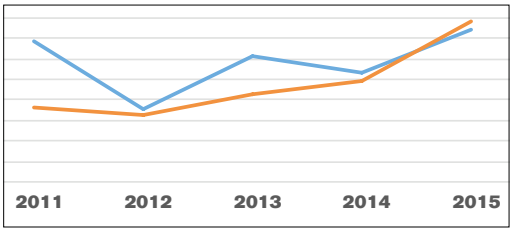






RSNA News

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!

NIBIB Renews Funding for RSNA/QIBA Research

The National Institute of Biomedical Imaging and Bioengineering (NIBIB) awarded RSNA a two-year, $2.5 million contract to support the Quantitative Imaging Biomarkers Alliance (QIBA) and its research activities.

Imaging biomarkers are of considerable interest in evidence-based clinical decision making and for therapeutic development. A portion of this funding will support groundwork projects by QIBA members to help validate specific imaging metrics, improve reproducibility and increase standardization across vendor platforms.

This collaboration will produce standards documents—informed by the groundwork activities—physical phantoms and digital reference objects to test the performance specifications in the documents and data sets to assess compliance.

This marks the third multi-year contract between NIBIB and QIBA since 2010. To learn more about QIBA, go to *RSNA.org/QIBA*.

RSNA Promotes Radiology Careers at AMA Medical Student Showcase

Gentile

RSNA recently participated in the annual American Medical Association (AMA) Medical Student Showcase, with RSNA staff joining **Michelle Gentile, M.D., Ph.D.**, chief resident in radiation oncology at Northwestern Memorial Hospital in Chicago, to promote radiology to medicine's future practitioners.

The AMA showcase gives medical students a chance to survey many specialties and opportunities. Dr. Gentile answered students' questions about the practice of radiology, various career paths in the field, and myths and facts about life as a radiologist. RSNA invited students to learn more about the specialty through RSNA membership—free to medical students, residents and fellows. View the medical students' brochure about careers in radiology at *RSNA.org/Trainee-Resources-Education*.

Hara

Hara Named Chair of Diagnostic Radiology at Mayo-Arizona

Amy K. Hara, M.D., has been named chair of Diagnostic Radiology at Mayo Clinic's Arizona campus. Dr. Hara, a professor of radiology, joined Mayo Clinic in 2001.

After receiving her medical degree from the University of Missouri, she completed her diagnostic radiology residency at Mayo Clinic in Rochester, Minn., and was part of the Clinician-Investigator Training Program. She completed a fellowship in abdominal imaging at Mallinckrodt Institute of Radiology at the Washington University School of Medicine in St. Louis.

Dr. Hara served as past chair of the RSNA Education Exhibits Awards Committee and as a session moderator and educational course faculty member during RSNA annual meetings. She is a current member of the RSNA Gastrointestinal Radiology Subcommittee of the Scientific Program Committee for the annual meeting.

Numbers in the News

6

Number of years David Hovsepian, M.D., has served as editor of *RSNA News*. Read Dr. Hovsepian's farewell column about his tenure as editor on Page 5.

95

Percentage of patients who consider telerobotic ultrasound to be superior to a traditional office visit, which often involves lengthy wait times in rural communities. Read more about the technology that stands to revolutionize telehealth on Page 9.

50

The number of RSNA educational courses available on USB—a quick and easy way to earn CME. Learn more about the devices available online for purchase in the Education & Funding section on Page 21.

1.4

The circulation—in billions—yielded by 3,170 tracked media placements generated through the *Radiology* Press Release Program overseen by the 17-member RSNA Public Information Committee (PIC). Read about the PIC Committee and its role in communicating to the public and media about the vital role radiologists play in healthcare on Page 11.

Japan Radiological Society Bestows Honors


Baron


Ros

Richard L. Baron, M.D., **Pablo R. Ros, M.D., Ph.D.**, **Kuni Ohtomo, M.D., Ph.D.**, **Tae-Hwan Lim, M.D., Ph.D.**, **Kazuo Miyasaka, M.D., Ph.D.**, **Takashi Yamashita, M.D.**, and **Hiromu Nishitani, M.D., Ph.D.**, were presented with honorary membership in the Japan Radiological Society (JRS) during the society's recent annual meeting in Yokohama, Japan.

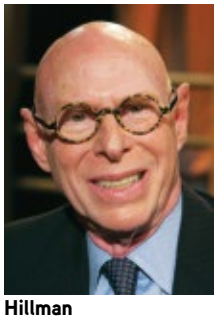
Dr. Baron, RSNA president-elect, is professor of radiology at the University of Chicago Medical Center, serving as chair of the Department of Radiology from 2002 to 2011 and dean for clinical practice from 2011 to 2013. His extensive RSNA involvement includes serving on the Education Exhibits Committee and on the RSNA Board of Directors.

Dr. Ros is radiologist-in-chief and chair of the Department of Radiology at University Hospitals Case Medical Center in Cleveland. He is also Theodore J. Castele University Professor and chairman of the Department of Radiology at Case Western Reserve University School of Medicine. Dr. Ros is a past-president of the Interamerican College of Radiology and chaired the Committee on International Radiology Education. He has served as a member of the RSNA Annual Assembly educational faculty.

Dr. Ohtomo is a diagnostic radiologist at the University of Tokyo; Dr. Lim is a professor of radiology at the University of Ulsan College of Medicine and a radiologist at the Asan Medical Center's Department of Radiology in Seoul, Republic of Korea; Dr. Miyasaka is a radiologist in the Department of Radiology, Hokkaido University, Japan; Dr. Yamashita is an advisor in the Radiation Oncology Department at the Cancer Institute Hospital of Japanese Foundation for Cancer Research, Tokyo; and Dr. Nishitani is a radiogist at the University of Tokushima, Japan.

Berlin, Hillman Receive Leadership Luminary Award


Berlin


Hillman

Leonard Berlin, M.D., and **Bruce J. Hillman, M.D.**, are the 2015 recipients of the Leadership Luminary Award presented by the American College of Radiology (ACR) Radiology Leadership Institute (RLI).

Dr. Berlin is professor of radiology at both Rush Medical College and the University of Illinois College of Medicine. He has written more than 430 scientific publications, seven book chapters and the book, "Malpractice Issues in Radiology," now in its third edition. Dr. Berlin has given more than 380 lectures on various medical subjects both nationally and internationally, primarily on radiologic malpractice and risk management. He delivered the Annual Oration in Diagnostic Radiology at RSNA 2012. Dr. Berlin was awarded gold medals for Distinguished Service to Radiology by the American Roentgen Ray Society in 2002, the Chicago Radiological Society in 2005 and the ACR in 2010.

Dr. Hillman is professor of radiology and public health sciences at the University of Virginia (UVA). He served as chair of the Department of Radiology and president of the UVA Health Services Foundation. Dr. Hillman has served as founding editor of the Journal of the American College of Radiology since 2003. From 1999 to 2007, Dr. Hillman was the founding principal investigator and chair of the American College of Radiology Imaging Network (ACRIN). Dr. Hillman received the RSNA Gold Medal in 2011, was the 2007 RSNA Outstanding Researcher and delivered the New Horizons Lecture at RSNA 1997.


Stainken

Stamford Hospital Appoints Stainken as Radiology Chair

Brian Stainken, M.D., was recently named chair of the Department of Radiology at Stamford Hospital, Conn.

Most recently Dr. Stainken served as the chair of radiology at Roger Williams Medical Center in Providence, R.I., and as an adjunct professor of radiology at Boston University School of Medicine since 2006. Previously Dr. Stainken held attending physician and academic positions in the departments of radiology at the University of Maryland, Albany Medical College, University of California, San Diego, and the Naval Hospital at Camp Pendleton in California.

Dr. Stainken is a past-president of the Society of Interventional Radiology. He served as a member of the Vascular and Interventional Subcommittee for the RSNA Scientific Program Committee and as a session moderator during numerous RSNA Annual Meetings.

IN MEMORIAM

Georges Salamon, M.D., Ph.D.

Georges Salamon, M.D., Ph.D., an internationally renowned neuroradiologist and anatomist, died in October.

A former president of the French Society of Radiology (SFR), Dr. Salamon served as chairman of the Department of Radiology at the University of Marseille, France, from 1975 to 1985; as head of neuroradiology at Hospital "La Timone" in Marseilles from 1972 to 1996; and as chief of the Research Laboratory of Neuroradiology at the Institut National de la Santé et de la Recherche Médicale in Marseilles from 1972 to 1995. He served as SFR president in 1995.

Image courtesy of French Society of Radiology

Salamon

After he retired from clinical practice, Dr. Salamon worked as a radiology researcher at the David Geffen School of Medicine at the University of California, Los Angeles, and as a fellow of Northwestern University's Cognitive Neurology and Alzheimer's Disease Center in Chicago.

Dr. Salamon received RSNA Honorary Membership in 1994.

Gerald D. Dodd, Jr., M.D.

Gerald Dewey Dodd, Jr., M.D., of Houston, died Sept. 25 at age 92. During his prestigious career, Dr. Dodd made significant contributions to radiology—specifically in breast imaging, gastrointestinal imaging and organized radiology. He was awarded an RSNA Gold Medal in 1986.

Dr. Dodd was born in Oaklyn, N.J., on Nov. 18, 1922. After serving in the U.S. Navy as a hospital corpsman during World War II, he earned his undergraduate degree from Lafayette College. He received his medical degree from Thomas Jefferson Medical College (TJMC) in Philadelphia and did his internship at Fitzgerald Mercy Hospital in Darby, Pa., before completing his radiology residency at TJMC. During the Korean conflict, Dr. Dodd joined the U.S. Air Force, rising to the rank of captain. During this time, he served as the chief of radiology at Mitchell Air Force Base and commanded a mobile radiology unit that served virtually all of the major U.S. basic training posts.

He quickly became a leading figure in the field of diagnostic radiology, beginning with his appointment as an assistant professor at TJMC in 1952. Fourteen years later, he became professor and the first chairman of the newly formed Division of Diagnostic Radiology at the MD Anderson Cancer Center in Houston. Over the next 25 years, he built the division into an internationally recognized center focusing on the diagnosis and treatment of cancer.

Dr. Dodd served as chairman of the board and president of the American College of Radiology (ACR), as president of the American Cancer Society (ACS), as a trustee of the American Board of Radiology, and as president of the Texas and Houston radiological societies.

Dodd

One of Dr. Dodd's greatest accomplishments was the standardization of the use of mammography for the detection and diagnosis of breast cancer. The international impact of Dr. Dodd's work was recognized by the International Union Against Cancer, which awarded him the Mucio Athayde Cancer Prize. In addition, the Society of Breast Imaging (SBI) named a lecture after Dr. Dodd.

Dr. Dodd received more than 40 other prestigious awards including the gold medals of the ACR, American Roentgen Ray Society, Texas Radiological Society, SBI and Gilbert H. Fletcher Society. He also received the ACS Presidential Medal, the Haughton Medal of the Royal College of Surgeons in Ireland, and the Cannon Medal of the Society of Gastrointestinal Radiologists.

Dr. Dodd gave 21 national and international named lectureships and served on the editorial boards of numerous scientific journals, including *Radiology* where he served as an associate editor from 1977 to 1985.

He authored or co-authored 123 peer-reviewed publications, 22 book chapters, six monographs, four books, 22 scientific exhibits and 27 other publications.

THIS MONTH IN THE *RSNA NEWS* ONLINE VERSION

Get more of this month's news at *RSNA.org/News*. Enjoy interactive features including video, audio, slide presentations and more. Go online to leave us a comment and easily share stories via social media as well.

As part of this month's cover story on the rise of telerobotic ultrasound, we invite readers to explore a video of researcher Jeffrey Soble, M.D., discussing the technology's potential in providing long-distance exams. We also highlight recent updates to RSNA's Science and Education pages on *RSNA.org*.

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RSNA Board of Directors Report

At its meeting in September, the RSNA Board of Directors gave an update on RSNA's Centennial Celebration at the annual meeting and beyond, announced collaborations with other radiologic and medical institutions and appointed volunteers to RSNA committees for the coming year.

Richard L. Ehman, M.D.
Chair, RSNA
Board of Directors

RSNA Centennial Celebration Continues

The RSNA Centennial continues as RSNA celebrates the 100th anniversary of the Society's founding and begins a new century of education, research and technologic innovation to advance patient care. Centennial activities will culminate at RSNA 2015 with the return of the Centennial Showcase. New exhibits illustrating 3D printing, nanotechnology, virtual reality applications and personalized medicine will be unveiled. The popular virtual Wilhelm Röentgen will make a return performance along with Cases of the Future, the Art and Science Gallery and winners of the 2015 Image Contest.

Before and during the annual meeting, visitors to the Centennial website (*RSNA.org/Centennial*) are invited to make predictions about future radiologic advancements and browse the gallery of Image Contest submissions.

The RSNA Research & Education (R&E) Foundation is hosting a virtual silent auction to benefit the Inspire-Innovate-Invest Campaign. Whether attending the meeting or not, anyone can bid on exciting experiences including European trips, golf packages and a fighter pilot adventure. The auction opens Monday, Nov. 23 at *RSNA.org/Foundation-Virtual-Auction*.

RSNA Research Partnership

RSNA will welcome researchers supported by the National Cancer Institute (NCI) who will be conducting studies on radiological image perception at RSNA 2016. RSNA will be providing space in the Learning Center for a research lab where RSNA meeting attendees will be able to learn about this important area of research and, if they wish, participate in the studies as volunteers.

Image Wisely® Pledge Update

The Board approved the Image Wisely® Executive Committee's recommendation to update the initiative's charge and to revise the pledge to require facilities, individuals, associations and educational programs to pledge on an annual basis to reinforce the Image Wisely standards. Starting in 2016, pledgees will receive notification to renew their pledges when they expire on December 31 each year.

Introduction to Academic Radiology Expands on Success

RSNA, the American Roentgen Ray Society and the Association of University Radiologists have partnered for more than 20 years to deliver the Introduction to Academic Radiology program. In 2014, the program introduced 80 second-year residents to the specialty, sparking interest in academic careers. With growing interest in the program, the Board approved resources to accept eight Ph.D. students and post-doctoral trainees to the 2016 program. The goal of this outreach program is to inspire talented scientists to consider research careers in the radiologic sciences.

RSNA, ASNR Collaboration

RSNA and the American Society of Neuroradiology (ASNR) will jointly sponsor a three-year pilot training course on comparative effectiveness research (CER). The RSNA/ASNR CER Training Program goal is to introduce junior faculty and trainees in radiology to the methodology and tools for performing CER. The target launch is in 2016.

RSNA Around the Globe

RSNA and the American College of Radiology are developing an "ESR Meets the U.S.A." program to be presented at the European Congress of Radiology in 2017. The program will highlight both societies' initiatives to further radiology research, clinical applications and patient care.

New Leadership Appointments

I am pleased to announce the Board of Directors approved appointments of numerous members to leadership positions throughout the organization. Volunteers generously give their time to further the mission of RSNA, and we are incredibly grateful for their dedication. As we look forward to the next century, RSNA volunteers will play a critical role in leading us into the future of radiology.

Richard L. Ehman, M.D.
Chair, RSNA
Board of Directors

Introduced at RSNA 2014, the popular virtual Wilhelm Röentgen is again part of the RSNA Centennial Showcase at this year's annual meeting. ***RSNA Centennial Showcase Sponsored by McKesson.***

Editor's Farewell

RSNA News Has Grown with the Society

"Things don't have to change the world to be important."

- STEVE JOBS

Hovsepian

As my six-year term as editor draws to a close, I sincerely hope that you, the readers, consider *RSNA News* as relevant, at least, if not important. It's a team effort and we strive to earn your trust, provide interesting and informative content, and be responsive to your needs.

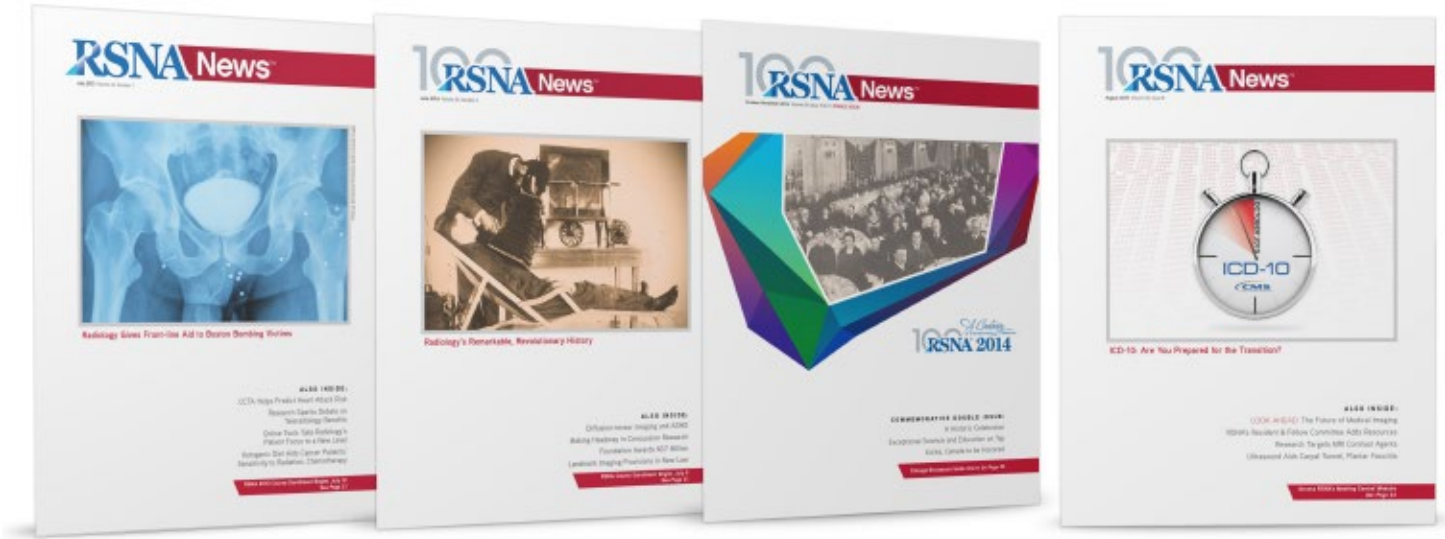
When *RSNA News* began almost a quarter century ago, its main purpose was to inform RSNA members about available benefits and services. At the time, it was a quarter of its current length (and photocopied). Growing as the Society grew, the scope of the magazine's mission has grown, too, and our goal is to be a more comprehensive news source on multiple levels to multiple readerships—including residents and fellows, international members, researchers and physicists.

With a general shift to online consumption of news and readers' expectation that the latest information should be only a click away, we recently introduced "Digital First" to the online version—posting current events as they happen, well in advance of fully developed feature articles. And our content is increasingly available in a variety of formats, giving you the option of using a mobile device or computer to read and store your copies—or maybe you prefer good old-fashioned print! We're very proud of that achievement.

Looking ahead, the future of *RSNA News* is in great hands. Please look at the masthead and familiarize yourselves with the many individuals who make this happen. The editorial board is a broadly representative sampling of diverse backgrounds and practice environments and each member brings unique talents. Our writers and production staff are seasoned professionals.

I am very proud of what we've accomplished so far but, even more, I look forward to being a reader of *RSNA News* for many years to come!

David M. Hovsepian, M.D.
***RSNA News* Editor**



LOOK AHEAD

The Evolution of Hands-on Simulation and Phantom Training in Radiology

BY DIANNE GEORGIAN-SMITH, M.D.

In 1989, Bill Shiels first demonstrated the value of the turkey breast as a platform for learning invasive freehand sonography skills at the RSNA Annual Meeting. As a fellow in pediatric radiology at University of Cincinnati (U.C.), he knew that children often receive radiation during fluoroscopy procedures to remove foreign bodies. Why not use ultrasound, he thought? But first, he needed to teach himself how to do it. The first retrieval took an hour, but after five or six procedures, he could accomplish the task in just a few minutes, changing pediatric radiology forever.

That same year, I was a breast imaging fellow at U.C., where Bill was using the long-axis technique for orientation instead of the standard short-axis technique, and I wanted to learn how to apply that approach to breast cyst aspirations. At the time, non-simple breast cysts essentially went right to surgical excision. How fortunate for myself, my trainees and my patients, that Bill and I became acquainted.

In 1991, we teamed up to start the RSNA hands-on (how-to) workshops using his turkey-breast model. In 1993, I spun off a dedicated breast hands-on workshop, both of which continue to this day.

Early on, the workshops used agar-filled 1-Liter saline bags. When we presented our idea for using raw turkey meat at the RSNA hands-on workshops, we knew there would be some interesting challenges, but we were resolved to make it a success.

While others were carrying 35mm slide carousels to the annual meeting, we were trying to figure out how to transport 200 pounds of raw meat. First we had to get the turkeys, which meant heading to the Chicago meat district at 5 a.m. to be ready for our 8:30 a.m. start. It was dark and Bill had rented a white Cadillac sedan so that we could bring back 10, 20-pound birds. Feeling that we must look a bit like Bonnie and Clyde in a getaway car with a suspiciously overloaded trunk, we headed back.

The next challenge was that, unlike store-bought birds, the turkey breasts were whole and needed to be split down the sternum. To split whole breasts, Bill brought a chain saw to the workshop and a large trunk filled with supplies for creating a variety of phantoms. He also had at his disposal a battalion of residents from Walter Reed Army Medical Center, where he had been appointed Surgeon General for the Army. It's no surprise that many of those residents are now the professors who teach the hands-on workshops and have done so for the past 24 years.

Turkey Phantom Workshops Take Off

The first RSNA workshop was an outstanding success, and we were invited back. As young radiologists eager for our academic careers to grow, we were thrilled. The plan for our next workshop, however, was to ask RSNA to procure the turkeys—no more trips in the dark to the meat district!

The following year, I can still remember the moment when I arrived to help set up and he told me that the birds had arrived—frozen. Not to be deterred, I found a kitchen in the back of McCormick Place, commandeered a large, industrial sink, and filled it with hot water. I grabbed a knife and started stabbing at the birds as they bobbed up and down, forcing

Continued on Next Page

Georgian-Smith

As many of you know, William (Bill) E. Shiels II, D.O., passed away this spring from pancreatic cancer. He was way ahead of his time and recognized over 25 years ago the value of simulation for teaching radiology skills. The gifts he gave were many; to me, it was the start of an academic career; to the community of radiologists, he bestowed knowledge and skills; and to women and children he gave health and to many their very lives. We owe him a sincere debt of gratitude for a legacy of helping others that will endure.

— Dianne Georgian-Smith, M.D.

"When we presented our idea for using raw turkey meat at the first RSNA hands-on workshops, we knew there would be some interesting challenges, but we were resolved to make it a success."

DIANNE GEORGIAN-SMITH, M.D.

Continued from Previous Page

warm water into the tissues. So much for my suit and coifed hair! I was so focused that I failed to notice a man in a full black tuxedo standing next to me, watching what I was doing. "There are not supposed to be any food products in that sink," he said. Undaunted, I simply apologized and returned to readying the birds.

From that experience, we learned that ice-crystals in turkey meat strongly reflect sound waves. We also learned that microwave-cooked meat is not conducive to good sound wave transmission.

We constantly faced the unexpected. The following year, the thighs that were delivered had such a strong odor that we suspected they had been sitting on the loading dock for an extended time.

Clean-up after the workshop had its own challenges, because of all the sharps and potentially infectious material. Picture the hauling out and discarding of the used carcasses and you'll be reminded of a well-known scene in the movie "Monty Python and the Holy Grail."

Value of the Turkey Phantom

The procedures we simulated in the RSNA hands-on workshops were cyst aspiration, percutaneous nephrostomy, foreign body removal, vascular access, abscess drainage, breast core biopsy, wire localization, biliary drainage and radiofrequency thermal ablation. Our goals were to introduce participants to the techniques of freehand invasive sonography in a tissue model and show them not only how to perform the procedure, but how to set up the phantoms so they could practice these skills on their own.

The benefit of the turkey model over synthetic models made of agar (Jello melts at room temperature) is that its true tissue provides tactile feedback during needle passage, more closely resembling clinical practice. Additionally, cavitation artifact from multiple needle passage can rapidly degrade the synthetic models. Moreover, the turkey phantom is versatile and easily modified for a variety of procedures.

This form of simulation has been used to train not only radiology residents, but those in other fields as well. For instance, anesthesia residents learn to perform ultrasound-guided nerve blocks using a phantom that has olives in it. We have had the pleasure of meeting radiologists from around the world, and fortunately the turkey's cousin, the chicken, seems to be available everywhere, so these techniques can be taught practically anywhere.

Simulation is the Way of the Future

We may think that learning in a safe and stress-free environment is ideal, but stress may actually serve a purpose in the process. I remember taking mock oral boards. Although it was a simulation, it felt as anxiety-provoking as the real thing. Nevertheless, it was very helpful not only as a practice exercise in factual recall, but for preparing me emotionally. The psychologist Jenny Susser, Ph.D., teaches that stress is an essential ingredient for learning. Stress is really an engineering term that describes the capacity to withstand pressure while maintaining functionality.

"In order to make a steel girder stronger, you have to add fire and heat," she said. "Here's the conundrum: You need to be emotionally fit to handle more stress. But the way to become emotionally fit is by exposing yourself to stress and pressure." That is the value of training on a phantom or a simulator—it's safe stress.

For decades, "Resusci Annie" mannequins have been familiar accompaniments to learning Cardiopulmonary Resuscitation (CPR) and Basic and Advanced Cardiac Life Support (BLS/ACLS). Some institutions have sophisticated simulation labs with full-scale "patients" who have intravenous access and telemetry

More than 25 years ago, William Shiels II, D.O., (*left*, leading a workshop), developed the hands-on workshops that are a familiar staple at RSNA annual meetings and paved the way for simulation training that is present in every field in medicine.

and are undergoing complex procedures. The principal advantage of using turkey breasts, of course, is their low cost and easy availability.

The success of simulation also depends on setting clear goals and having measurable mileposts for trainees. In a residency program, performance has traditionally been assessed by direct observation, but the use of computerized testing has become increasingly widespread. The Irish web-based company Ziltron designs cloud-based simulators and applications. Its mammographic screening program immediately provides the operator's sensitivity and specificity results. Ziltron's Facebook game, "X-Ray Ninja," aims to make the learning experience fun. The RSNA Diagnosis Live™ sessions at annual meetings and in residency programs are hugely successful because they are interactive and feel more like a game than an educational session.

Simulation training in medicine is now present in every field, from practicing procedures to approaching patients. As computer functionality becomes more complex and life-like, empowering drones and driverless cars, the capacity of simulators to enhance learning becomes limitless. Their cost will always be less than the price of a human life. However, the compassionate personal touch that singles out those memorable doctors from the merely competent ones will always be best taught by humans. □

DIANNE GEORGIAN-SMITH, M.D., is a senior radiologist, Brigham and Women's Hospital, and an associate professor of Radiology, Harvard Medical School, Boston.

The future of simulation training rests with computerized testing, such as RSNA's interactive Diagnosis Live™ Sessions *(above)* featuring technology that allows participants to use personal digital devices to submit case diagnoses in a game format. As a fun, interactive way to test radiologists' knowledge, Diagnosis Live sessions are increasingly popular at RSNA annual meetings.

Telerobotic Ultrasound May Revolutionize Telemedicine

BY RICHARD S. DARGAN

Researchers testing the efficacy of remote-controlled telerobotic ultrasound say the technology may have the potential to assess risk of heart attack or stroke and could play a critical role in reaching patients in rural and underserved areas around the globe.


Soble


Doherty


Doukky

The new technology—Tele Robotic Ultrasound for Distance Imaging, or TRUDI—allows an operator to perform ultrasound from any location with an Internet hookup. The ultrasound system is integrated into a robotic kiosk that the operator can manipulate into the proper position to complete an examination in just a few minutes.

Although still in the early stages of development, experts say the technology has vast potential for providing critical healthcare to resource-poor areas of the world—among other potential uses.

"Telerobotic ultrasound has the potential to revolutionize telemedicine by connecting the remote underserved areas of the world with a real-time imaging capability for diagnosis of acute diseases such as acute appendicitis and ectopic pregnancy," said Vikram Dogra, M.D., director of ultrasound and professor of radiology and biomedical engineering at the University of Rochester, N.Y.

New York, Chicago Test Telerobotic Ultrasound

In a groundbreaking study, cardiovascular imaging specialists of Icahn School of Medicine at Mount Sinai Hospital in New York and Rush University Medical Center in Chicago are investigating whether remote-controlled robotic ultrasound examinations can produce results comparable to those of manual examinations.

"The operator can use video images of the patient environment, simulated patient views and our remote control software suite to enable proper probe positioning on the patient's anatomy, all the while communicating with the patient directly through telepresence," said Jeffrey S. Soble, M.D., a cardiologist at Rush, who developed the technology with biomedical engineer Sarah Doherty. "Additionally, a digital ultrasound machine with PC controls allows users to change depth and gain and the ultrasound mode from their remote locations."

The PC-based ultrasound system is manufactured by Telemed Ultrasound Medical Systems.

Dr. Soble and Doherty are co-founders of TeleHealthRobotics in Chicago. The pair developed a prototype that can perform cardiovascular and neck ultrasound.

For a new two-part study, Partho P. Sengupta, M.D., an associate professor of medicine at the Icahn School of Medicine, and colleagues at Mount Sinai will use the TRUDI platform to perform carotid ultrasound from their New York City facility on patients in Chicago, comparing results with standard ultrasound examinations performed on the patients by Chicago sonographers at Rush University Medical Center.

"In the first cohort, volunteers will receive two manual ultrasound carotid artery acquisitions and two telerobotic acquisitions. We aim to show non-inferiority, or equivalency, between acquisition types," said researcher Rami Doukky, M.D., professor of medicine and radiology at Chicago's Rush Medical College.

For the second group, researchers will compare manual and telerobotic ultrasound acquisition for detection of carotid atherosclerotic plaque, a common warning sign of heart attack and stroke. If successful, the technology could provide a safe, convenient risk assessment for high-risk patients who might not otherwise have access to ultrasound, and allow for earlier therapeutic intervention.

"If proven cost-effective, we could potentially use this technology at regular intervals to provide personal risk assessment," Dr. Sengupta said.

Although there is a learning curve associated with the telerobotic platform, Dr. Sengupta demonstrated that experienced sonographers can achieve proficiency quickly.

In a study published in the August 2015 issue of the *Journal of the American College of Cardiology: Cardiovascular Imaging*

> *"A fetal ultrasound expert might not be available in a rural community, but with telerobotic ultrasound, those experts will be available anywhere in the world with an Internet hookup."*
>
> PARTHO P. SENGUPTA, M.D.

Dr. Sengupta and colleagues at the German Heart Center in Munich compared the performance of an early ultrasound trainee with that of an advanced sonographer on the telerobotic platform. Results indicated that while both operators became proficient with the technology, the professional sonographer adapted to the new situation faster than the early trainee. Results show that clinical experience with ultrasound is useful for telerobotic acquisition even as TeleHealthRobotics incorporates sensing and image recognition mechanisms for semi-automation of the exam. An advanced sonographer was able to complete a telerobotic carotid ultrasound exam on a healthy volunteer in four minutes.

WEB EXTRAS

Access a video of Jeffrey Soble, M.D., discussing the promise and potential of telerobotic ultrasound at *RSNA.org/News*.

Technology Could Cut Wait Times for Diagnosis

The technology may also reduce wait times for patients at high risk of heart attack or stroke, according to Dr. Sengupta's research. He collaborated with researchers in Sweden to analyze how a robot-assisted echocardiogram test affected waiting times for a diagnosis in heart failure patients from rural communities.

Average wait times were reduced from nearly four months to less than one month in patients receiving remote consultation, while patient wait times for a specialty consultation were reduced from 86 to 12 days. Results showed that 95 percent of the remote-consult patients considered it to be a superior strategy.

"Patients with heart failure often have to wait for days or weeks to see a specialist," Dr. Sengupta said. "In this randomized trial, diagnosis time was substantially reduced with the robotic ultrasound system."

The research shows promise for a safe, inexpensive technology that does not expose patients to radiation. In the future, patients could potentially undergo robotic ultrasound examinations similar to the automated blood pressure readings now available at pharmacies, Dr. Sengupta said.

"This would enable us to perform carotid artery screening without having a dedicated technologist at every machine," Dr. Doukky added.

Potential for Cardiac Procedures and Beyond

Telerobotic ultrasound also may have a role in advanced cardiac procedures such as transcutaneous valve replacements. The remotely controlled robotic kiosk would enable physicians to perform ultrasound on the chest surface instead of down the throat, eliminating the need for general anesthesia and enabling the technologist to remain at a distance from the exam room, avoiding exposure to radiation from the X-rays required for the procedure.

Though the new study focuses on carotid artery imaging, the robotic approach has the potential to be used on other parts of the body, researchers said.

"A fetal ultrasound expert might not be available in a rural community, but with telerobotic ultrasound, those experts will be available anywhere in the world with an Internet hookup," Dr. Sengupta said.

"The technology is poised to reduce the overall maternal mortality by providing access to antenatal care in developing countries," he said. "Telerobotic ultrasound will revolutionize the practice of diagnostic ultrasound across the globe."

Dr. Sengupta expects to begin seeing results from the study in 2016. □

RICHARD S. DARGAN is a writer based in Albuquerque, N.M., specializing in healthcare issues.

ON THE COVER

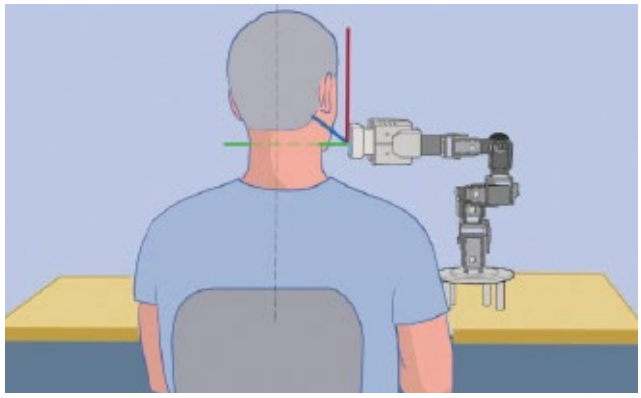


Image courtesy of Sarah Doherty

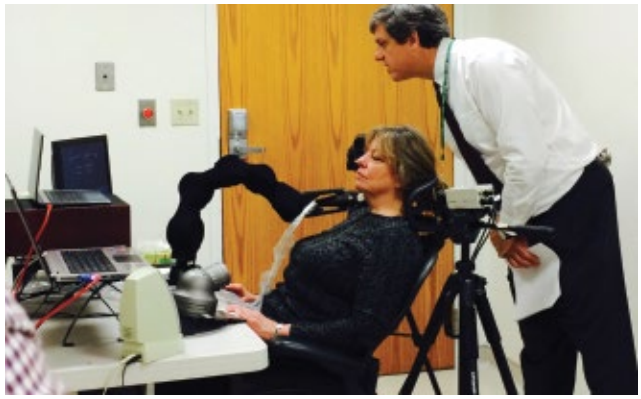


Image courtesy of Sarah Doherty

A new clinical trial is testing the feasibility of remotely performing long-distance, telerobotic ultrasound exams over the Internet. *Top*: Partho Sengupta, M.D., of Mount Sinai Hospital in New York, conducts a long-distance, telerobotic ultrasound patient exam between Mount Sinai and Rush University Medical Center, Chicago; *center*: a simplified schematic of the telerobotic ultrasound technology's 3-D movement capabilities; *bottom*: Jeffrey Soble, M.D., of Rush University, looks on as Dr. Sengupta remotely performs telerobotic ultrasound on a volunteer at the Chicago medical center.

RSNA Outreach Educates Public, Media About Radiology

BY PAUL LaTOUR

In April, the NBC News website posted an article, "Brain Brownout: Concussion Recovery May Be Slower for Women."


Yee


Wintermark


Mathews

The story featured Chi-Jen Chen, M.D., a co-author of a study published in the RSNA journal *Radiology* that found women were more likely than men to experience prolonged memory deficits following a mild traumatic brain injury (mTBI).

NBC News wasn't alone that day. Versions of the story also appeared on the *U.S. News and World Report* website, at *MSN.com*, and *WebMD.com*, among others. In fact, there were 550 placements, making it one of the most popular stories to stem from a *Radiology* study in 2015.

This wasn't a coincidence. It was part of a well-designed process created by the RSNA Public Information Committee (PIC) in 2002. The *Radiology* press release program was conceived as a means to highlight important and newsworthy studies published in *Radiology* and increase public awareness of the role that radiology and radiologists play in healthcare.

"The journal press release program also helps to enhance public awareness of RSNA and it allows us to give the general public a better understanding of the important contributions of radiologists and medical imaging and how we affect their medical care," said Judy Yee, M.D., chair of the PIC and vice-chair of radiology and biomedical imaging at the University of California San Francisco.

A variety of groups within RSNA work together to develop and distribute the press releases, including the 17-member PIC and RSNA media relations staff. After review by the study author, *Radiology* editor, PIC chair and staff, the press releases are distributed to general healthcare and radiology trade media outlets based on the topic of the article.

The *Radiology* press release program continues to do well. Media coverage through Aug. 25 of this year totaled 3,170 tracked media placements, yielding an estimated audience/circulation of more than 1.4 billion.

> *"Many times radiologists are not even recognized as physicians. We're putting a face to the profession."*
> JUDY YEE, M.D.

Putting a Face to the Profession

A major goal of radiology's continued move toward a patient-centered care model is communicating to the public and media about the vital role radiologists play in a patient's overall healthcare. The PIC activities support that goal.

"Highlighting what we do has an educational benefit to the public and to the media," Dr. Yee said. "Many times radiologists are not even recognized as physicians. We're putting a face to the profession."

The press releases include quotes from a study's lead or co-author, who is available for media interviews after the release is distributed. In case reporters seek additional sources for their stories, the PIC turns to members of RSNA's Public Information Advisors Network (PIAN), an assembly of subject matter experts spread across radiology's subspecialties and the world.

But being a subject matter expert isn't always enough to be an effective member of the PIAN. Most have gone through media training workshops provided by the RSNA during the annual meeting.

"To communicate with the media and the public requires certain skills," said Max Wintermark, M.D., the PIC vice-chair and professor of radiology at the Stanford University Medical Center. "That's something that some radiologists are very good at doing, but others aren't because they have not been trained. It's helpful to have a representative body that plays that role and plays it in an expert fashion."

Also during the annual meeting, the PIC selects appropriate articles for press conferences, which are

Each year at the RSNA Annual Meeting, RSNA Public Information Committee (PIC) members moderate the press conferences given by RSNA presenters.

moderated by PIC members. Topics must have scientific validity while also appealing to the general public's interest.

"On the PIC we have subject matter expertise and we try to match that up with the different press conference topics to help guide the discussion and clarify points as needed," Dr. Yee said.

Radiology Offers Organized Responses to Hot Topics

Helping the public and media better understand radiology means not only disseminating information, but also responding to or providing context for controversial or misleading information that may be gaining traction in the press. A recent example is radiation exposure from CT scans.

With that in mind, several radiology organizations formed the Imaging Communication Network (ICN), which allows for inter-organizational notification of potential hot topics in the press and for organized responses to press reports when appropriate.

Formed in 2012, the ICN currently includes RSNA, the American College of Radiology (ACR), the American Association of Physicists in Medicine, the American Board of Radiology, the American College of Radiation Oncology, the American Roentgen Ray Society and the Canadian Association of Radiologists.

WEB EXTRAS

For more information on RSNA's Media Relations Department, go to *RSNA.org/Media.aspx*.

Access the RSNA/American College of Radiology joint patient information website at *RadiologyInfo.org*.

Other RSNA programs to educate the public include the creation and distribution of public service announcements and the "60-Second Checkup" radio program, as well as the joint production with ACR of the patient information website, *RadiologyInfo.org*.

Increasing public awareness of the contributions made to healthcare by radiology and radiologists is the guiding principle behind RSNA's public information programs.

"Radiology, unfortunately, is not well understood by the public," said Vincent P. Mathews, M.D., a PIAN member and chair of the Department of Radiology at the Medical College of Wisconsin. "Awareness initiatives, like the many efforts supported by the PIC and PIAN members, help educate the public on the important role of radiology in medicine as a distinct specialty."

PIC members help develop press releases stemming from *Radiology* research that are distributed to media outlets across the globe for news coverage (*above, right*).

PAUL LaTOUR is an *RSNA News* staff writer.

Radiologists See Increased Pay for Second Year

BY MIKE BASSETT

Radiologists realized salary increases for the second consecutive year, according to the American Medical Group Association (AMGA). The 2015 Medical Group Compensation and Productivity Survey ranks radiology among the most highly compensated specialties.

IN THIS YEAR'S REPORT, AMGA received survey responses from 251 medical groups representing more than 73,000 providers.

The survey shows that the median compensation levels for non-interventional radiologists increased by 1.6 percent, from $476,013 in 2013 to $483,660 in 2014, while compensation for interventional radiologists jumped 11.4 percent in the same time period. (See graphs)

"It's always good to see that compensation is going up," said David Yousem, M.D., M.B.A., a professor in the Department of Radiology, vice-chair of program development and director of neuroradiology at Johns Hopkins Hospital in Baltimore, and a nationally recognized expert in radiology economics. "We are working harder, but we continue to get maximum efficiency."

Yousem

Dobosenski

"It's always good to see that compensation is going up. We are working harder, but we continue to get maximum efficiency."

DAVID YOUSEM, M.D., M.B.A.

A look at the radiology compensation numbers—and productivity numbers as represented by work RVUs (relative value units)—over a longer period of time suggests that while radiologists are earning more money, they are also working more efficiently.

Interventional Radiology Salary Increase "an Anomaly"

While the numbers for interventional radiologists may seem out of step with previous compensation reports (last year's survey showed a 2.7 percent increase in compensation and a 5.8 percent increase in work RVUs from 2012 to 2013 for interventional radiology), Tom Dobosenski, president of AMGA Consulting Services, said that taking a long-term look at the data is a better way to put the numbers for interventional radiology in perspective.

He pointed out that it's not unusual to find "anomalies" in a compensation survey, particularly when it comes to high-income specialties where large practices might report their data one year and fail to do so the next.

"We always suggest that people blend data from a longer length of time rather than looking at one-year periods," Dobosenski said.

An examination of collections data also helps put the interventional radiology survey results in perspective, Dr. Yousem said.

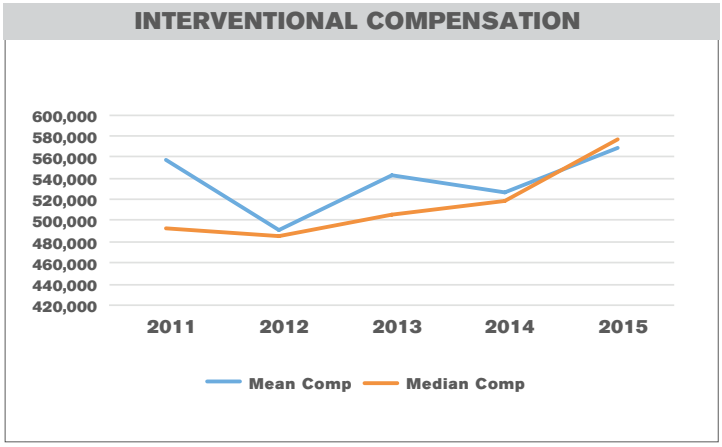
"Even though RVUs went down, collections actually went up," he said, pointing out that mean net collections for interventional radiology increased from $893,546 in 2013 to $975,380 in 2014. Net payments per RVU in 2014 were $73.62 compared to $65.24 in 2013. "So even though RVUs were lower, they were collecting more for the work they were doing."

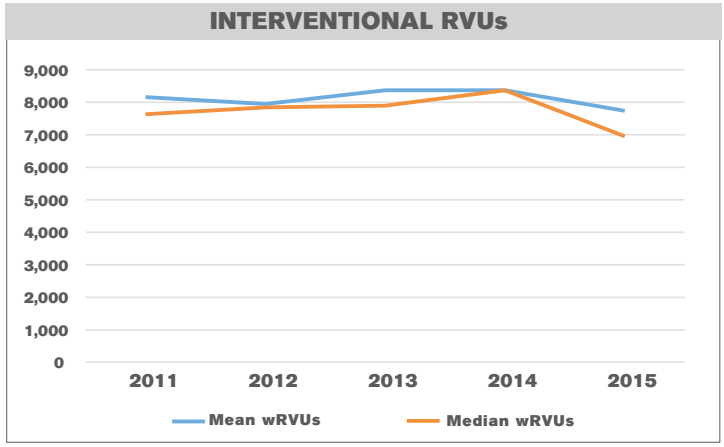
One explanation for this may be that payer mixes are changing, according to Dr. Yousem.

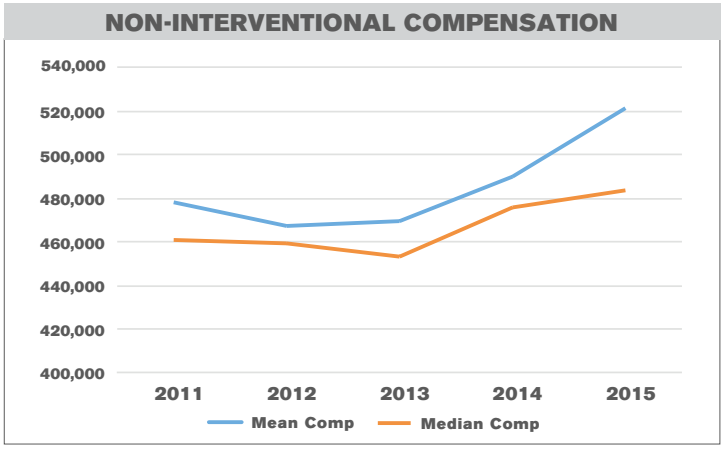
"For example, in Baltimore many private practices contract with insurers at rates that are less than what Medicare pays, while hospitals like the University of Maryland Medical Center and Johns Hopkins contract at higher than Medicare rates," he said. "This may suggest that more procedures are being performed at facilities that charge more to the payers than Medicare rates."

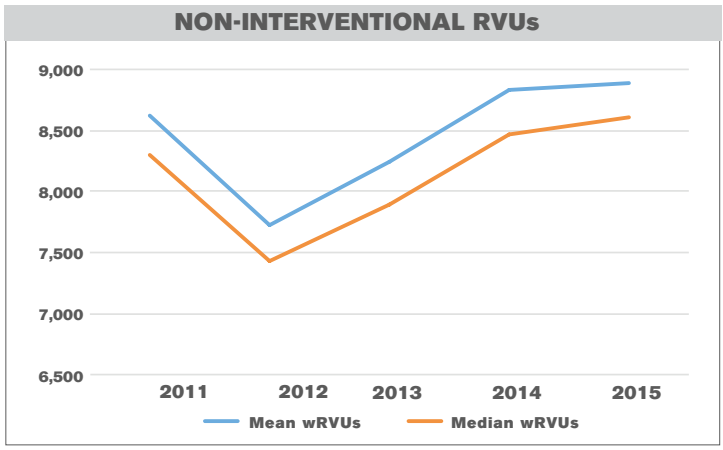
Radiology Among Most Highly Compensated Specialties

Overall, compensation for medical specialties increased by 5.9 percent, while work RVUs increased by 1.1 percent in 2014. Surgical specialties saw a 3.5 percent increase in compensation and a 0.6 percent decrease in RVUs, while primary care saw no change in compensation and a 0.2 percent decrease in work RVUs.









Radiologists' salaries increased across the board in 2014. The American Medical Group Association (AMGA) survey shows that the median compensation levels for non-interventional radiologists increased by 1.6 percent, from $476,013 in 2013 to $483,660 in 2014, while compensation for interventional radiologists jumped 11.4 percent in the same time period. In terms of productivity represented by RVUs (relative value units), the survey shows that radiologists are earning more money, but are also working more efficiently.
Charts courtesy of the American Medical Group Association (AMGA).

"I would have expected to see primary care go up at a faster pace than it did over the past several years, particularly with the shift to preventive medicine and value-based compensation structures," Dobosenski said.

"When you look at radiology, these numbers sort of map where the market is going for a lot of specialties," Dobosenski added. "There are specialties that have seen larger increases in compensation over the last few years, such as cardiology, but a lot of medical and surgical specialties have been relatively flat this year."

As for the future, both experts say they believe there really isn't much room for more efficiency in radiology practices. "With PACS and RIS and voice recognition we are pretty much maxed out," Dr. Yousem said. "I don't know how we are going to get more efficient in reading more cases per unit time. So I don't expect to see RVUs increase that much from the standpoint of work efficiency."

However, Dr. Yousem suggests that neurointerventional radiologists should benefit from the results of recent stroke trials, such as the ESCAPE clinical trial, which demonstrated that overall stroke mortality rates can be reduced with endovascular neuro-interventional clot removal procedures. "This should continue to be an area of growth for neuro-interventional radiologists," he said. □

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

WEB EXTRAS
More information about the American Medical Group Association is available a *amga.org*.

Health Policy Focus of RSNA 2015 Sessions

Watch *RSNA News* for a report on RSNA 2015 sessions covering issues including the CMS 2017 mandate for clinical decision support and trends in radiologists' reimbursement including the role of relative value units (RVUs).

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Research Resident Grant Recipient Awarded $2 Million from NIH


Gade

Terence Gade, M.D., Ph.D., received the 2012 Cook Medical Cesare Gianturco/RSNA Research Resident Grant to evaluate the use of dynamic hyperpolarized carbon-13 nuclear MR spectroscopy for the non-invasive assessment of metabolic changes in hepatocellular carcinoma cells, in response to transarterial chemoembolization (TACE) treatment. These metabolic changes enable cell survival under TACE-induced ischemia and often result in recurrence following a period of latency, not seen until follow-up imaging.

Dr. Gade, now an assistant professor of radiology at the Hospital of the University of Pennsylvania, has been awarded a $2 million, 5-Year NIH Director's Early Independence Award to further elucidate the metabolic alterations in cells surviving ischemia and to translate his initial findings into a clinically applicable imaging paradigm that will improve treatment of this devastating disease.

"This is the first time a radiologist has received this award and I think it demonstrates the progress we are making in radiology research, in large part due to pilot funding mechanisms like the Research Resident Grant," Dr. Gade said. "I want to express my appreciation for the support of the Foundation and all who make these grants possible."

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

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2016 R&E Grant Application Deadlines Approach

Applications for RSNA Research & Education (R&E) Foundation grants for 2016 are being accepted (*see deadlines below*). For more information, go to *RSNA.org/Foundation* or contact Scott A. Walter, M.S., Assistant Director, Grant Administration at 1-630-571-7816 or *swalter@rsna.org*.

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DEADLINE—JAN. 11

- Education Scholar Grant
- RSNA/AUR/APDR/SCARD Radiology Education Research Development Grant

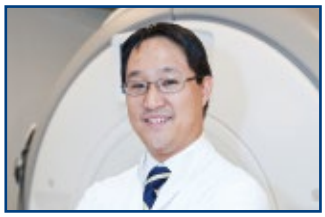
RESEARCH GRANTS

DEADLINE—JAN. 15

- Research Scholar Grant
- Research Seed Grant
- Research Resident/Fellow Grant

RESEARCH MEDICAL STUDENT GRANT

DEADLINE—FEB. 1



By receiving an R&E Foundation grant, I have increased the visibility of my research inside my department, my institution and in the RSNA community.

Edwin H.G. Oei, M.D., Ph.D
2014 Research Seed Grant

Journal Highlights

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

State of the Art: Digital Breast Tomosynthesis

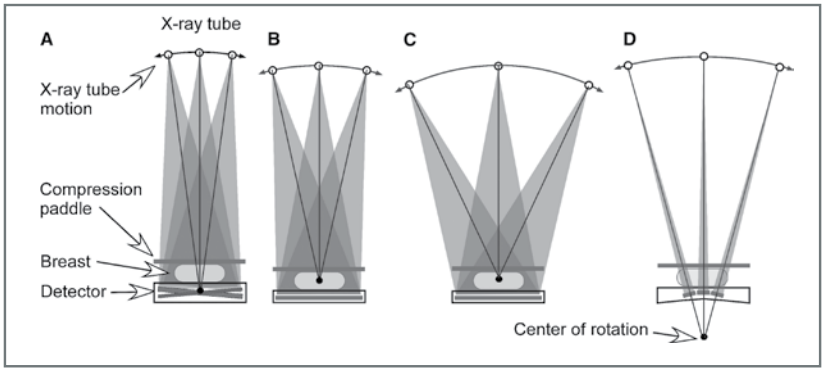
Digital breast tomosynthesis (DBT), a limited-angle tomographic breast imaging technique, was developed to overcome tissue superposition, and its clinical adaptation was facilitated by the development of digital detectors.

In a State of the Art article in the December issue of *Radiology* (*RSNA.org/Radiology*), Srinivasan Vedantham, Ph.D., of the University of Massachusetts Medical School, and colleagues describe DBT in terms of technology, results from recent clinical studies, advanced applications such as contrast-enhanced DBT, and ongoing efforts to develop multimodality imaging systems that includes DBT.

Essentials from the article include:

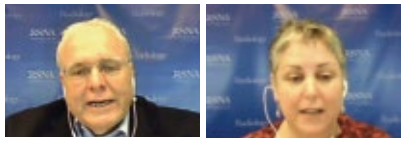
- Current clinical and clinical prototype DBT systems differ in imaging geometry, angular range of tube motion, number of projections, scan duration, acquisition method such as step-and-shoot or continuous X-ray motion, detector technology and its operation such as pixel binning and reconstruction algorithms.
- Studies in screening population show a statistically significant reduction in recall rate with 2-view DBT plus full-field digital mammography (FFDM) compared with 2-view FFDM.
- Prospective trials in a screening population from Europe show a statistically significant increase in cancer detection rate with 2-view DBT plus FFDM compared with 2-view FFDM, and retrospective observational studies from the U.S. show either a significant or a nonsignificant increase.
- Retrospective reader studies show either noninferiority or superiority of DBT compared with mammography in terms of area under the curve or other equivalent figures of merit.

"Almost all studies reported to date with DBT alone or a combination of DBT with FFDM show that DBT is either noninferior or superior to FFDM, with the exception of an early study on microcalcifications," the authors write.



Clinical digital breast tomosynthesis systems vary in imaging system geometry as illustrated *(left):* A, Detector is angulated with respect to the center of rotation while the X-ray source traverses an arc in a predetermined ratio and is referred to as isocentric motion of detector. B,C, Detector remains stationary while the X-ray source traverses an arc covering a predetermined angular range, with the X-ray tube covering a larger angle in C than in B. D, A slot-scan DBT system in which the center of rotation is located below the breast.

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



Radiology EXTRA PODCASTS

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

- "Development and Validation of Electronic Health Record–based Triggers to Detect Delays in Follow-up of Abnormal Lung Imaging Findings," Daniel R. Murphy, M.D., M.B.A., and colleagues.

A roundtable discussion combining these articles:

- "U.S. National Diagnostic Reference Levels: Closing the Gap (Editorial)," James A. Brink, M.D., and Donald L. Miller, M.D.
- "Radiation Doses in Consecutive CT Examinations from Five University of California Medical Centers," Rebecca Smith-Bindman, M.D., and colleagues.

"Golden Oldies" Spotlighted in December *Radiology* Issue

As part of the RSNA Centennial Celebration, each month *Radiology* is featuring 15 "Golden Oldies" articles based on their significance to the advancement in the field of radiology. The special supplement in the December issue spotlights MR and CT imaging:

- "Precise biopsy localization by computed tomography," 1976
- "Diffusion-weighted MR imaging of anisotropic water diffusion in cat central nervous system," 1990
- "Aortic and hepatic peak enhancement at CT: effect of contrast medium injection rate—pharmacokinetic analysis and experimental porcine model," 1998

The online-only articles will be available to RSNA members and *Radiology* subscribers. For more information, and to view a video of *Radiology* Editor Herbert Y. Kressel, M.D., and Senior Deputy Editor Deborah Levine, M.D., discussing the series, go to *RSNA.org/Golden-Oldies*.

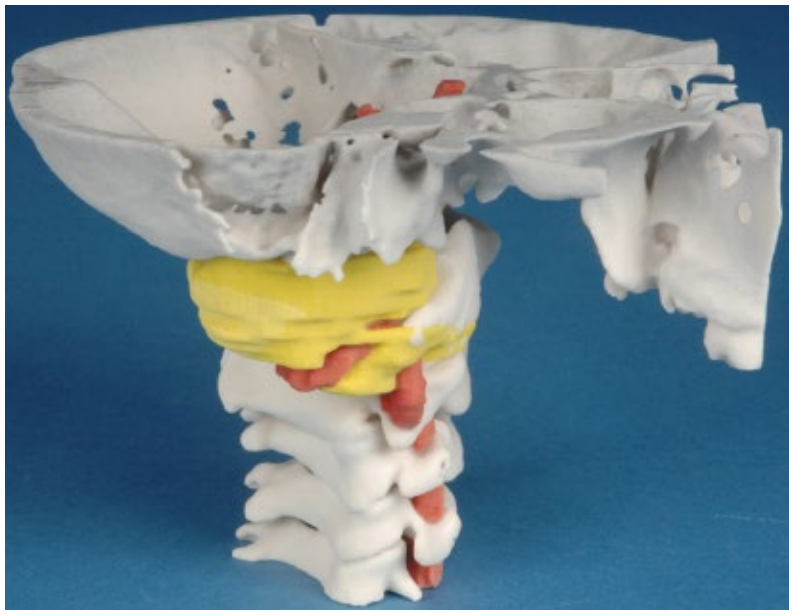
Three-Dimensional Physical Modeling: Applications and Experience at Mayo Clinic

Radiology is on the verge of another technological revolution. Just as digital imaging moved images from film to computers and cross-sectional imaging and three-dimensional (3-D) reconstruction produced virtual realism, 3-D physical modeling (or 3-D modeling) promises to create a paradigm shift in medical imaging.

In an article in the November-December issue of *RadioGraphics* (*RSNA.org/RadioGraphics*), Jane S. Matsumoto, M.D., of the Mayo Clinic, and colleagues outlined the available technology and the processes necessary to create 3-D models from the radiologist's perspective. They reviewed the published medical literature regarding the use of 3-D models in various surgical practices and shared their experience in creating a hospital-based 3-D printing laboratory to aid in the planning of complex surgeries.

Specifically, the authors discuss the following teaching points:

- Combining the multisensory inputs of touch and binocular vision leads to a higher level of spatial conceptualization. This is consistent with the concept of "touch to comprehend."
- Clear imaging planning is a key step in the 3-D modeling process.
- The surgeon uses the tangible, life-sized model of individual anatomy for preoperative planning, explanation of the procedure to the patient, and as a reference during the surgical procedure.
- A resolution phantom is used as the quality control phantom to monitor the accuracy of 3-D printing models.
- The National Institutes of Health has developed an online database for sharing biomedical print files and educational information on 3-D printing.



Model of a skull base tumor, printed with an ink-jet printer, shows the complex relationship of the tumor to the upper cervical spine, skull base, and vertebral artery. (*RadioGraphics* 2015;35;InPress) ©RSNA 2015 All rights reserved. Printed with permission.

At this time, a barrier to more rapid development is the absence of a Current Procedural Terminology code that would provide a mechanism for reimbursement beyond direct patient billing or reliance on institutional funding.

"Given the dependence of the 3-D modeling process on the selection of proper imaging techniques, the acquisition of high-quality data and the need for expertise in understanding and interpreting radiographic anatomy and pathophysiology, we believe that every radiologist will become increasingly involved in this emerging technology," the authors write.

Radiology in Public Focus

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

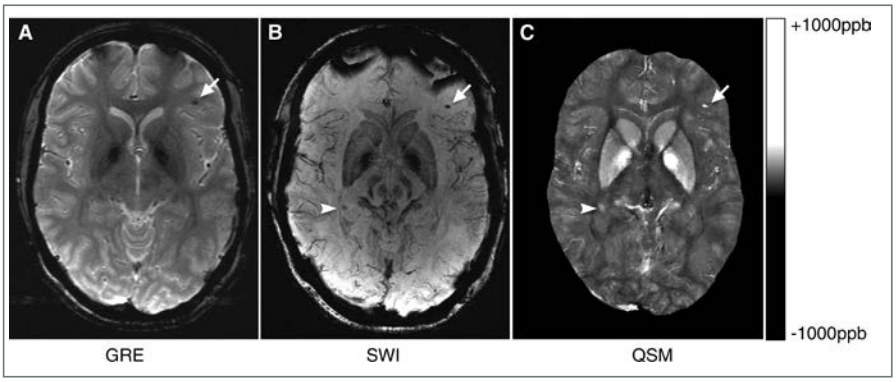
MRI Improves Diagnosis of Microbleeding after Brain Injury in Military Personnel

Performing MRI in patients with traumatic brain injury (TBI) as early as possible would facilitate better evaluation of cerebral microhemorrhages (CMHs), according to new research.

Wei Liu, D.Sc., of Walter Reed National Military Medical Center, and colleagues studied 603 military personnel patients who underwent 2-D conventional gradient-recalled-echo MRI and 3-D flow-compensated multiecho gradient-recalled-echo (GRE) MRI(processed to generate susceptibility-weighted images [SWI] and quantitative susceptibility maps [QSM]), and a subset of patients who underwent follow-up imaging. Microhemorrhages were identified by two radiologists independently. Comparisons of microhemorrhage number, size, and magnetic susceptibility derived from quantitative susceptibility maps between baseline and follow-up imaging examinations were performed by using the paired *t* test.

Among the 603 patients, cerebral microhemorrhages were identified in 43 patients, with six excluded for further analysis owing to artifacts. Seventy-seven percent (451 of 585) of the microhemorrhages on susceptibility-weighted images had a more conspicuous appearance than on gradient-recalled-echo images. Thirteen of the 37 patients underwent follow-up imaging examinations. In these patients, a smaller number of microhemorrhages were identified at follow-up compared with baseline on quantitative susceptibility maps (mean ± standard deviation, 9.8 microhemorrhages ± 12.8 vs. 13.7 microhemorrhages ± 16.6; P = .019). Quantitative susceptibility mapping-derived quantitative measures of microhemorrhages also decreased over time: -0.85 ^{mm3} per day ± 1.59 for total volume (P = .039) and -0.10 parts per billion per day ± 0.14 for mean magnetic susceptibility (P = .016).

"In the current study we found that the number of microhemorrhages and QSM-derived measurements of microhemorrhages all decreased over time, suggesting that hemosiderin products undergo continued, subtle evolution in the chronic stage of TBI. Furthermore, by correlating microhemorrhages with regional brain volumes, abnormalities such as fiber discontinuities or hyperintensities on T2-weighted fluid attenuation inversion-recovery images will facilitate the investigation of this disease," the authors write.



A, gradient-recalled-echo (GRE), B, susceptibility-weighted images (SWI), and C, quantitative susceptibility maps (QSM) images in a patient with traumatic brain injury (TBI). The arrows indicate a cerebral microhemorrhage that is visible on SWI, GRE and QSM images. The arrowheads indicate another CMH that is visible on SWI and QSM images, but not the GRE image. ppb = parts per billion
(*Radiology* 2016;278;2:InPress) ©RSNA 2016

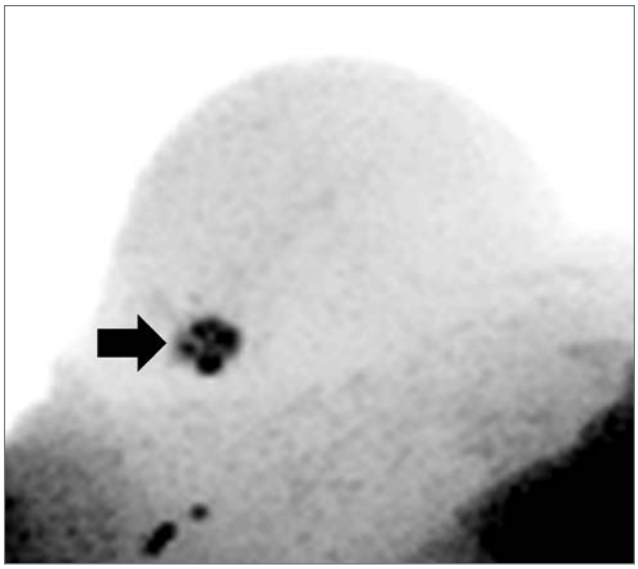
MRI Technique Could Reduce Need for Breast Biopsies

Unenhanced diagnostic MRI-diffusion-weighted imaging with background suppression (DWIBS) mammography can help exclude malignancy in women with suspicious X-ray screening mammograms without the use of ionizing radiation or a contrast agent, according to new research. The method has the potential to reduce unnecessary biopsies—as well as emotional distress—for breast cancer screening patients if used as a complement after the regular screening clarification procedure.

Sebastian Bickelhaupt, M.D., of the German Cancer Research Center, Heidelberg, Germany, and colleagues conducted a prospective institutional review that included 50 women (mean age, 57.1 years; range, 50-69 years), who gave informed consent and who had suspicious screening mammograms and an indication for biopsy from September 2014 to January 2015.

Before biopsy, full diagnostic contrast-enhanced MRI was performed that included DWIBS (b = 1500 sec/mm^2). Two abbreviated protocols (APs) based on maximum intensity projections (MIPs) were evaluated regarding the potential to exclude malignancy: DWIBS (AP1) and subtraction images from the first post-contrast and the unenhanced series (AP2). Diagnostic indexes of both methods were examined using the McNemar test and were compared with those of the full diagnostic protocol and histopathologic findings.

Of the 50 participants, 24 had a breast carcinoma. With AP1 (DWIBS), the sensitivity was 0.92, the specificity was 0.94, the negative predictive value (NPV) was 0.92 and the positive predictive value (PPV) was 0.93. The mean reading time was 29.7 seconds and was less than three seconds in the absence of suspicious findings on the DWIBS MIPs.



With the AP2 protocol, the sensitivity was 0.85, the specificity was 0.90, the NPV was 0.87, the PPV was 0.89, and the mean reading time was 29.6 seconds (range, 6.0–100.0 seconds).

Unenhanced diagnostic MR imaging–DWIBS mammography achieved a comparable accuracy to the full diagnostic protocol and to abbreviated contrast-enhanced protocols when used as a complementary method after screening mammography, according to researchers.

"The comprehensive method is fast and robust to perform as a complement to routine mammography. Along with lack of need for intravenous contrast agent administration, advantages include its short acquisition time of less than seven minutes and short reading time of less than 30 seconds," the authors write.

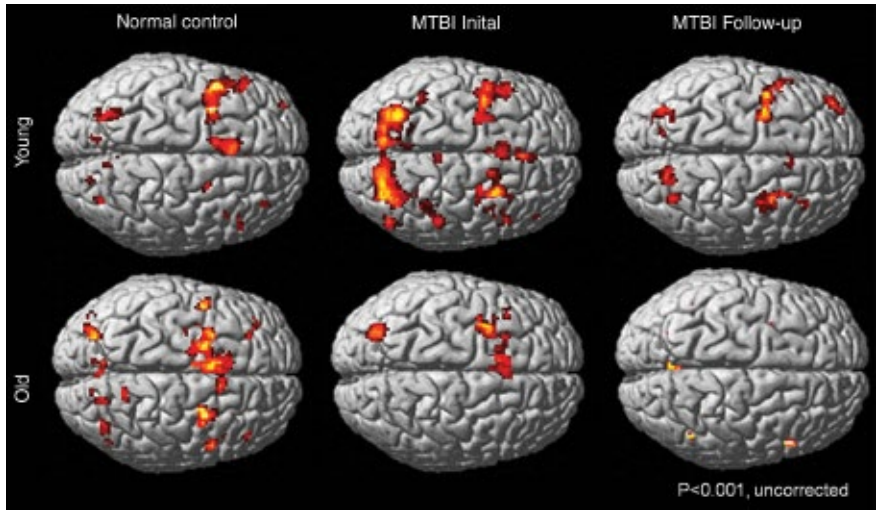
Image in a 65-year-old breast cancer screening participant with a suspicious lesion (arrow) at screening mammography. Diffusion weighted imaging with background suppression (DWIBS) (b = 1500 sec/mm^2) maximum intensity projection, displayed with black-white inversion, shows the lesion as an area of focal diffusion restriction.

Older Patients Recover More Slowly from Concussion

Functional MRI (fMRI) showed different activation patterns during working memory (WM) performance tasks in younger and older patients, confirming the importance of age in the activation, modulation and allocation of WM processing resources after mild traumatic brain injury (MTBI), according to a new study.

David Yen-Ting Chen, M.D., of the Brain and Consciousness Research Center in Taiwan, and colleagues assessed N-back WM cerebral activation with fMRI in 13 younger (mean age, 26.2 years ± 2.9; range, 21–30 years) and 13 older (mean age, 57.8 years ± 6.6; range, 51–68 years) patients with MTBI and 26 age- and sex-matched control subjects. Two fMRI were obtained within one month after injury and six weeks after the initial study. Group comparison and regression analysis were performed among post-concussion symptoms, neuropsychologic tests, and WM activity in both groups.

In addition to showing different activation patterns during WM tasks in younger and older patients, the study also found:

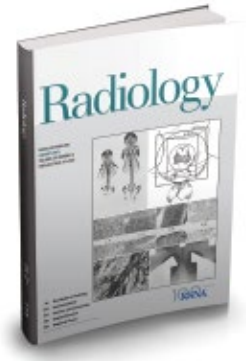


Different working memory (WM) activation patterns in healthy control subjects and young and old patients with mild traumatic brain injury (MTBI). Surface-rendered projections on a representative atlas brain show areas of activation in two-back greater than one-back condition with a threshold of P < .001 uncorrected and a minimum cluster extent of 36 contiguous voxels. Top left: Young control subjects had increased activation in the frontal and parietal regions, predominantly at the left hemisphere. Top middle: In the initial study, young patients had bilateral hyperactivation in the frontal and parietal regions compared with young control subjects. Top right: Partial recovery of the activation pattern is seen at follow-up imaging; young patients had less activation compared with the initial imaging study. Bottom left: Older control subjects had increased cerebral activation in bilateral frontal and parietal regions. Bottom middle: In the initial study, older patients showed hypoactivation compared with older control subjects, with cerebral activation lateralized to the left frontal and parietal regions. Bottom right: At follow-up imaging, older patients had even less activation compared with the initial imaging study.

- Partial recovery of a decrease of post-concussion syndrome (PCS) symptoms associated with hyperactivation was observed in younger patients at six-week follow-up imaging, whereas persistent hypoactivation and no change in PCS symptoms were observed in older patients.
- Increased activation in younger patients was associated with poorer task performance and more severe PCS symptoms; surprisingly, the latter may suggest that hyperactivation in younger patients with MTBI indicates more severe brain injury.

"Taken together, these findings provide evidence for differential neural plasticity across different ages, with potential prognostic and therapeutic implications," the authors write.

Radiology In Public Focus



Media Coverage of RSNA

In August and September, 1,026 RSNA-related news stories were tracked in the media. These stories reached an estimated 1.2 billion people.

Coverage included *Yahoo! News*, *U.S. News & World Report*, *Bloomberg News*, *Chicago Tribune*, *Reuters*, *MSN.com*, *Business Wire*, *Boston.com*, *The Daily Telegraph*, *San Francisco Chronicle*, *The International Business Times*, *Houston Chronicle*, *Toronto Star*, *CNNMoney.com*, *HealthDay*, *CNBC.com*, *AuntMinnie.com*, *Imaging Economics*, *Medical Imaging*, *Diagnostic Imaging* and *Health Imaging & IT*.

DECEMBER PUBLIC INFORMATION ACTIVITIES FOCUS ON ALZHEIMER'S DISEASE

In December, RSNA's 60-Second Checkup radio program will focus on Alzheimer's disease.

Become a *RadiologyInfo.org* Content Reviewer

RadiologyInfo.org, a public information website produced by RSNA and the American College of Radiology, is dedicated to being the trusted source of information for the public about radiology and the unique and vital role of radiologists in their healthcare.

Over the past 15 years since *RadiologyInfo.org* was launched, more than 330 radiology professionals, recognized on our Medical Advisors page, have volunteered their time and expertise to contribute to the success of the site. Now, you too can help shape, review and publish useful patient information by volunteering as a *RadiologyInfo.org* Medical Advisor.

If you are interested in serving as a Content Reviewer, please send your curriculum vitae to Joshauna Strong at *jstrong@rsna.org*, noting your area of expertise and interest.

RadiologyInfo.org
For patients

New on RadiologyInfo.org

Visit *RadiologyInfo.org* to read the latest content on Abdominal X-ray and Renal Cysts.

Education and Funding Opportunities

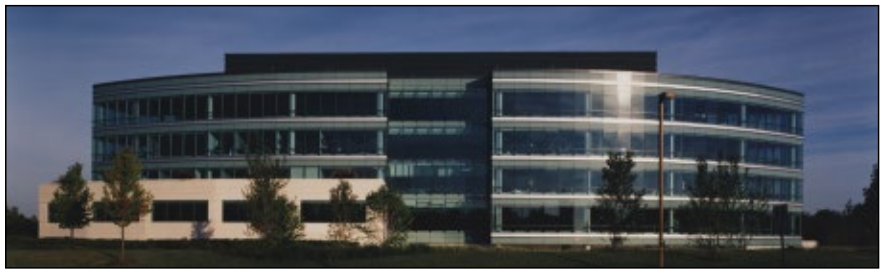
Stock Up on RSNA Educational Courses on USB Flash Drive

Now available for purchase online, RSNA's educational courses on USB flash drive are a quick and easy way to earn CME. With more than 50 courses available, the devices contain a full audiovisual educational experience, complete with a read-along transcript.

Listen as experts guide you through a variety of imaging findings and differential diagnoses, and provide insight on clinical management of specific diseases and conditions. Users can click any topic on the main menu to be taken directly to that content within the course. Each course also dynamically tracks your progress and bookmarks your last known location. Users can earn CME for successfully completed courses.

RSNA's educational courses on USB flash drive are $55/member, $80/non-members. To purchase any of RSNA's educational courses on USB flash drive, visit *RSNA.org/Library* and select "Browse New."

Writing a Competitive Grant Proposal



February 5-6, 2016
RSNA Headquarters
Oak Brook, Ill.

Registration is open for the Writing a Competitive Grant Proposal workshop, designed for researchers in radiology, radiation oncology, nuclear medicine and related sciences who are interested in actively pursuing federal funding.

Guided by a faculty of leading researchers with extensive experience in all aspects of grant applications and funding, the program will focus on developing specific aims to be included in a grant application. Participants will be provided tools for getting started in the grant writing process and developing realistic expectations. Faculty includes Udo Hoffmann, M.D., M.P.H., of Massachusetts General Hospital in Boston; Ruth Carlos, M.D., of the University of Michigan Health System in Ann Arbor, Mich.; Martin Pomper, M.D., Ph.D., of Johns Hopkins School of Medicine in Baltimore; David Shuster, M.D., of Emory University in Atlanta, and Antonio Sastre, Ph.D., of the National Institute of Biomedical Imaging and Bioengineering, Bethesda, Md.

The course fee is $225. Register online at *RSNA.org/CGP*. Contact Rachel Nelson at 630-368-3742 or *rnelson@rsna.org* for additional information.

Essentials of Radiology Available on USB Flash Drive

RSNA's Essentials of Radiology is now offered on USB flash drive. The attractive, lightweight device holds more than 14 hours of audiovisual presentations highlighting a broad spectrum review for general radiologists, residents and subspecialists. Subspecialty areas include: Breast Imaging, Cardiac Imaging, Chest Imaging, Genitourinary Imaging, Musculoskeletal Imaging, Neuro Imaging, Pediatric Imaging, Postoperative Gastrointestinal Imaging and Ultrasound.

The RSNA Essentials of Radiology is also a perfect teaching companion. Use the collection to let world-class RSNA annual meeting speakers teach residents about topics including Evaluation of Adult Congenital Heart Disease with CT (Cardiac Imaging), The Mediastinum: A Case-Based Approach (Chest Imaging), Pattern-based Approach to White Matter Disease (Neuro Imaging), and Pediatric Ingested Foreign Objects: Recognition and Triage (Pediatric Imaging), among many others. The collection also includes access to content on non-interpretive skills for radiologists including "What Every Radiologist Needs to Know about Medicare" and "Quality—What is It and How to Improve It."

Purchase the Essentials of Radiology at *RSNA.org/Essentials-Collection* or visit *RSNA.org/library* and click the banner at the top of the page. The collection is $175 for RSNA members, $250 non-members.

For Your Calendar

JANUARY
Abstract Submission Opens
Deadline is April 13, 2015
• *RSNA.org/Abstracts*

FEBRUARY 5–6
Writing a Competitive Grant Proposal
RSNA Headquarters, Oak Brook, Ill.
• *RSNA.org/CGP*

FEBRUARY 17–20
Mexican Society of Radiology and Imaging (SMRI)
Mexico City, Mexico
Visit the RSNA Booth
• *SMRI.org*

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

Annual Meeting Watch

RSNA 2016 Online Abstract Submission Opens mid-January

The online system to submit abstracts for RSNA 2016 will be activated in mid-January. The submission deadline is noon Central Time (CT) on Wednesday, April 13, 2016. Abstracts are required for scientific presentations, education exhibits, applied science, quality storyboards and quantitative imaging reading room showcases.

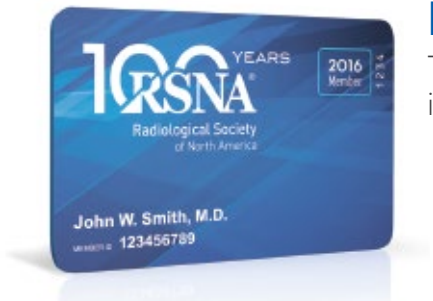
To submit an abstract online, go to *RSNA.org/Abstracts*. The easy-to-use online system helps the Scientific Program Committee and Education Exhibits Committee evaluate submissions efficiently. For more information about abstract submissions, contact the RSNA Program Services Department at 1-877-776-2227 within the U.S. or 1-630-590-7774 outside the U.S.

Students, clinical trainees and post-doctoral trainees are eligible to receive $500 travel awards for top-rated abstracts accepted for presentation at RSNA 2016. Full eligibility requirements will be available with the 2016 Call for Abstracts in mid-January.

November 27 – December 2
102nd Scientific Assembly & Annual Meeting

RSNA® 2016

Value of Membership



Renew Your RSNA Membership Now

The deadline for RSNA membership renewal is Dec. 31 to avoid interruption of your subscription to RSNA journals and *RSNA News*.

RSNA membership includes many benefits:

- Subscriptions to *Radiology* and *RadioGraphics*
- Free tools to help with continuing medical education
- Free advance registration to the RSNA Annual Meeting

Renew online at *RSNA.org/Renew* or by mail with the invoice sent to you in early October. Members can also sign up for automatic renewal—a new, convenient feature that allows RSNA to charge a designated credit card for annual membership dues.

For more information, including how to apply for retired status, 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

RSNA Science, Education Sections Get Updated Look

Recent facelifts to the Science and Education pages at *RSNA.org* are designed to help members find the important information they want faster and in a more user-friendly format.

Along with a host of valuable information members have come to rely on, each section features easier navigation and more streamlined content so members can spend less time searching and more time learning.

Go to the Science page at *RSNA.org/Science* for more information on:

- The Quantitative Imaging Biomarker Alliance (QIBA)
- Grant Writing and Research Development Workshops
- Molecular Imaging (including molecular imaging articles in *Radiology*)
- Quality Improvement tools and resources

Go the Education page at *RSNA.org/Education* for more information on:

- eLearn (formerly the Online Library) featuring online SA-CME education offerings
- Track My CME (CME Repository, CME Gateway)
- Career Development (MOC, ethics and professionalism courses)
- Education Resources (funding initiatives, RSNA/AAPM Online Physics Modules, RSNA journals, education products)

COMING NEXT MONTH

Along with highlights of some of the most captivating images and stories from RSNA 2015, we feature a report on the RSNA International Visiting Professors' (IVP) recent trip to Chile.

SHARE YOUR KNOWLEDGE

Present at RSNA 2016:

- Scientific Presentations
- Applied Science
- Education Exhibits
- Quality Storyboards
- Quantitative Imaging Reading Room

NEW for 2016!

The RSNA Travel Award Program for Students

Up to 400 top-rated abstracts from current RSNA members will earn a $500 travel stipend.

Kuo York Chynn Neuroradiology Research Award

The top scientific paper as selected by the Scientific Program Committee will earn a $3,000 award recognition.

Visit ***RSNA.org/Abstracts*** for complete guidelines.

Submit online

beginning January 2016 at *RSNA.org/Abstracts* through Wednesday, April 13, 2016, noon Chicago Time.

Questions?

Call 1-877-776-2227 *(within U.S.)*
or 1-630-590-7774 *(outside U.S.)*

Includes sessions in joint sponsorship with the American Association of Physicists in Medicine

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