

Focus on RSNA 2013

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Dunnick is RSNA President

Distinguished radiology leader N. Reed Dunnick, M.D., is RSNA president for 2014. Dr. Dunnick is the Fred Jenner Hodges Professor and chair of the Department of Radiology at the University of Michigan Health System in Ann Arbor.

As president, Dr. Dunnick will help shape and implement RSNA's vision and strategic goals to advance the radiologic sciences and develop the future of patient-centered practice. "We are proud of our past, but must focus on the future," he said. "This is a time to reflect on the many advances in our field and how they help us improve the quality of the patient care we deliver. How will we translate the continued advances in medical imaging and image-guided therapy into better patient outcomes?"

"We are moving from an era of 'volume-based imaging' to one of 'value-based imaging,'" Dr. Dunnick continued. "It will be challenging to make that transition. However, medical imaging has so much to offer, I am confident we can succeed. Today's research is tomorrow's practice."

Dr. Dunnick earned his medical degree from Cornell University Medical College in New York City. He was a radiology resident at Stanford University School of Medicine and served as chief resident his last year. Dr. Dunnick began his academic appointments at Stanford as an assistant professor in 1976. Later that year, he moved to the Diagnostic Radiology Department at the National Institutes of Health. At Duke University Medical Center in Dur-



ham, N.C., Dr. Dunnick held many posts from 1980 to 1992, including professor of radiology, chief of uro-radiology and director of the Division of Diagnostic Imaging.

Dr. Dunnick has authored or co-authored over 250 peer-reviewed scientific articles, 62 book chapters and 10 books, and has served on the editorial boards of 14 journals.

He has served as president of the Academy of Radiology Research, American Board of Radiology, American Roentgen Ray Society, Association of University of Radiologists, Michigan Radiological Society, Society of Chairs of Academic Radiology Departments, Society of Body Computed Tomography, and Society of Uroradiology.

Dr. Dunnick's service to RSNA includes the Scientific Program Committee, Research Development Committee, Research & Education (R&E) Foundation Board of Trustees, Education Council and the Grants Program Committee. In 2006, he was elected to the RSNA Board of Directors and served as the Liaison for Publications and Communications from 2006 to 2007. In 2007, he became the Liaison for Science and served as Chairman from 2011 to 2012, and President-Elect from 2012 to 2013.

Baron Named Board Chairman

Richard L. Baron, M.D., is chairman of the RSNA Board of Directors for 2014. Dr. Baron is a professor of radiology at the University of Chicago Medical Center, where he has been since 2002, serving as chair of the Department of Radiology from 2002 to 2011 and dean for clinical practice from 2011 to 2013.

As chairman, Dr. Baron will support RSNA's missions and core values by placing a priority on evaluating how RSNA's educational offerings are organized and accessed, given that lifelong learning and continuous, real-time education are now so essential to the radiology community.

"RSNA members and contributors produce a broad array of scientific and educational content that collectively provide an unmatched resource for the imaging community," he said. "We want to optimize how we capitalize on that resource to most effectively meet our members' needs."



Dr. Baron also believes it is important to reach out to international members to foster valuable interaction amongst members of the radiology community worldwide.

Dr. Baron has served on RSNA committees including the Scientific Program Committee, Public Information Advisors Network, Finance Committee and the Education Exhibits Committee, of which he served as chairman from 2006 to 2009. In 2008, he was elected to the RSNA Board of Directors and served as the Liaison for Education and then as Liaison for International Affairs.

Arenson is President-Elect

Renowned diagnostic radiologist Ronald L. Arenson, M.D., is RSNA president-elect. Dr. Arenson is the Alexander R. Margulis Distinguished Professor and chair of the Department of Radiology and Biomedical Imaging at the University of California, San Francisco.

As president-elect, Dr. Arenson will focus on the value and improvement of patient-centered care initiatives at the annual meeting and throughout the year. "As we enter an unprecedented period of change in our healthcare system, radiology must adapt in fundamental ways," he said.

Having served in the past as RSNA Board Liaison for Information Technology and Annual Meeting, Dr. Arenson is committed to the use of informatics to develop the future of patient service. "In addition to its usual roles in education and research, the RSNA is in a unique position to give practicing radiologists tools to improve the services we provide our patients and referring physicians," Dr. Arenson said.

A member of RSNA since 1974, Dr. Arenson has served on numerous committees, including the Publications Council, Public Information Advisors Network, Research Development Committee and the Radiology Informatics Committee (formerly Electronic Communications Committee), which he chaired from 1999 to 2005. He was elected to the RSNA Board of Directors in 2007 and served as Board chairman from 2012 to 2013.



Borgstede Named to RSNA Board

James P. Borgstede, M.D., an accomplished clinician and educator whose experience and expertise in radiology economics, quality and safety, and healthcare politics have made him a voice for the specialty, is the newest member of the RSNA Board of Directors. Dr. Borgstede will assume the position of Board Liaison for International Affairs as Richard L. Baron, M.D., becomes chairman of the Board of Directors.

"The RSNA as an organization is visionary and outstanding in both education and research in imaging and image-guided therapies," Dr. Borgstede said.

A professor of radiology and vice-chair of professional services, clinical operations and quality at the University of Colorado, Denver, Dr. Borgstede is president of the American Board of Radiology and president-elect of the International Society of Radiology.

Dr. Borgstede's career has included both private practice and academic radiol-

ogy. He has spent his teaching career at the University of Colorado. For more than 25 years he also has worked to advance radiology through his service to and leadership of numerous national and local radiologic and medical organizations.

A member of RSNA since 1976, Dr. Borgstede has been a familiar face as part of the annual meeting



refresher course faculty for many years. Dr. Borgstede has served in numerous positions with the RSNA Research & Education (R&E) Foundation, including chair of the R&E Board of Trustees for the past year. He has also served on the RSNA Quality Committee from 2009 to 2011. He is currently the R&E liaison to the RSNA International Radiology Education Committee.

ABR Names Jackson Executive Director

The American Board of Radiology (ABR) Board of Trustees has named RSNA Board of Directors Liaison for Education **Valerie P. Jackson, M.D.**, as its next executive director, effective July 1, 2014. She will succeed Gary J. Becker, M.D., who will retire June 30, 2014.

Dr. Jackson is the Eugene C. Klatte professor of radiology and chair of the Department of Radiology and Imaging Sciences at the Indiana University School of Medicine in Indianapolis. Dr. Jackson is also active in radiology resident education and previously served as residency program director for the Indiana University Department of Radiology.

An RSNA member since 1982, Dr. Jackson has served as chair of the Refresher Course Committee from 2009 to 2012, chair of the Breast Imaging Subcommittee of the Scientific Program Committee from 2003 to 2006 and as a member of the Pub-

lic Information Advisors Network (PIAN). She also served on the *RSNA News* Editorial Board and as an Associate Editor of *Radiology*. She served as RSNA first vice-president from 2008 to 2009 and is a member of the RSNA Centennial Committee. Dr. Jackson also has been active in RSNA Research & Education (R&E) Foundation committees and served on the R&E Foundation Board of Trustees from 2009 to 2012.

She delivered the Annual Oration in Diagnostic Radiology, "Screening Mammography: Controversies and Headlines," at RSNA 2002.



Jackson

100 YEARS RSNA® CENTENNIAL SNAPSHOTS

During this year as RSNA celebrates the 100th anniversary of its first annual meeting and scientific assembly, *RSNA News* will take a look back at milestones in the Society's history.

1915: Western Roentgen Society Founded

Almost 20 years after Roentgen discovered the X-ray, radiologists practicing in the Midwest region of the U.S. were finding it difficult to travel to radiologic conventions held primarily on the East Coast. A meeting of five radiologists in the St. Louis office of **Miles B. Titterington, M.D.**, led to the founding of the Western Roentgen Society, predecessor to RSNA.



1975: Annual Meeting First Held at Chicago's McCormick Place

At that time McCormick Place had only one building, what is now known as the Lakeside Center. A little over 12,000 people attended that first meeting in McCormick; registration now tops 50,000 and fills three buildings.

1990: infoRAD Introduced

This new annual meeting feature was the first public demonstration of a standard for digital imaging and communications in medicine (DICOM), now the universal standard for medical imaging.



2000: RadiologyInfo Launched

The collaborative website of RSNA and the American College of Radiology was created to help patients understand radiologic procedures and interventions, radiation oncology, nuclear medicine and radiation safety. The website now attracts nearly 500,000 visitors per month.

2007: "Presents" Series Debuts

These special annual meeting sessions explore the very latest developments in radiology from around the world. Italy, Japan, the United Kingdom, China, Latin America, India, Brazil and France already have been featured as part of the Presents series; Canada and the Republic of Korea will be featured at RSNA 2014.

IN MEMORIAM

Two RSNA Honorary Members

RSNA and the entire radiology community mourn the loss of two RSNA Honorary Members and renowned physicians: **Robert E. Steiner, M.D.**, who received RSNA Honorary Membership in 1979 and **Maurice Tubiana, M.D.**, who was awarded the honor in 1989.

Dr. Steiner, whose career was devoted to cardiac and pulmonary radiology, died on September 12, 2013. He was 95.

Toward the end of his career, Dr. Steiner developed an interest in MR imaging and made many contributions to the field. The MRI unit at the Imperial College in London is named after him in honor of his achievements. Dr. Steiner served as a professor of diagnostic radiology at the University of London at the Post-Graduate Medical School, Hammersmith Hospital, in 1960, a position he held until his retirement in 1983.

He was president of the British Institute of Radiology (BIR), the Royal College of Radiologists (RCR), and the Fleischner Society. Among his many awards, Dr. Steiner received RCR, ECR and European Association of Radiology (EAR) Gold Medals, the BIR Barclay Medal and the EAR Boris Rajewsky

Medal. He served as a *Radiology* manuscript editor from 2001-2010.

Dr. Tubiana, a world-renowned French oncologist who played a critical role in the development of modern radiotherapy and radioprotection, died September 24, 2013. He was 93.



Steiner



Tubiana

Dr. Tubiana was head of the Department of Radiotherapy at the Institute Gustave Roussy in Villejuif, near Paris, before becoming the fifth director from 1982 to 1988. He was a consultant for the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA) in 1995, and chaired the IAEA Scientific Committee and the Committee of Cancer Experts of the European Union from 1986 to 1994. He was a member of the French Academies of Sciences and Medicine and a distinguished member of the International Agency for Research on Cancer (IARC) Scientific Council from 1976 to 1981.

Dr. Tubiana's numerous contributions to cancer research include radiotherapy of lymphomas and thyroid carcinomas as well as the application of nuclear medicine to radiobiology.

My Turn

A Century of Transforming Medicine

Shortly after Wilhelm Roentgen's report of the discovery of X-rays, physicists, physicians and others began using Crookes tubes for medical imaging. The initial applications were images of bones and the localization of metallic foreign bodies such as bullets. These early "skiagraphs" were valuable additions to clinical diagnosis, and other applications quickly followed.

Contrast agents were developed to facilitate examination of the gastrointestinal system and, later, the urinary tract. Fluoroscopy enabled physicians to view motion. Radionuclides were discovered by Henri Becquerel and Marie Curie isolated radium in 1903. Angiography was performed by direct arterial puncture until 1953 when Seldinger described his technique using a guide wire to pass a catheter into the femoral artery.

After World War II, technology blossomed. Ultrasound was adapted for human imaging using A mode, then bistable B mode, grayscale B mode, Doppler and Power Doppler imaging. Cormack demonstrated the mathematic feasibility of CT, and Hounsfield built the first CT scanner. While the underpinnings of MR can be traced back to Fourier and Tesla, it was not until the 1970s that Mansfield, Hinshaw and Damadian successfully imaged human subjects. With percutaneous transluminal angioplasty pioneered by Dotter, minimally invasive image-guided intervention began to flourish.



N. Reed Dunnick, M.D., is RSNA President for 2014. Dr. Dunnick is the Fred Jenner Hodges Professor and chair of the Department of Radiology at the University of Michigan Health System in Ann Arbor, Mich.

The significance of these developments is shown not only by the many Nobel Prizes awarded to them, but also by their daily applications in the care of our patients. In 2001, a survey of 225 general internists reported the leading advances in medicine. By a wide margin, MR and CT imaging ranked first. Mammography was ranked number 5, while ultrasonography was 11 and bone densitometry was included in these top 25 innovations. What a wonderful 119 years we have had in radiology!

Just 20 years after the discovery of the X-ray, a group of radiologists founded the Radiological Society of North America (RSNA) to advance radiologic science and technology, and to provide radiologists with continuing medical education as well as opportunities to communicate with one another. The growth

of radiology has proceeded hand in hand with the growth of the RSNA, whose 100th annual meeting we celebrate this year." of radiology has proceeded hand in hand with the growth of the RSNA, whose 100th annual meeting we celebrate this year.

We must help to restrain the increases in healthcare costs? How can we migrate our practices from volume-based to value-based imaging? How do we deliver healthcare that puts patients and families first? We must understand the physical principles that underlie our imaging equipment. This will help us optimize image quality and minimize ionizing radiation for each examination. We must serve as consultants to help referring physicians obtain the most appropriate imaging studies. Patient safety must be our guide. The risks of imaging studies include complications of the examination, long-term risks of ionizing radiation (if used) and the further evaluation of incidental findings, most of which are of little medical consequence. We must weigh those risks against the benefit of the information gained from those studies. As radiologists, we must maintain our intellectual leadership by conducting the research that defines the value of imaging and develops the studies that will become tomorrow's practice.

The RSNA Research & Education (R & E) Foundation was founded in 1985 and has grown to a size that now funds more than \$3 million in grants each year. The impact of these grants is demonstrated by subsequent funding awarded to these talented investigators. For every dollar awarded by the R&E Foundation, more than 40 dollars in subsequent grants from other agencies are awarded to R&E funded investigators! We have a

wonderful history, but there are new challenges to be faced to keep the radiological sciences at the forefront of medicine. As it has for the past 100 years, the RSNA will continue to be a vital participant in meeting those challenges.

“The growth of radiology has proceeded hand in hand with the growth of the RSNA, whose 100th annual meeting we celebrate this year.”

N. Reed Dunnick, M.D.

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As we celebrate our past, we must also look to the future. How will we apply these technologies at a time that

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World Radiology Leaders Seek to Match Resources with Needs

CT scanners sometimes end up in remote areas of a developing nation, due to the ambitions of its government, the donations of well-meaning foreign philanthropists, or the tireless activity of vendor representatives. But unless those machines come with someone to operate and maintain them, and someone to interpret the images, they don't benefit the population they were meant to serve.

AT THIS YEAR'S International Trends meeting, held during RSNA 2013, a gathering of the world's radiology leaders discussed how to sync up the radiology education needs of developing nations with the resources of the developed ones.

"There is a huge need for education in those regions where the technology is coming very fast," said Richard Baron, M.D., professor of radiology at the University of Chicago, 2014 RSNA Board Chairman, previously the Liaison for International Affairs, and co-chair of the RSNA 2013 International Trends meeting focusing on radiology education in developing nations. "The Internet lets them read about the latest imaging technology, economic development lets them buy it. In many ways we've been handing out loaves of bread and we have to teach them how to cook."

The meeting was an international summit of professional radiology, and attendees included the heads of major professional societies: the Asian Oceanian Society of Radiology; the Interamerican College of Radiology; the European Society of Radiology and the International Society of Radiology.

The presidents of many individual countries' societies attended as well, including Canada, Great Britain, China, France, Spain, Germany, Japan, Korea, the Netherlands, Italy, Australia and New Zealand. In addition to Dr. Baron, RSNA was represented by then-President Sarah S. Donaldson, M.D., and board members N. Reed Dunnick, M.D., and Ronald L. Arenson, M.D. The co-chair was Byung Ihn Choi, M.D., of South Korea, chair of the RSNA International Advisory Committee.

Dramatic changes in radiology education are needed to bring adequate capabilities to developing nations. Meeting speakers focused on the needs of developing nations and the resources available in developed nations, and how the two might be aligned. "No one has taken a step back to look at the library of opportunities out there, or to ask whether we're duplicating efforts," Dr. Baron said. "Do we have five teams going to the same small town while we ignore other areas? Do we know that the techniques we use to teach in the U.S. or Europe will work well in these countries? Have we asked them what they want?"

Dr. Baron observed that a developing country might have needs at several levels. "We send people to the capital cities to talk about CT or MR because the leadership in that country wants the technology, but 50 miles out, they need help using plain film radiography and maybe ultrasound," he said.



The RSNA 2013 International Trends meeting was a summit of radiologists discussing radiology education in developing nations.

Gloria Soto, M.D., of Chile, president of the Interamerican College of Radiology, cautioned against regarding the "developing world" as a monolith. "Five billion people live in 'developing nations,' or 80 to 85 percent of the world population, and somewhere between 104 and 152 countries, out of 206, are developing or underdeveloped, depending on the definition," she said. "They are not homogeneous. There are great differences in their infrastructure, their technologies, their work forces, their national policies. Any educational programs must be focused to specific needs and support local conditions."

"We are a Piece in the Puzzle of Medical Care"

Presentations by speakers from developed areas made clear that every professional society already offers a variety of activities to help radiologists from less developed countries. Those include sending visiting professors to the countries, sponsoring fellowships for radiologists in training to study abroad and providing educational materials online.

The impact of these efforts is unclear, however said International Advisory Committee member Gabriel P. Krestin, M.D., Ph.D., of the Netherlands. "The needs of developing countries 10 to 15 years ago are the same as their needs today," said Dr. Krestin. "I'm convinced that many young people profited a lot from outreach efforts, but did we change anything in those countries or those regions? I don't know if coordination would be helpful, because it might just add bureaucracy, but we should have unified metrics so we can measure what we're providing."



A gathering of the world's radiology leaders discussed solutions for spreading radiology training, technology and education through developing countries. For example, there are 400 radiologists to serve the 30 million people in Peru, creating a dire need for visiting professionals and standardization of radiology curricula.



William Mayo-Smith, M.D., of Brown University, urged attendees to consider not only radiology societies, but also other medical specialty societies, hospitals and other institutions, non-government organizations and even individuals when trying to determine how best to organize outreach. “We must realize that we are a piece in the puzzle of medical care,” he said.

Teresita Angruaco, M.D., of the U.S., a member of RSNA’s International Advisory Committee, observed that professional organizations can work very effectively by taking local power structures into account. She recounted how the committee was able to reshape radiology residency programs in Thailand, creating separate training tracks for diagnostic and interventional radiologists. “An elite group in Thailand makes all those decisions, and there’s not a lot of red tape or discussion,” she said. “A little influence from an international group can make big changes.”

Speakers from several developing countries presented the current state of radiology and radiology education in their respective countries.

Daily Bulletin coverage of RSNA 2013 is available at RSNA.org/bulletin.

Sarah Guerra, M.D., representing Peru, said that a third of the country’s population, along with most of its radiology resources, is concentrated in Lima, the capital. There are 400 radiologists in Peru to serve 30 million people and a dire need exists for more visiting professionals and more standardization of radiology curricula.

Hassen Gharbi, M.D., representing Tunisia, said his country needs more radiologists, better distribution of equipment, and more advanced equipment (such as PET scanners) and would benefit from closer collaboration with international organizations and expanded research facilities.

Though itself a developing country, Tunisia also helps spread radiology training and services throughout less developed countries of Africa. While those countries can benefit from the many resources provided online by international radiology societies, Dr. Gharbi said in-person instruction is needed. “There are limits to virtual learning,” he said. “Skills are taught by people using machines.” □

Promise of PET/MR in Gynecologic Imaging Explored

While PET/MR shows promise in detecting and staging women's pelvic cancers, more research is required to take full advantage of its capabilities, said presenters of scientific papers at RSNA 2013.

PATRICK VEIT-HAIBACH, M.D., of the Department of Medical Imaging at University Hospital Zurich, assessed and compared the diagnostic accuracy of PET/CT and PET/MR imaging for primary gynecological malignancies. "PET/MR imaging for advanced tumors works," he said. "It provided several pieces of useful information concerning the local tumor status. However, the overall detection rate for local and distant metastases was not different from PET/CT."

PET/MR imaging provided localized information, while PET/CT was obtained on the whole body to provide information on the distant metastases, Dr. Veit-Haibach said.

The study included 26 patients with 18 suspected primary cancers and eight with suspected recurrence. The two imaging procedures were performed within a single session, with a "shuttle" table facilitating the transition from the MR table to the PET/CT table. Following F18-fluorodeoxyglucose ([18F]FDG) contrast administration, the patients underwent MR imaging of the abdomen and pelvis and then standard unenhanced PET/CT with a field of view from the mid-thigh to the vertex of the skull.

"For primary tumor detection, PET/MR was superior in 14 cases and equal in 10," Dr. Veit-Haibach said. "But PET/CT provided advantages concerning distant metastases." PET/CT overall showed relevant additional information in nine cases, mainly concerning distant metastases, while PET/MR showed relevant additional information in three cases concerning the primary tumor, he added.



Patrick Veit-Haibach, M.D.

PET/MR imaging might be one of the future clinical routine indications for evaluating gynecologic tumors, Dr. Veit-Haibach said. "However, in advanced stages, whole-body imaging is needed. We have to figure out efficient whole body protocols which adequately cover the pelvis but also the rest of the body for evaluation of distant metastases, without having the patient too long in the scanner. Otherwise it will be a very expensive staging tool."

Future research will also go into multiparametric PET/MR imaging with advanced MR techniques to better characterize the tumor itself, Dr. Veit-Haibach said.

PET/MR Shows Promise in Evaluating Abdominal Malignancies

Combining PET and MR imaging could be more effective in evaluating abdominal malignancies than conventional body CT, according to a presenter at RSNA 2013.

Researchers in South Korea observed added value from PET/MR in more than 30 percent of the patients used in their study.

"Because of low soft-tissue contrast of CT examination, there are some limitations in the evaluation of abdominal oncologic diseases," said presenter Beomsik Kang, a resident in the radiology department at Seoul National University Hospital where the study was conducted. "In fact, in our study, a relatively large proportion of additional findings of PET/MR compared to CT were characterization of hepatic lesions, which was not determined at CT scan."

Researchers conducted a retrospective study of 122 patients (80 men, 42 women) who underwent 18-FDG PET/MR and con-

trast-enhanced CT for initial staging or follow-up of abdominal malignancy. Oncological diagnoses for the patients included anal cancer, colorectal cancer, cholangiocarcinoma, hepatocellular carcinoma, gallbladder cancer, lymphoma, renal cell carcinoma and pancreatic cancer.

Using PET/MR, additional findings beyond the CT results were discovered in 38 patients. Lesion characterization was improved in 26 patients, while additional malignancies were identified in 12 patients. PET/MR also resulted in a change of treatment strategy for 22 patients.

Further analysis of the results shows dedicated MR improved lesion characterization in five patients. Whole-body PET/MR improved lesion characterization in six patients, and helped identify an additional malignancy in seven patients.

Daily Bulletin coverage of RSNA 2013 is available at RSNA.org/bulletin.

PET/MR Yields Higher Detection Rate of Metastatic Lesions

Presenting the results of separate study, Karsten Beiderwellen, M.D., of the Department of Diagnostic and Interventional Radiology at University Hospital Essen in Germany, said PET/MR imaging as a whole-body technique allowed a higher detection rate of female pelvic metastatic lesions than MR imaging alone. “Integrated PET/MRI is a high-potential modality for whole body staging of patients with pelvic malignancies,” Dr. Beiderwellen said.

“This very young technique combines two powerful modalities,” Dr. Beiderwellen continued. “First, MR imaging, offering an excellent soft tissue contrast, allows for visualization of the local tumor extent and possible tumor infiltration. Second, FDG-PET allows for detection of small distant metastases as well as information on metabolic activity of suspect lesions.”

Daily Bulletin coverage of RSNA 2013 is available at RSNA.org/bulletin.

Study results indicated that PET/MR imaging when compared to MR imaging alone leads to a higher detection rate of metastatic lesions, a higher lesion conspicuity and a higher diagnostic confidence in the assessment of metastatic lesions. The study included 20 patients with ovarian or cervical cancer who underwent a whole-body MR protocol using an integrated scanner. The researchers detected metastatic lesions in 17 patients.

“Based on PET/MR, there was correct identification of all 17 disease-positive patients, and based on MR alone there was correct identification of 15 patients,” Dr. Beiderwellen said. He noted that PET/MR provided significantly higher lesion conspicuity and significantly higher diagnostic confidence.

“Today, pelvic MR imaging as well as whole-body PET—or, rather, PET/CT—are already part of the restaging procedure in patients with recurrent pelvic malignancies,” Dr. Beiderwellen said.

“However, these examinations are usually performed independently, on different days.

Administering independent exams means that, due to different patient positioning and differences in the state of bladder fullness, lesions characterized in one modality might not be comparable or present in the other modality, Dr. Beiderwellen said. “There is also the matter of radiation exposure. Nowadays, PET is usually performed as combined PET/CT. The added CT leads to an additional radiation exposure that can be avoided in PET/MR imaging.”

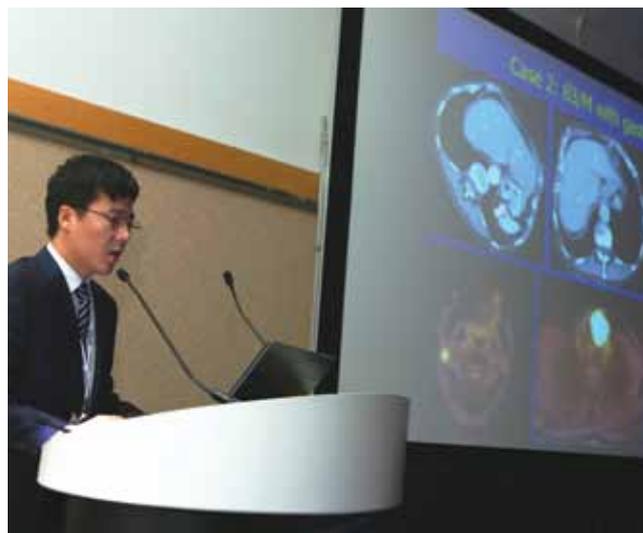
While the study included a small patient cohort and lacked histopathological correlation for all lesions, the results are still promising, Dr. Beiderwellen said. “PET/MRI might be a valuable alternative to MR and PET/CT in re-staging of patients with recurrent pelvic malignancies,” he concluded. □



Karsten Beiderwellen, M.D.

“For primary tumor detection, PET/MR was superior in 14 cases and equal in 10.”

Patrick Veit-Haibach, M.D.



Beomsik Kang

Lesion characterization was improved in 15 patients when PET/MR was combined with MR. The combination also resulted in detection of additional malignancies in five patients.

No statistical improvement was shown in T and N staging of CT and PET/MR when compared with histopathologic findings in 24 patients who underwent surgery after the PET/MR scan. PET/MR produced correctly staged results for 18 of the 24, compared with 15 using CT. Overstaging with PET/MR occurred in three (compared to five), and understaging also occurred in three (compared with four).

But in the N stage, CT correctly staged 16 of the patients, while PET/MR had 15. Both methods overstaged four patients, while CT understaged four and PET/MR had five.

Despite the positive results that suggest PET/MR does add clinical value, Kang cautioned against using it as a replacement for CT. He added the convenience and relative short time needed for CT scans should be emphasized. It is also more cost effective than the PET/MR combined.

“It is too early for use to make a conclusion regarding whether PET/MR can replace a conventional CT based on our study results with a small number of patients,” Kang said. “As of now, it should be regarded as being in addition to CT.” □

Coronary CTA Administered at Lower Radiation with Iterative Reconstruction

Iterative image reconstruction allows coronary CT angiography (CTA) to be administered at lower radiation exposure and with less iodine than conventional filtered-back projection reconstruction, and with no loss of image quality, according to a prospective study of more than 200 patients at several imaging centers.

PRESENTED BY BIN LU, M.D., the RSNA 2013 research, "Effect of Reduced X-ray Tube Voltage, Low Iodine Concentration Contrast Medium and Iterative Reconstruction on Image Quality and Radiation Dose at Coronary CT Angiography: A Prospective Multicenter Study," was conducted at nine hospitals in China and spearheaded by researchers at Fuwai Hospital, Beijing, and the Chinese Academy of Medical Sciences.

Dr. Lu and colleagues compared image quality for two CTA protocols. The first protocol used a tube voltage of 120kVp, a contrast agent of 370mgI/ml iopromide and filtered back projection reconstruction; the second used 100kVp, a contrast agent of 270mgI/ml iodixanol and sinogram affirmed iterative reconstruction (SAFIRE). The two groups, 115 in the reduced dose group and 116 in the control group, were comparable in size, age, body mass index and contrast volume.

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Images were read by radiologists who had attended training sessions to enable them to assign image quality scores consistently. Image quality scores in the two groups were comparable, and there were no statistically significant differences in mean attenuation, image noise, or contrast-to-noise ratio. The mean iodine dose was 27 percent lower with the 100kVp protocol, and the mean effective radiation dose was 35 percent lower.

Dr. Lu cited two limitations for the study. The first was that the body mass index (BMI) of the Chinese study subjects was, on

average, significantly lower than that of the general population in both Europe and North America, and further study is needed to determine whether higher BMI might affect the results. The second was that the protocol wasn't designed to measure whether the lower iodine load would translate to a reduced risk of contrast-induced nephropathy. □



Bin Lu, M.D.

average, significantly lower than that of the general population in both Europe and North America, and further study is needed to determine whether higher BMI might affect the results. The second was that the protocol wasn't designed to measure whether the lower iodine load would translate to a reduced risk of contrast-induced nephropathy. □

Unpredictability of CT Dose Addressed

Knowledge of the intrinsic variability in radiation dose delivered to patients undergoing diagnostic CT imaging would aid efforts to evaluate and lower the radiation patients receive, said an RSNA 2013 presenter.

Radiation dose can be almost two-fold higher for a patient receiving an identical repeated CT in identical conditions, said Douglas G. Larson, M.D., during his presentation, "CT Dose Variability for Patients Undergoing Repeat Identical CT Scans: A Retrospective Analysis of 2,606 Patients Undergoing 12,632 CT Scans."

"All we know is the average dose number is being brought lower," said Dr. Larson, an abdominal imaging fellow in the radiation department at Duke University School of Medicine. "Almost nobody is talking about the standard deviation. It turns out there is quite a bit of unpredictability in the CT system."

Dr. Larson discovered the minimum to maximum variation ratio of radiation dose ranged from 1.56 times to 2.02 times in patients. "We pushed all the same buttons, we did everything the same and one of the scans had double the dose of one of

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the others without necessarily imparting increased clinical value," Dr. Larson said.

Patient size, table height, scanner manufacturer and scanner model can all affect dose variability. No variation was seen with patient age or patient gender. "An important step in understanding CT variability is identifying the controllable – the things we can manipulate about the scan and the patient – as well as the intrinsic components of dose variability," Dr. Larson said.

Dr. Larson retrospectively examined the records of more than 2,000 patients who had undergone more than 12,000 combined repeat CT scans at his institution. He identified colon cancer, rectal cancer, lung cancer and renal stone patients who underwent the same CT protocol at least twice between January 2007 and February 2013.

Data collected included study protocol; CT dose index (CTDI) and dose-length product (DLP); table height; pitch; noise index

Amid Controversies, Dose Reduction Remains Priority

Understanding the controversies surrounding the relationship between CT radiation dose and potential cancer risks better equips radiologists to find ways to reduce the dose, according to an RSNA 2013 presenter.

THE NATIONAL RESEARCH COUNCIL'S Biological Effects of Ionizing Radiation VII (BEIR VII) report, which estimated the associated cancer risk for patients undergoing CT exams, is mathematically complex and not very digestible for radiologists, said Justin E. Costello, D.O., a third-year radiology resident at the San Antonio Military Medical Center.

"Even for most general radiologists, it's difficult to have a really good understanding of BEIR VII," said Dr. Costello, who presented "CT Radiation Dose: A Review of the Current Controversies and Dose Reduction Strategies through Clinical Scenarios and Patient/Clinician Questions." "Our goal was to present the information in a neutral way so that the general radiologist could at least make some sense of it, and may be able to convey that to an ordering provider," Dr. Costello said.

Among the controversies regarding BEIR VII are the report's reliance on atomic bomb survivor data (ABSD), the difficulty in calculating exact CT dose, and use of the linear no threshold (LNT)

model, which makes a linear extrapolation of cancer risk at higher radiation doses to include individuals exposed at lower doses, Dr. Costello said.

"It's an assumption that these lower levels of radiation are actually going to cause cancer," he said. "The Health Physics Society has looked at that and said there isn't concrete data to support it. We're causing fear in patients, and we're not even sure if this causes risks."

Among the issues with using ABSD is that the radiation exposure they experienced differs from that given patients undergoing medical imaging, which is a fractionated dose compared to the one-time dose survivors were exposed to. The researchers took the ABSD and extrapolated down to levels considered medical radiation, between 5-10 or 5-100 millisieverts.

"When you compared that to people who weren't exposed to radiation, there's



Justin E. Costello, D.O.

no statistical difference between increased risk of incidence of cancer at those levels," Dr. Costello said.

Despite the controversies, radiologists should still be seeking ways to reduce radiation dose to patients. He suggested several strategies and techniques to reduce radiation dose, including angular current modulation and iterative reconstruction.

"The dose reductions we can get from current modulation are pretty dramatic," Dr. Costello said. "If you looked at five years ago, some of the factors we're doing to current modulation have saved at least half a dose from a CT scan."

Current modulation results in the same savings in breast dose found using bismuth breast shields. However, the shields are no longer used at most institutions due to their considerable drawbacks, which include substantial increases in CT numbers, streaking and beam hardening artifacts, and increased image noise. □

and effective mA; peak kilovolt (kVp); date; patient age and gender; and patient size.

The researchers also wanted to know the role played by the scanners themselves - the manufacturer, the model and the unique ID of each. They found a significant statistical difference does exist.

"Even if the scanners look identical they don't actually perform the same," Dr. Larson said. "Each piece of equipment has its own dose distribution characteristics. If you look at different manufacturers or generations of scanners, everything behaves a little differently."

Other contributing factors likely exist, including particular CT technologists, which were not taken into account during his research, he said.

As the push for lowering radiation dose moves forward, Dr. Larson said the question involves more than simply reducing the average dose received by patients as a whole.

"I feel it's a real blind spot in all of the work that's happened to date," he said. "I fully support everything we've done to lower CT dose. But as we try to stretch the limits, it's time to start looking at some other factors as well." □



Douglas G. Larson, M.D.

Focus on RSNA 2013

A capacity crowd of more than 53,000 descended on Chicago's McCormick Place to experience the full array of world-renowned presenters and speakers, the latest in cutting-edge research and the vast spectrum of technical exhibits offered at RSNA 2013. Technology continued to play an increasingly pivotal role with the introduction of CreditEval—the new process for claiming educational credit online—and the expansion of the Virtual Meeting and the RSNA Meeting App for iPhone, iPad and Android smartphones. The gamut of partnership-focused programming offered throughout the week underscored the meeting's theme, “The Power of Partnership.”



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1 2013 RSNA President Sarah S. Donaldson, M.D., inspired the crowd with her President's Address on "The Power of Partnership."

2 A new interactive map allowing fellow attendees to search and connect based on specialty or home country was one of the features of this year's expanded Global Connection booth.

3 Spanning two halls, the RSNA 2013 Technical Exhibition featured more than 600 exhibitors.

4 The Radiology Cares booth was buzzing with attendees anxious to take the Radiology Cares pledge and receive a lapel pin and a suitable-for-framing certificate acknowledging that patients are the focus of their radiology practice.

5 An exhibitor offers a demonstration of the latest technology in the Technical Exhibit Hall.

6 New this year, attendees were invited to stop by the RSNA Studio to have their professional headshots taken for free to use for social media profiles. The studio was also used to videotape congratulatory messages to help RSNA prepare for its 2014 centennial celebration.

7 Attendees could select from a rainbow of subspecialties in the Lakeside Learning Center.

8 RSNA experts staffed the Mobile Connect area to answer attendees' technical questions.

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6

Financial Issues Linked to Resident Stress

Radiology residents experience similar or higher levels of job-related stress than their peers in other medical specialties according to recent research that shows a strong connection between resident burnout and financial worries.

RESEARCHERS IN THE DEPARTMENT OF RADIOLOGY AT THE UNIVERSITY OF WASHINGTON, Seattle, demonstrated that 53 percent of trainees surveyed experienced symptoms of stress at least weekly, while 49 percent had feelings of depersonalization at least weekly, according to results of the study published in the May 2013 issue of *Academic Radiology*. In terms of finances, results indicate that attitudes about money are closely related to overall emotional wellness, rather than objective appraisals such as debt level or household income level, said Michael F. McNeeley, M.D., lead author of the study.

Compounding the problem, many residents go into radiology thinking it will be less intense than it actually is, said Dr. McNeeley, a fellow in the university's radiology department.

"There is a myth that radiology is a 'lifestyle' specialty with relatively high compensation, a relatively light workload, and relatively low intensity from a patient-care standpoint," Dr. McNeeley said. "Although those of us in the field recognize that myth to be nonsense, the lingering myth of the 'radioliday' has fueled a misperception that radiology residency is a vacation-like experience, when in reality it's a tough job that requires a lot of grit."

Researchers sent an electronic survey to all 1,389 resident and junior members of the Association of University Radiologists (AUR). Of those, 226 (19 percent) responded. Researchers used a modified Maslach Burnout Index (MBI)—a standard research method for identifying burnout in health professionals—to evaluate feedback. Overall quality of life was evaluated based on a single item self-assessment on a scale of 1-5.



McNeeley



Perez

Results showed a slightly higher burnout rate for females (mean 15.14 +/- 7.16 versus 12.79 +/- 7.64, P = .025), but no significant burnout predictors were based on age, marital status, parenthood or training level.

Researchers discovered that 38 percent of respondents rated their overall quality of life as "generally bad" or "neutral," which is likely related to the 'radioliday' misperception many have about radiology, Dr. McNeeley said. Early in their careers, trainees can become overwhelmed by the vast amount of new information they must learn and new technology they must master. As training continues, the nature of stress changes as they begin to apply this new knowledge with increasing efficiency and independence.

"That can be a difficult adjustment," Dr. McNeeley said. "Make no mistake—these are extremely important experiences. This is a time when a trainee forges his or her identity as a clinical imager and develops his or her professional self-confidence, but it certainly isn't an easy or stress-free process."

Residents From Around the World Share Secrets for Battling Stress

We asked doctors in the Residents Lounge at RSNA 2013 how they handle stress during training.



"I play with my friends," said **Meeyum Park, M.D.**, a second-year resident at the Kangnam Sacred Hospital in Seoul, Korea.



"I listen to music, whatever is on my Spotify list," said **Rudi Barua, M.D.**, a fourth year resident at Jacobi Medical Center in New York City. "That's about it."



"I like to sleep," said **James Zheng, M.D.**, a second-year resident at the Royal University Hospital in Saskatoon, Canada. "I also enjoy yoga and going to the gym."



While financial issues played a big role in residents' overall emotional wellness, according to a recent *Academic Radiology* study, experts say trainees can reduce stress by making sure time commitments are structured and meaningful, maintaining face-to-face social interaction, staying physically active and cultivating a spiritual life, among other methods.

Money Woes Contribute to Stress

Financial issues also played a big role in residents' overall emotional wellness, the survey showed.

The study showed that 42 percent (112 of 266) of the respondents felt that their personal finances made it somewhat difficult to pay for mandatory work-related expenses, such as American Board of Radiology dues and licensing fees. Purchasing other work-related items such as textbooks was at least somewhat difficult for 52 percent (139) based on financial constraints.

"Finances may be an underappreciated influence on resident burnout, and subjective feelings of financial scarcity could outweigh the impact of objective indebtedness," Dr. McNeeley said.

Moonlighting was one way respondents mitigated their stress level. Those who had moonlighted within the previous 30 days of the survey reported a higher level of personal achievement and lower levels of emotional exhaustion.

"Choosing to pursue a long training pathway, I have been stressed at times thinking that I may not be adequately providing for my family financially with a resident stipend," said the study's co-author Francisco A. Perez, M.D., Ph.D., a neuroradiology fellow in the university's radiology department.

"The opportunity to apply my radiology training through moonlighting opportunities has helped me to reduce this anxiety. Moonlighting not only helps to pay the bills, it reinforces that my training is valuable and worthwhile."

Dr. Perez added that seeking opportunities to interact with patients has reduced burnout by helping him reaffirm his purpose as he strives to be a "compassionate radiologist."

In terms of other ways to reduce stress, Dr. McNeeley suggests staying physically active, maintaining a face-to-face social network, cultivating a spiritual life and finding non-medical hobbies. "Those things matter," he said.

Dr. McNeeley, who credited the University of Washington for making his trainee period as stress-free as possible, says other healthcare leaders can help trainees through this process by making sure resident time commitments are structured and meaningful, reinforcing the social interactions of residents and their families, making sure they are treated as valued members of the department and instilling a sense of purpose in them.

"All of these gestures go a long way toward mitigating burnout," Dr. McNeeley said. "Residents have to see beyond the worklist to truly feel their worth."

In fact, finding ways to reduce stress was a major impetus for the study, Dr. Perez added.

"The hope was that survey results could be used to develop and implement evidence-based initiatives to reduce resident burnout and improve resident happiness in radiology residency programs across the country," he said. □

WEB EXTRAS

□ To access an abstract of the study, "The Emotional Wellness of Radiology Trainees," go to www.academicradiology.org/article/S10766332%2813%2900072X/abstract.

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Scott B. Reeder, M.D., Ph.D., of the University of Wisconsin School of Medicine and Public Health (UWSMPH), has been awarded an R01 grant from the National Institutes of Health (NIH) to continue his work on MR Quantification of Fatty Liver Disease – a project he started as an Agfa Corporation/RSNA Research Scholar Grant recipient in 2006. Since that time, Dr. Reeder has received over \$6 million as principal investigator on federally funded grants.

Dr. Reeder now serves as the chief of MRI and associate director of the Medical Scientist (M.D./Ph.D.) Training Program at UWSMPH.



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**Ayca Gazelle, M.D. &
 G. Scott Gazelle, M.D., M.P.H., Ph.D.**
 David S. Gierada, M.D.
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 Brenda Zeran-Joyce

Drayer is R&E Chair-Elect

2011 RSNA President Burton P. Drayer, M.D., is the new chair-elect of the RSNA Research & Education (R&E) Foundation Board of Trustees.



DR. DRAYER is executive vice-president for risk at The Mount Sinai Medical Center in New York City, and since 1995, has served as the Dr. Charles M. and Marilyn Newman Professor and chairman of the Department of Radiology at The Mount Sinai School of Medicine. He served as president of The Mount Sinai Hospital from November 2003 to September 2008.

Dr. Drayer's academic appointments began in 1977 at the University of Pittsburgh Health Center. From 1979 to 1986, Dr. Drayer was at Duke University Medical Center in Durham, N.C., where he became professor of radiology and assistant professor of medicine (neurology). In 1986, he was appointed chairman of the Division of Neuroimaging Research-Education at the Barrow Neurological Institute in Phoenix, Ariz., where he remained until 1995. Dr. Drayer then moved to The Mount Sinai Medical Center where he practices today.

An RSNA member since 1980, Dr. Drayer served as first vice-president in 2003 and as RSNA president in 2011. His RSNA involvement includes serving as chair of the Public Information Committee and a member of the Public Information Advisors Network and the R&E Foundation's Public Relations Committee. Dr. Drayer was elected to the RSNA Board of Directors in December 2003, was liaison for the annual meeting and technology until 2008, and served as president-elect of the board in 2010.

Dr. Drayer is a longtime supporter of the R&E Foundation and a Visionary Donor. He has served on the board of the R&E Foundation since 2009 and served as the R&E Treasurer and Finance Committee Chair from 2012-2013. Dr. Drayer will become chair of the R&E Board of Trustees at the conclusion of RSNA 2014.

N. Reed Dunnick, M.D., was appointed as a new R&E Foundation board trustee, and trustees Gregory C. Karnaze, M.D., and Thomas N. McCausland were reappointed. G. Scott Gazelle, M.D., Ph.D., and Dr. Karnaze were appointed as secretary and treasurer, respectively.



Burton P. Drayer, M.D.

Education and Funding Opportunities

Access RSNA Educational Offerings Year-Round

This year, the RSNA Store at RSNA 2013 was busier than ever with the unveiling of the mobile-capable online education library. Attendees received demonstrations on earning CME on-the-go via the new mobile-capable interface.

CD collections containing refresher courses were also a big hit. The newest collections available for purchase were Dementia, ER Missed Diagnosis, Head Imaging, New Frontiers in Breast Imaging and Cardiac Imaging.

Anyone who missed the RSNA Store this year can visit RSNA.org/purchase to view the current product catalog.

Throughout the year, members can access RSNA's full array of online educational offerings including annual meeting content at RSNA.org/library. Content includes:

- **Earn Online CME On-the-Go**

RSNA's newly redesigned online education library offers the tools to earn CME in a newly mobile-optimized format. Experience streamlined access to refresher courses, *RadioGraphics* and *Radiology* content and Cases of the Day, which provide an interactive learning experience with instantaneous feedback.

- **Online Cases of the Day**

Divided into 14 subspecialty areas, each online Case of the Day combines five unique subspecialty cases into one CME activity designed to challenge diagnosis skills. Access online Cases of the Day at RSNA.org/cod.

- **Online Refresher Courses**

Captured at past annual meetings, each online refresher course is presented in an engaging audiovisual format, combining the speaker's in-person lecture with their presentation slides. Select refresher courses are also available for purchase on CD. Individual CDs are \$55 for members; \$80 for non-members. CD collections are offered at a 25 percent savings compared to individual CDs.

Access Refresher Courses at RSNA.org/rc.

- **Supplemental Online Education**

Browse RSNA's supplemental online courses available for CME credit including modules on ethics and professionalism, leadership and management courses and education exhibits paired with journal articles.

For more information on RSNA's online content, contact the Education Center at ed-ctr@rsna.org or 1-800-272-2920.



Medical Meetings

January-March 2014

- **JANUARY 27-31**

Integrating the Healthcare Enterprise (IHE®) North American Connectathon, Hyatt Regency Chicago
• www.ihe.net/Connectathon

- **FEBRUARY 13-16**

American Society of Spine Radiology (ASSR), Annual Symposium, Fontainebleau Hotel, Miami
• www.theassr.org

- **FEBRUARY 15-20**

International Society for Optics and Photonics (SPIE), Medical Imaging 2014, Town & Country Resort and Convention Center, San Diego
• www.spie.org

- **FEBRUARY 19-21**

Integrating the Healthcare Enterprise (IHE®) World Summit, Rosen Centre, Orlando, Fla. • www.ihe.net

- **FEBRUARY 20-22**

American Society for Radiation Oncology (ASTRO) Multidisciplinary Head and Neck Cancer Symposium, JW Marriott Camelback Inn Resort and Spa, Scottsdale, Ariz.
• www.headandnecksymposium.org

- **FEBRUARY 23-27**

Healthcare Information and Management Systems Society (HIMSS), Annual Conference and Exhibition, Orlando, Fla.
• www.himssconference.org

- **MARCH 3-7**

American Physical Society (APS), March Meeting, Denver Convention Center • www.aps.org

- **MARCH 6-10**

The European Society of Radiology (ESR), European Congress of Radiology (ECR), Austria Center Vienna • www.ecr.org

- **MARCH 22-27**

Society of Interventional Radiology (SIR), 39th Annual Scientific Meeting, San Diego • www.sirweb.org

FIND MORE EVENTS AT
RSNA.org/calendar.aspx

Writing a Competitive Grant Proposal Program

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.

- **March 7-8, 2014**

RSNA Headquarters,
Oak Brook, Ill

A limited number of slots are available for this 1½-day intermediate-level program that combines didactic and small group interactive sessions designed to help radiologic researchers understand and apply the key components of writing a competitive grant proposal. Topics to be covered are the National Institutes of Health grant review process, developing specific aims, and funding opportunities.

Guided by a faculty of leading researchers with extensive experience in all aspects of grant applications and funding, the program will focus on developing realistic expectations and will provide tools for getting started. The course fee is \$175. Register online at RSNA.org/CGP. Contact Fiona Miller at 1-630-590-7741 or fmiller@rsna.org for further information.

Journal Highlights

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

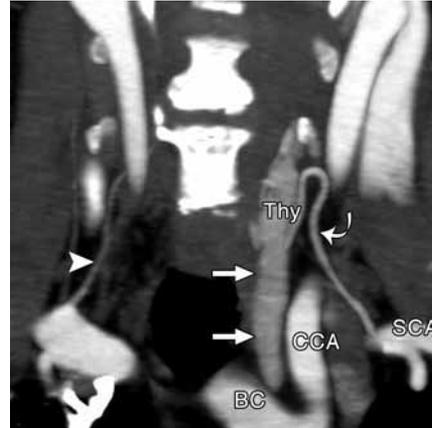
How to Perform Parathyroid 4D CT: Tips and Traps for Technique and Interpretation

Parathyroid 4D CT is an imaging technique for preoperative localization of parathyroid adenomas that involves multidetector CT image acquisition during two or more contrast enhancement phases.

In an article in the January issue of *Radiology* (RSNA.org/Radiology), Jenny K. Hoang, M.B.B.S., of Duke University Medical Center, Durham, N.C., and colleagues describe the 4D CT technique, provide a practical guide to the radiologist for imaging interpretation and discuss the rationale for imaging, the approach to interpretation, and imaging findings and pitfalls. Awareness of several technical and patient factors can increase the success of performing 4D CT, according to the authors.

"Interpretation of 4D CT images is challenging because of ectopic lesions, multiglandular disease, and lesion mimics such as thyroid nodules and lymph nodes," the authors write. "The radiologist's ability to detect a candidate lesion and differentiate it from mimics can be increased with appreciation of the typical contrast enhancement characteristics and morphologic features of parathyroid adenomas."

Radiology



Images in a 52-year-old woman with a large left parathyroid adenoma. Coronal arterial phase 4D CT image shows a lesion measuring up to 4 cm in craniocaudal dimension (straight arrows), inferior to the left thyroid lobe and extending between the left common carotid artery (CCA) and brachiocephalic artery (BC). An enlarged inferior thyroid artery terminates at the superior pole of the lesion (curved arrow). Note the contralateral normal inferior thyroid artery (arrowhead).

(*Radiology* 2014;270:1:15-24)

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

Application of Emerging Techniques for Abdominal CT Dose Optimization: How to Achieve the Dose That Fits the Patient and Diagnostic Task

Recent advances in CT scanning techniques have allowed CT radiation dose reduction while maintaining diagnostic image quality. Radiologists need to understand the latest dose optimization strategies and should incorporate them into clinical practice by collaborating with physicists and CT technologists.

In an article in the January-February issue of *RadioGraphics* (RSNA.org/RadioGraphics), Ravi K. Kaza, M.D., University of Michigan Hospitals, Ann Arbor, and colleagues discuss the use of emerging techniques for the development of optimal imaging protocols aimed at achieving the desired image quality at a reduced dose. Specifically, the authors discuss:

- Image quality parameters and CT dose
- Automated tube current modulation (ATCM)
- Optimal tube voltage
- Iterative image reconstruction

Optimization of scanning technique based on imaging task and patient habitus, in conjunction with use of iterative image reconstruction, allows significant radiation dose reduction without compromising image quality, according to the authors.

"The optimization of scanning protocols requires a collaborative effort between radiologists, medical physicists, and CT technologists, and a full recognition of the potential decrease in image quality when radiation dose is reduced," the authors write.

This article is accompanied by an Invited Commentary by Mahadevappa Mahesh, M.S., Ph.D., Russell H. Morgan Department of Radiology and Radiological Science, Johns Hopkins University School of Medicine Baltimore.

RadioGraphics



Axial 2.5-mm-thick model-based iterative reconstruction images from a low-dose CT enterographic study performed in a patient with Crohn disease at 80 kV with a noise index of 60 at 0.625-mm thickness (CTDIvol value = 1.9 mGy) show wall thickening and enhancement involving the neoterminal ileum (arrow). (*RadioGraphics* 2014;34:4-18)

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

Residents & Fellows Corner

Richard E. Sharpe Jr., M.D., M.B.A., is the new chair of the RSNA Resident and Fellow Committee. *RSNA News* caught up with Dr. Sharpe to ask him a few questions.

Q What are the most significant issues facing radiology residents and fellows today and how can RSNA help address them?

A Today's residents and fellows are practicing in one of the most dynamic periods imaginable. Healthcare reform will transform the practice of radiology. The rapid expansion of technology has significantly increased the amount of information that trainees are expected to know. The American Board of Radiology has implemented a paradigm shift in their certification process for trainees completing residency. Also, there has been a proliferation of educational content and there is far more print and electronic content than any one person can assimilate during training.

RSNA assists trainees by providing a combination of value-added resources and creating a "blueprint" that trainees can use to successfully navigate these tumultuous times. RSNA gives trainees focused educational content in the form of online resources and lectures at the annual meeting, such as the Essentials of Radiology series. The RSNA also provides trainee-directed, career-oriented programming, such as the RSNA Residents and Fellows Symposium and makes this available online for trainees who are unable to attend the annual meeting. RSNA also created Fellowship Connect to gather the previously disparate information about radiology fellowships and present them in an easy to use fashion. Finally, there are numerous networking opportunities provided by RSNA, including a trainee-focused reception at the annual meeting.

Q Conversely, what are most significant ways that residents and fellows can contribute to the mission of the RSNA?

A Today's trainees will quickly become tomorrow's RSNA leaders. All radiology trainees are encouraged to attend the meeting (for free!). RSNA encourages trainees to speak up and get involved in a variety of ways. Trainees can submit scientific

or education abstracts to the annual meeting or participate on committees. As a result of trainees contributing their time and ideas to RSNA, the organization remains vibrant, current and effective. In the last couple of years, via the Resident and Fellow Committee, trainees have made many exciting contributions including the RSNA Residents and Fellows Symposium, Fellowship Connect, expansion of the Residents Lounge at the annual meeting and creation of a brochure that serves as a guide to resident-focused activities at the annual meeting.

Q What is your vision for the RFC and what it can accomplish?

A The Resident and Fellow Committee comprises a solid group of dedicated members in training who are radiology's future leaders. The committee is well poised to continue to refine its successful projects and has a number of exciting proposals in the works, including an educational portal that would allow trainees to sample the educational content from all across the world and rank them based on their usefulness. By scouring the web for the most useful radiology educational sites and presenting them to trainees, the RSNA will be able to assist trainees in creating a successful and personalized study plan. Additionally, the committee is already working on the career-oriented symposium for trainees at RSNA 2014, and will assist RSNA in utilizing social media to reach out to trainees. Finally, the committee wants to identify emerging trainee leaders and get them involved to the fullest extent. If you or someone you know is interested, please reach out to us.

Q How has involvement with RSNA personally benefited you and your career?

A The RSNA is a tremendous resource that has helped me become the best trained radiologist possible by offering high-yield online and in-person learning opportunities. RSNA also has helped me establish a solid network of friends, col-



EDITOR'S NOTE

Richard E. Sharpe Jr., M.D., M.B.A., is a resident in the Department of Radiology at Harvard Medical School and Beth Israel Deaconess Medical Center, Boston.

leagues and mentors. By participating in RSNA committees I have been able to understand the larger landscape of the practice of radiology and learn valuable leadership skills. By presenting research at the annual meeting, I have strengthened my research skills and also met people with common interests—after nearly every presentation you can find like-minded people congregating and discussing their shared interests. Be friendly and outgoing at the annual meeting and there is no limit to the benefits that you and your career can receive from RSNA.

Radiology in Public Focus

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

Reviving the Dinosaur: Virtual Reconstruction and Three-dimensional Printing of a Dinosaur Vertebra

CT IS FEASIBLE for virtually preparing a CT dataset to separate fossilized bone from its surrounding sediment matrix and produce a 3D print, new research shows.

René Schilling, M.D., of the Universitätsmedizin Berlin, and colleagues performed CT on an unprepared fossil from the Museum für Naturkunde, Berlin, using a 320-slice multidetector unit. Researchers used a marching cube-based method to transform the voxel CT dataset into triangle-based, editable geometry, and then performed comprehensive post-processing to isolate the geometry of the vertebra from its surrounding fossilized matrix. Finally, the resulting polygon mesh describing only the vertebra was used for a physical 3D reconstruction by using a selective laser sintering machine.

The CT examination provided enough data to assign the fossil to the genus *Plateosaurus* along with valuable informa-

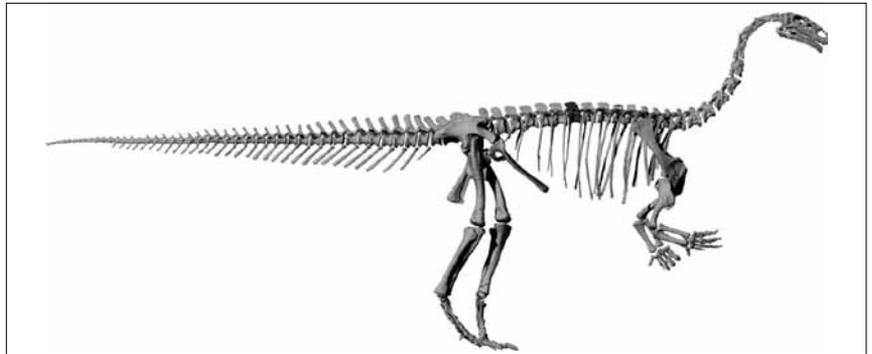


Illustration of *Plateosaurus* skeleton.

(*Radiology* 2014;270;3:InPress)

tion about the fossil—in particular the visualization of multiple fractures and the destruction of the anterior rim of the vertebral body. The 3D print may be considered an accurate copy of the bone with the unprepared fossil.

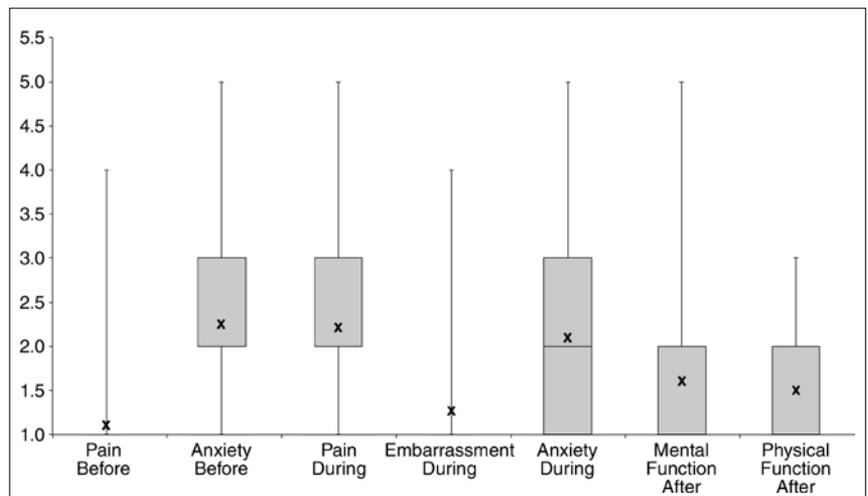
“The authors demonstrated the feasibility and potential utility of combining CT with 3D printing, providing a nondestructive method to future paleontologists,” they write.

Percutaneous Breast Biopsy: Effect on Short-term Quality of Life

YOUNGER PATIENT AGE is a significant predictor of decreased short-term quality of life related to percutaneous breast biopsy procedures, according to new research. Tailored prebiopsy counseling may better prepare women for percutaneous biopsy procedures and improve their experience, researchers discovered.

Kathryn L. Humphrey, M.D., of the Massachusetts General Hospital Institute for Technology Assessment, Boston, and colleagues recruited 188 women undergoing percutaneous breast biopsy in an academic medical center to participate in a mixed-mode survey 2–4 days after biopsy. Patients described their biopsy experience by using the Testing Morbidities Index (TMI), a validated instrument for assessing short-term quality of life related to diagnostic testing. The scale ranged from 0 (worst possible experience) to 100 (no adverse effects).

The women ranging in age from 22 to 80 years had a mean TMI score of 82 out of 100. Patient age was the only significant independent predictor of the TMI score, which decreased by approximately three



Testing Morbidities Index (TMI) attributes. Box plot shows distribution of responses to the seven components of diagnostic testing that make up the TMI. For each component, the patient rated her experience on a five-point scale. X = mean score for each component. (*Radiology* 2014;270;2:InPress)

points for every decade decrease in patient age. The mean TMI score for women less than 40 years old was 76.4.

“Tailored prebiopsy counseling may better prepare women for percutaneous biopsy procedures and improve their experience,” the authors write.

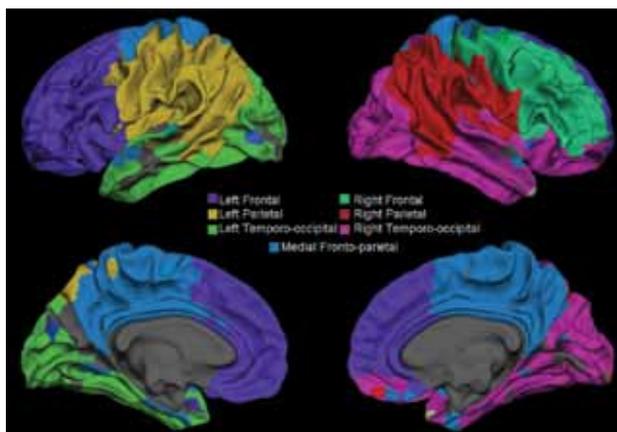
Altered Structural Connectome in Temporal Lobe Epilepsy

TEMPORAL LOBE EPILEPSY (TLE) involves altered structural connectivity in a network that reaches beyond the temporal lobe, especially in the default mode network, new research shows.

Matthew N. DeSalvo, M.D., of the Athinoula A. Martinos Center for Biomedical Imaging, Charleston, Mass., and colleagues analyzed 60 direction diffusion-tensor imaging and magnetization-prepared rapid acquisition gradient-echo (MP-RAGE) MR imaging volumes in 24 patients with left TLE and in 24 healthy control subjects. MP-RAGE volumes were segmented into 1,015 regions of interest (ROIs) spanning the entire brain.

Patients with TLE had 22–45 percent reduced ($P < .01$) distant connectivity in the medial orbitofrontal cortex, temporal cortex, posterior cingulate cortex and precuneus compared with healthy subjects. However, local connectivity, as measured by means of network efficiency, was increased by 85 percent to 270 percent ($P < .01$) in the medial and lateral frontal cortices, insular cortex, posterior cingulate cortex, precuneus and occipital cortex in patients with TLE compared with healthy subjects.

“TLE involves alterations in structure beyond the medial temporal lobe, especially in the DMN, that may provide a noninvasive biomarker for diagnosis, prognosis, and therapy monitoring in patients with TLE,” the authors write.



Surface representation shows the gray–white matter junction of the seven modules that emerge by using the Newman spectral algorithm on an across-subject (both healthy subjects and patients with TLE) average connectivity matrix. (*Radiology* 2014;270:3:InPress)

Media Coverage of RSNA

In October, 397 RSNA-related news stories were tracked in the media. These stories reached an estimated 80 million people.

Coverage included ABCNews.com, Philly.com, Edmonton Journal - Online, Auntminnie.com and Imaging Economics.



January Public Information Outreach Activities Focus on CT Angiography

In January, RSNA's 60-Second Check-up radio program focuses on the use of CT angiography (CTA) to evaluate face transplantation patients.

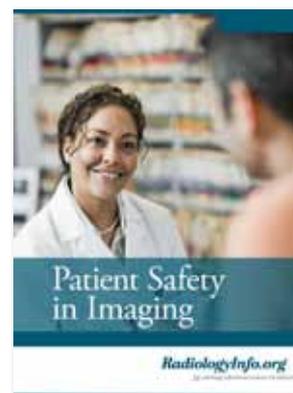
Radiology Select to Spotlight Radiation Dose, Dose Reduction

Next month, *RSNA News* will preview the next issue of *Radiology Select*, Volume 5: Radiation Dose and Dose Reduction, coming in February. *Radiology Select* is a continuing series of selected *Radiology* articles that highlight developments in imaging science, techniques, and clinical practice. For more information, go to www2.rsna.org/timssnet/radiologyselect/index.cfm.

RadiologyInfo.org Patient Safety App

Have you downloaded the *RadiologyInfo.org* Patient Safety in Imaging app? Available for your iPhone, iPad and Android tablet, gain quick access to more than 18 videos and 30 articles that include safety topics such as:

- Radiation dose in X-ray and CT exams
- Airport scanners
- Anesthesia
- Contrast materials
- Children and radiation safety
- CT during pregnancy
- fMR imaging



Annual Meeting Watch

RSNA 2014 Online Abstract Submission Opens mid-January

The online system to submit abstracts for RSNA 2014 will be activated in mid-January. The submission deadline is 12 noon Central Time on Wednesday, April 9, 2014. Abstracts are required for scientific presentations, education exhibits, applied science, quality storyboards and quantitative imaging reading room showcase.

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 more efficiently. For more information about the abstract submission process, contact the RSNA Program Services Department at 1-877-776-2227 within the U.S. or 1-630-590-7774 outside the U.S.



Other Important Dates for RSNA 2014

- May 7:** Member registration and housing open
- June 4:** General registration and housing opens
- July 9:** Course enrollment opens
- October 24:** International deadline to have full conference badge mailed
- November 7:** Final housing and discounted registration deadline
- November 26:** Deadline to guarantee a seat for all ticketed courses
- Nov 30-Dec 5:** 100th Scientific Assembly & Annual Meeting



Explore RSNA's Roster of International Resources

As this month's feature on the annual "International Trends" session at RSNA 2013 clearly demonstrates, RSNA continues to build on its commitment to serve members across the globe at the annual meeting and beyond.

To access the full scope of RSNA programs and opportunities, non-North American members—who make up about 27 percent of RSNA's more than 53,000 members—are invited to explore the International page on *RSNA.org* on the top menu above the search field.

Access the latest international news and link to resources and programs that impact developing or newly developed countries, including the RSNA International Visiting Professors Program, the RSNA Derek Hardwood International Fellowship and RSNA Introduction to Research for International Young Academics.

Current members are encouraged to alert fellow colleagues about the benefits of RSNA membership including free advance registration to the RSNA annual meeting and discounted dues for eligible countries (see the website for the full list of eligible countries and further details). Membership applications must be received by September 1 in order to attend RSNA 2014 as a member.

Check the site regularly to stay plugged into updated news and information throughout the year.



COMING NEXT MONTH

Read about the current state of radiology in France, including the latest topics in oncologic imaging presented by RSNA 2013 researchers, in next month's issue.

William R. Eyler Editorial Fellowship

Experience radiologic journalism firsthand...

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...

Editor of [Radiology](#)
Boston, Massachusetts,
for 2 weeks

Editor of [RadioGraphics](#)
Burlington, Vermont,
for 2 days

RSNA Publications Department
Oak Brook, Illinois,
for 2 days

The fellow will also assist the editors and attend editorial meetings during the [RSNA annual meeting](#).

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.

Eligibility

Candidate must:

- ✓ Be an RSNA member
- ✓ Have accomplished at least 3 years of attending-level work at an academic institution
- ✓ Have served as a reviewer for a major imaging journal
- ✓ Be affiliated with a national radiologic society in his or her country

Applications

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

Deadline for applications is May 1, 2014

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

