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► **PCCT Shows Promise in Assessing Coronary Calcifications**

New study compares the use of PCCT with other methods in evaluating coronary calcifications.



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Patient Perspective Key in Defining the Value of Imaging

By Lynn Antonopoulos

“If we expand our thinking to the patient’s perspective, we will find that imaging’s value extends beyond the tight focus of the radiologist or radiation oncologist,” said RSNA President Bruce G. Haffty, MD.

“To the patient, imaging can remove uncertainty, decrease anxiety and give hope. Through the panoramic lens of the patient, imaging is a powerful and meaningful source of knowledge and comfort that we can all relate to,” he said during his President’s Address in the Arie Crown Theater Sunday.

Dr. Haffty shared insights into the value patients place on imaging and the increasing importance of patient-reported outcomes like quality of life, well-being and anxiety.

“To realize the significance of the value of imaging, or any medical procedure, we need to recognize the enormous shift of our health care system from procedure-oriented care toward value-based care,” Dr. Haffty said. “Value is subjective, dependent on perspective and can be different—from the perspective of the physician, the insurance company, society or the patient.”

A radiation oncologist, Dr. Haffty receives daily reminders of the importance of imaging to his patients’ peace of mind. “Just imagine undergoing radiation or chemotherapy—the impact of a PET/CT showing the tumor is responding. To the patient, that is real value.”

Sharing an unscripted video of a patient candidly sharing the importance of follow-up imaging for himself and his family, Dr. Haffty said that from the physician’s perspective, imaging is a decision-making tool to guide next steps. From the patient perspective, it can also provide a sense of well-being.

CONTINUED ON PAGE 10



Haffty

“The bottom line is to make the patient and their family feel as reassured and comfortable as possible regarding the imaging experience—from start to finish. Image results are the tip of the iceberg. Imaging’s true value through the lens of the patient—quality of life, comfort, peace of mind, certainty, hope and trust—all lies below the surface for us to explore together.”

Bruce G. Haffty, MD

Too Many Lives to Save—We Need to Speed Up

By Mary Henderson

During Sunday’s Opening Session, Elizabeth Morris, MD, strongly advocated for radiologists to take ownership of screening of all cancers.

“It’s clear that our current system isn’t working well, especially for the most vulnerable patients,” said Dr. Morris, chair of the Department of Radiology at the University of California, Davis (UCD) and a recognized expert in breast imaging.

Dr. Morris said breast MR is recommended for women with dense breasts and a normal screening mammogram, but only 2% of the population undergo the test. The utilization rate for the recently approved low-dose CT screening is just 6% of eligible patients.

“There’s a disconnect between the available screening tests and why more people



Morris

aren’t availing themselves of the tests,” she said.

She herself was eligible for a breast MR, but didn’t schedule the screening because it was simply easier not to. As she was about to start a new job at UCD, she received a breast cancer diagnosis—despite receiving

normal results from both a screening 3D mammography and breast US. Her 4 mm invasive lobular tumor was found only after tissue had been removed from her breast during surgery.

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Monday At a Glance

Plenary Lecture
11 a.m. – Noon | Arie Crown Theater



Siddhartha Mukherjee, MD

Three Visions for the Future of Medicine
Dr. Mukherjee will discuss his vision for the future of health care and how radiology will play an important role.

Plenary session
Nov. 28 | 4:30–5:30 p.m. CT



Mini Pathria, MD

The Image Interpretation Session is a single-session event that will cover multiple subspecialties and offer a cross-disciplinary opportunity to test your knowledge beyond your area of expertise. Follow along with moderator Mini Pathria, MD, and a panel of experts identifying abnormal findings critical to making accurate diagnoses and recommending additional studies or procedures

View the full program and add sessions to your calendar at Meeting.RSNA.org.



- 8 a.m. – 9:30 a.m.
United Kingdom Presents
Building and Sustaining Imaging Services in the U.K. (E350)
- 8 a.m. – 9 a.m.
Science and Education Sessions
- 9 a.m. – 9:30 a.m.
Poster Discussions
Learning Center
- 9 a.m. – 3 p.m.
Cutting-Edge Research Presentations
Learning Center Theater
- 10 a.m. – 5 p.m.
Technical Exhibits
- Industry Presentations**
10 a.m. – 5 p.m.
- Professional Portrait Studio**
South Hall, Booth 1031
- 11 a.m. – 12 p.m.
Meet the RSNA Journal Editors:
Suhny Abbata, MD
Radiology: Cardiothoracic Imaging
South Hall, Booth 1007
- 11 a.m. – 12 p.m.
Kahoot Radiology Competition

- 11 a.m. – 12 p.m.
Science and Education Sessions
- 12:15 p.m. – 1:15 p.m.
Poster Discussions
Learning Center
- 12:15 p.m. – 12:45 p.m.
RSNA Case Collection Kahoot Session
Learning Center
- 1 p.m. – 2 p.m.
Science and Education Sessions
- 1 p.m. – 1:30 p.m.
Meet the *RadioGraphics* Podcasts Editors
Ross P. Frederick, MD
Wende N. Gibbs, MD, MA
South Hall, Booth 1007
- 3 p.m. – 5:30 p.m.
Science and Education Sessions
- 4 p.m. – 5 p.m.
RSNA AI Challenge
AI Theater
South Hall, AI Showcase
- 4:30 p.m. – 5:30 p.m.
Image Interpretation Session
Arie Crown Theater

Daily Bulletin

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The RSNA 2022 *Daily Bulletin* is the official publication of the 108th Scientific Assembly and Annual Meeting of the Radiological Society of North America. Published Sunday, November 27–Thursday, December 1.

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AI Theater: Sun, Nov. 27, 2:30-2:45pm

"How AI-based CT Denoising Impacts Imaging Workflow Efficiency: An Experience at Tübingen University Hospital"

Booth: Booth 4932
South Hall Level 3, AI Showcase

RSNA Offers Opportunities to Learn, Connect and Contribute All Year Long
Before and after the annual meeting, RSNA provides radiology professionals with resources and opportunities to advance in their careers and make a difference in the lives of their peers, their patients and themselves.

RSNA Imaging AI Certificate Program
As advancements in medical imaging AI change the landscape of radiology, RSNA leads the way in radiology-specific AI education. Following the successful launch of the RSNA Imaging AI Foundational Certificate, RSNA will soon release its Advanced Certificate. Developed and taught by AI leaders in the field, the Advanced Certificate is the next step in the pathway for radiologists who want to leverage AI in their practice and their career. The RSNA Imaging AI Certificate Program is open to members and non-members. Visit RSNA.org/AI-Certificate for program details including enrollment and pricing.

Volunteer Opportunities
RSNA also offers ongoing volunteer opportunities for members interested in including their voice in future RSNA programming. Options include providing peer review and mentorship for RSNA Case Collection, joining the RSNA team to support efforts at Global Learning Centers, reviewing R&E Foundation Grant Applications and providing survey responses as a contributor to the RSNA Insights Community. Members may also submit their names to the RSNA Speaker Database and deliver expertise to any of RSNA's educational programs throughout the year.

For those interested in helping select content for RSNA 2023, applications are open for volunteer abstract reviewers who are responsible for reviewing and scoring abstracts submitted the RSNA Official Call for Abstracts.

Learn about these opportunities and more at Communities.RSNA.org/VolunteerOpportunities. And, stay informed about all things RSNA all year long at RSNA.org.

Publish Your Research in RSNA Journals
Increase your visibility through RSNA's highly respected journals. Submit your original research and editorial commentary to *Radiology*, RSNA's premier journal featuring the most current, clinically relevant and highest quality research, and to *RadioGraphics*, RSNA's primary education journal focused on a variety of radiologic subspecialties to promote lifelong learning.

You can also submit to other peer reviewed RSNA journals, including *Radiology: Artificial Intelligence*, *Radiology: Cardiothoracic Imaging* and *Radiology: Imaging Cancer*. Each journal focuses on specific areas that impact radiology and patient care.

Unprofessionalism in the Workplace: Professional Transgressions

By Mary Henderson

During a Sunday morning educational course, a panel of radiologists defined the negative behaviors that disrupt professional environments and offered strategies for improving the civility and inclusiveness of the workplace.

Vikas Gulani, MD, PhD said disruptive workplace behaviors, including discrimination, bullying, harassment and a lack of teamwork, are both problematic and costly.

Dr. Gulani said radiologists should all commit to modeling the behavior we want to see. His approach includes clearly communicating the values of the department and incorporating citizenship into the department's compensation plan.

"We hire first for decency and look for individuals who can get along with other team members," said Dr. Gulani, chair of radiology at the University of Michigan.

He believes in dealing with bad behavior early and head-on with a "cup of coffee" conversation with the offender.

Removing the Stigma in Sexual Harassment

Early in the #MeToo movement, radiology resident Marika A. Pitot, MD, joined a task force to research the prevalence of sexual harassment in radiology.

In the task force's poll of 375 radiology trainees, more than 60% reported personal experiences with sexual harassment in the workplace, from verbal remarks of a sexual nature and unwanted touching to receiving sexual messages. Identified perpetrators included training faculty, patients, senior physicians and peer physicians.

The majority of victims did not report the event, citing a belief that reporting would be futile or a fear of negatively impacting their career or retaliation. Of the 17.7% who did report an event, 65% reported not being satisfied with the resolution.

She recommended that departments clearly define sexual harassment, put systems in place for reporting, guarantee effective and thorough investigation of incidents and ensure confidentiality and lack of retribution for victims who report.

"Prevention is the best tool eliminate sexual harassment in the workplace," she said.

Courage in the Face of Microaggressive Behavior

Microaggressions—brief verbal, behavioral or environmental indignities—are a



Gulani



Pitot



Leschied



Robbins

common workplace disruption according to Jessica R. Leschied, MD. Whether intentional or unintentional, she said this type of hostile and derogatory communication is often directed toward marginalized groups.

Even the physical workplace can be non-welcoming to specific groups of people, from a lack of dressing rooms for trans and non-binary patients to an absence of leadership diversity or inadequate family leave policies.

Speaking up by asking for clarification from the microaggressor and standing up for others by challenging stereotypes are a few ways to handle microaggressions.

"Your greatest asset in the journey toward creating a more inclusive workplace is your courage," Dr. Leschied said.

Handling Burnout With Care

Jessica Robbins, MD, concluded the course by discussing the signs of symptoms of suicidal ideation and burnout—and the steps physicians can take to help one another.

Dr. Robbins said that between 2021 and 2022, the percentage of radiologists reporting burnout increased from 36% to 50%. In another 2021 survey of 2,838 physicians and nurses worldwide, 47% reported plans to leave their current role in two to three years.

The consequences of burnout include medical errors and lower patient care quality. For physicians, it can lead to substance abuse, depression and poor self-care. This adds up to reduced productivity, increase turnover and higher costs for the healthcare system.

To help each other, Dr. Robbins recommended several strategies, beginning with active listening and offering to help think through the situation.

"Ask your colleague, 'How are you doing right now' and really listen," Dr. Robbins said. "Repeat back what you heard but offer advice only if asked. Check in on them later and familiarize yourself with the resources available for help through your organization."

More Data Can Help Understand and Reduce Breast Cancer Overdiagnosis and Overtreatment

By Melissa Silverberg

Large-scale mammography screening has undoubtably saved lives, but there's also a concern that it has led to breast cancer being overdiagnosed.

As radiologists and scientists develop new ways of understanding how breast cancer presents and progresses, there is a hope that cancers that will progress into invasive cancer can be caught and treated, while reducing the amount of women who may undergo unnecessary procedures.

A session on Sunday included experts talking about the frequency of overdiagnosis, imaging trends of ductal carcinoma in situ (DCIS) and how data from radiomics can help get more information about tumors that may progress to invasive cancer.

How Often Is Breast Cancer Overdiagnosed?

Marc Ryser, PhD, assistant professor in the Department of Mathematics at Duke University, defined overdiagnosis as occurring in a patient with an asymptomatic tumor that she never would have known about without screening and where the patient would have died of another cause aside from breast cancer before the tumor became symptomatic.

Dr. Ryser said it has been hard to estimate how much overdiagnosis is occurring and estimates have ranged from 0 to 50%. However, his recent research worked with the Breast Cancer Surveillance Consortium



Grimm

and studied 36,000 women aged 50-74 who were screened between 2000 and 2018 using a mathematical model-based approach. The study found that the overall rate of overdiagnosis was 15%, with non-progressive tumors making up 6% and progressive tumors that would not have become symptomatic in the woman's remaining lifetime making up the other 9%.

"This tells us that about one in seven screen-detected cancers will be overdiagnosed."

That number is higher for women who are older and sicker, lower if younger and healthier," Dr. Ryser said. "But it is lower than many of the influential prior studies that have dominated the discourse over the last decade or so."

There is a concern that this is a cancer of screening and that the more screening we do, the more DCIS we find, according to Lars Grimm, MD, associate professor of radiology at Duke University and member of the Duke Cancer Institute.

But, showing images of four different types of DCIS that all evolved into invasive cancer, he highlighted the difficulty of knowing what tumors will progress into a dangerous cancer. Some qualities on imaging can help predict invasive disease, he said, such as asymmetry, extent of calcifications, and

other suspicious features, but more research is needed.

"As radiologists we are typically trained to make a determination between cancer and not cancer, but we need to evolve our understanding to better predict invasive cancer versus not," Dr. Grimm said.

Role of Radiomics in Understanding Tumor Progression

The session also included research done by Despina Kontos, PhD, associate vice-chair for research, Department of Radiology, University of Pennsylvania, on how radiomic signatures can help reduce overtreatment for DCIS.

"The amount of features you can extract from your images is in some ways only limited by your creativity," said Dr. Grimm, who presented on Dr. Kontos' behalf. For example, there are studies looking at breast MR imaging features associated with recurrence after treatment, and others looking at spatial tumor heterogeneity to make future predictions.

Radiomics is still developing and is often based on small datasets at individual institutions. However, Kontos' presentation highlighted the Cancer Phenomics Toolkit, or CaPTk, a platform developed at Penn designed to be an open-source way to use image validated data to analyze more data,



Kontos

share information, and help spread knowledge.

"The goal of this line of work is to take these multiple inputs—the imaging, the clinical information, patient demographic information, the pathology information and any other molecular marker you can get—to put all this information together and the dream is that we would be able to provide our patients with the greatest precision and value in our guidance for their treatment going forward," Grimm said.

Physics Quiz

American Association of
Physicists in Medicine

Q

A modified barium swallow for an adult patient should use what pulsed rate?

- a. 4 pps
- b. 7.5 pps
- c. 15 pps
- d. 30 pps

[Answer on page 8.]

Photon-Counting CT Feasible in Cardiac Imaging of Neonates and Infants

By Richard Dargan

Photon-counting CT (PCCT) is feasible for the imaging of heart defects in neonates and infants, offering superior signal-to-noise ratio and image quality than conventional CT, according to research presented Sunday.

Congenital heart defects are among the most common organ malformations in newborns, with a great variety of mostly complex anatomical conditions. CT is an important imaging method for visualization of cardiac anatomy, especially in surgical planning. However, it carries with it a significant radiation dose that makes it impractical in very young patients.

PCCT has emerged recently as an alternative to conventional CT. It converts X-ray photons directly into an electrical signal, avoiding the intermediate step of conversion by means of a photodiode found in conventional CT. This gives PCCT the advantage of significantly reduced energy and signal loss at the detector site, attributes crucial in imaging young patients.

"Especially in CT examinations of neonates with complex cardiac pathologies, the image quality in relation to the radiation dose is of critical importance," said study co-author and presenter Eric Tietz, MD, from the Department of Diagnostic and



Tietz

Interventional Radiology at RWTH Aachen University Hospital in Aachen, Germany.

Because PCCT is new to the clinical and research space, reliable data is lacking on its utility in cardiac imaging of neonates and infants.

Dr. Tietz and colleagues compared clinical PCCT with a third generation dual-source CT (DSCT) scanner in 109 children, including 57 males and 52 females. All participants had clinical indication for cardiac CT. Of the 109 subjects,

84 underwent contrast enhanced DSCT and 25 had PCCT. The researchers calculated effective children's radiation dose, along with signal-to-noise-ratio (SNR) and contrast-to-noise-ratio (CNR). Four readers rated axial and 3D image quality on a 5-point Likert scale.

PCCT Gives Improved Image Quality with Lower Dose

The mean SNR was 46.3 for PCCT compared with 29.9 for DSCT. Mean CNR

was 62.0 for PCCT compared with 37.2 for DSCT. The SNR-dose-ratio and CNR-dose-ratio were also considerably higher for PCCT compared with DSCT.

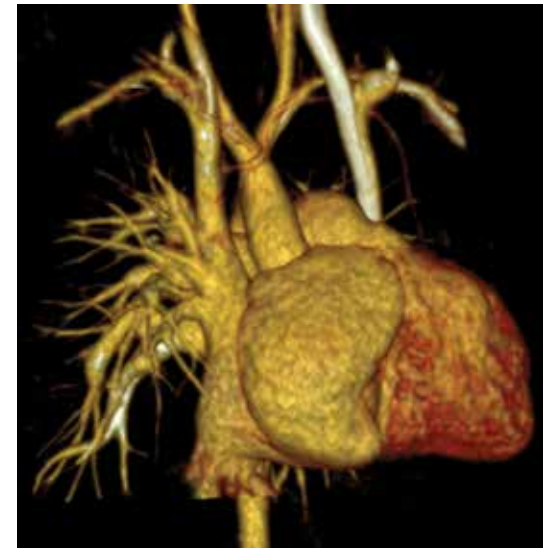
The mean overall image quality as rated on the 5-point Likert Scale was 4.17 for PCCT compared with 3.16 for DSCT.

"PCCT of newborns with congenital heart defects offers significantly higher signal-to-noise-ratio and contrast-to-noise-ratio compared to conventional CT," Dr. Tietz said. "Experts also rated the overall image quality of PCCT, including 3D reconstructions, as superior to that of conventional CT. At the same time PCCT offers a slightly lower radiation exposure."

The researchers are imaging more infants and neonates with PCCT so that patient numbers will be equal to those of the DSCT group. They also plan to study the effect of lowering the tube voltage from 90 kV to 70 kV.

"Future efforts must now focus on further technical optimization, such as a lower tube voltage, to further reduce the radiation dose," Dr. Tietz said.

Additional plans include testing PCCT for more advanced applications such as quantification of ventricular function, myocardial mapping, late enhancement and perfusion measurement.



PC-CT conformed a sinus venosus defect with partial anomalous pulmonary venous connection (PAPVC). Reconstruction quality was rated 5 (excellent). DLP: 18 mGy*cm; eRD: E = 0.576 mSv (conversion coefficient k = 0.032 mSv / (mGy*cm).

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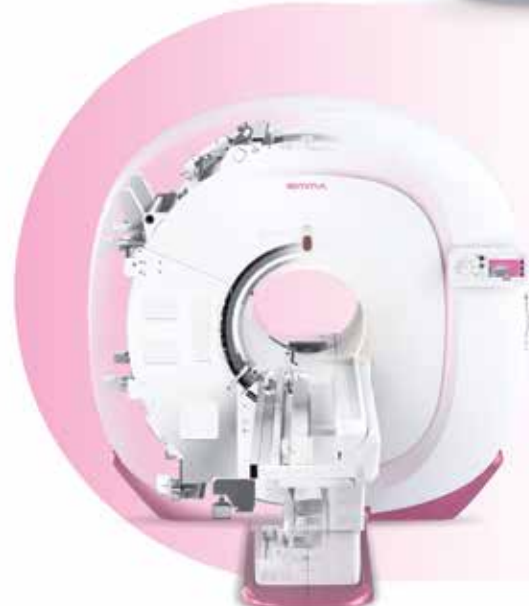
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Flanders Elected to Board of Directors

Adam E. Flanders, MD, FSIIM, a prolific mentor, author and pioneer for digital learning, has been elected to the RSNA Board of Directors. Dr. Flanders is a standing director and liaison for information technology and annual meeting.

“It is an amazing honor and privilege to be nominated to serve on the RSNA Board of Directors,” Dr. Flanders said. “RSNA has been my second academic home for many years and I have had the opportunity to meet and collaborate with an exceptional group of volunteers and staff in the informatics community for several decades now. My hope is to continue to develop and grow existing informatics initiatives and facilitate many of the new and exciting developments that are on the horizon.”

Dr. Flanders is professor of radiology and rehabilitation medicine and vice chair of imaging informatics at Thomas Jefferson University in Philadelphia. He earned his medical degree in 1983 from Rush Medical College in Chicago and completed a residency in diagnostic radiology at the University of Illinois Medical Center, where he served as chief resident in 1986. After completing a fellowship in neuroradiology at Jefferson in 1989, he joined the Jefferson faculty. In 2022, he was named the William E. Conrady, MD, Professor of Radiology Informatics.

It is an amazing honor and privilege to be nominated to serve on the RSNA Board of Directors.

Adam E. Flanders, MD, FSIIM

Previously the informatics associate editor for *RadioGraphics*, Dr. Flanders currently serves on the *RSNA News* Editorial Board. From 2011 to 2017, Dr. Flanders served as chair of the RSNA Radiology Informatics Committee (RIC), actively encouraging radiologists to become involved in the EHR selection process at their hospitals and advocating for engagement in meaningful use initiatives and championing the development of robust electronic teaching files. He also chaired the Neuro-radiology RadLex and Reporting and Medical Imaging Resource Center (MIRC) subcommittees. He is a past chair of the RSNA

Digital Roadmap subcommittee which led to development of RSNA Case Collection. He currently serves RSNA as an informatics advisor to the RIC, member of the Machine Learning, Data Science, and Common Data Elements (CDE) subcommittees. Dr. Flanders served on the program committee for the Society of Imaging Informatics in Medicine (SIIM) and was awarded the SIIM fellowship for contributions to imaging

informatics research and education.

Dr. Flanders co-authored the “Digital Roadmap” for the National Institutes of Health/RSNA/American College of Radiology (ACR)/The Academy Workshop on Artificial Intelligence in Medical Imaging, identifying and prioritizing needs for academic research laboratories, professional societies and industry. He has also helped to facilitate several neuroimaging-based AI Challenges with RSNA in collaboration with the American Society of Neuroradiology (ASNR) in 2019, 2021 and 2022.

A past president of the American Society of Spine Radiology (ASSR), he has also served in multiple roles for the ASNR, including as chair of its Rules Committee and as deputy editor for *NeuroGraphics*. He now chairs the ASNR CDE workgroup in collaboration with the ACR and RSNA.

Dr. Flanders’ research interests have focused primarily on application of MRI in the evaluation of human spinal cord injury (SCI), and he has been funded by RSNA, the Nielson Foundation and the Department of Defense (DoD) to evaluate the capabilities of MR in forecasting neurologic recovery in SCI. He has been a funded subject matter expert for the National Cancer Institutes (NCI) Cancer Bioinformatics Grid



Flanders

(caBIG) and more recently is a principal investigator for the National Institute of Biomedical Imaging and Bioengineering (NIBIB) Medical Imaging and Data Resource Center (MIDRC) which is focused on assembling large, diverse imaging datasets for AI research.

Dr. Flanders was honored with the 2021 RSNA Outstanding Educator Award in recognition of his many contributions through publications and technology to enhance radiology education.

Pandharipande Elected as At-Large Director

A seasoned advocate committed to representing radiology and advancing its role in the greater health care community, Pari V. Pandharipande, MD, MPH, has been elected to the RSNA Board of Directors as an at-large director.

“I am deeply honored to be selected for a role on the RSNA Board of Directors,” Dr. Pandharipande said. “Everything that RSNA does—in supporting our clinical practices today, and in investing in the education, research, and innovation that will shape our field tomorrow—is grounded in the same, patient-first mission that motivated me to pursue a career in medicine and radiology years ago. I am so excited

to be part of it, and to have the opportunity to contribute in this way.”

Dr. Pandharipande is professor and chair of radiology at The Ohio State University (OSU) and chief of radiology services for OSU Wexner Medical Center in Columbus, OH. She was previously at Massachusetts General Hospital (MGH) in Boston for 17 years as an abdominal radiologist and physician-scientist.

After earning her medical degree at Weill Medical College of Cornell University, Dr. Pandharipande completed an internship at the New York Presbyterian Hospital-Cornell, both in New York. She completed her diagnostic radiology residency at New York University Medical Center. She concurrently completed a cancer outcomes research fellowship and an abdominal imaging clinical fellowship at MGH, where she also earned a master’s degree in public health from the Harvard T.H. Chan School of Public Health in Boston.

An experienced leader, Dr. Pandharipande served as associate chair of integrated imaging & imaging sciences at MGH, leading an enterprise-wide project at Mass General Brigham involving the clinical integration of the enterprise’s imaging services.

At MGH, she also served as the director of the MGH Institute for Technology Assessment, a multidisciplinary health outcomes research institute. Dr. Pandharipande also led an NIH (R01)-funded research program centered in imaging and cancer outcomes, which continues at OSU.

Dr. Pandharipande served as chair of the American Cancer Society’s Healthcare Outcomes, Policy and Systems (HOPS) grant review committee and is a new member of the NIH’s Organization and Delivery of Health Services (ODHS) study section. She serves on the advisory board of ACR’s Harvey L. Neiman Health Policy Institute and is a past president of the Radiology Alliance for Health Services Research within the Association of University Radiologists. She has served on numerous ACR committees, including serving seven years as chair of the Incidental Findings Committee. She has closely mentored more than 20 individuals, including learners and faculty members who have pursued careers in both academic medicine and private practice.

Dr. Pandharipande is the newly selected chair of the RSNA Government Relations

committee, where she will work to build relations with RSNA and federal agencies with a goal of accelerating imaging innovation and imaging care delivery in the U.S. She also serves on the RSNA Research Development Committee and the *Radiology* Editorial Board as an associate editor for health policy and practice.

For a decade, Dr. Pandharipande was a special consulting editor of *American Journal of Roentgenology* (AJR) where she developed and led the Best Practices series. She has continued as a member-at-large of the AJR editorial board. Dr. Pandharipande also serves on the editorial board of the *Journal of the American College of Radiology*.

Her work has earned numerous awards in recognition of her research and leadership, including the RSNA Roentgen Resident/Fellow Research Award, the Lucy Frank Squire Distinguished Resident Award from the American Association of Women in Radiology, the RSNA Honored Educator Award, election to the Academy for Radiology and Biomedical Imaging Research Council of Distinguished Investigators, and selection for participation in the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) program at Drexel University.



Pandharipande



On Sunday, RSNA President Bruce G. Haffty, MD, gave his President's Address to hundreds of RSNA 2022 attendees in Arie Crown Theater.



In her Opening Plenary address, Elizabeth Morris, MD, discussed using imaging to envision cancer survival for every patient and shared her personal story of cancer diagnosis and treatment.



The RSNA AI Theater featured presentations throughout the day showcasing the innovations in medical imaging AI.



Exhibitors and attendees were energized and engaged when the Technical Exhibits halls opened on Sunday.



More than 650 exhibitors welcomed RSNA attendees, offering insight into the latest products and services that are empowering patient care.



RSNA 2022 attendees were ready to walk onto the floor of the Technical Exhibits and immerse themselves in the latest technology and network with the leading manufacturers, supplies and developers.

Fast 5-Minute Shoulder MRI Aids Patient Comfort

By Richard Dargan

A fast 5-minute MRI protocol of the shoulder with deep learning (DL) reconstruction is feasible in clinical routine and allows a reduction in scan time of more than 50% compared to the standard protocol, according to research presented Sunday.

MRI of the shoulder has become the most commonly used imaging modality in patients with shoulder pain. It provides a comprehensive noninvasive diagnosis of pathologies such as rotator cuff or biceps tendon tears and glenoid labral abnormalities.

“MRI is often preferred to arthroscopy and offers much more information than a simple shoulder X-ray,” said presenter and study lead author Judith Herrmann, MD, from the Department of Diagnostic and Interventional Radiology at the Eberhard Karls University of Tübingen in Tübingen, Germany.

The exam can be time-consuming and may cause patient discomfort. A speedier, more efficient exam of similar quality would be of great benefit to clinicians and patients.

Dr. Herrmann and colleagues studied a 5-minute shoulder MRI protocol that exploits the power of DL for faster image

reconstruction. The 5-minute protocol consists of accelerated 2D turbo spin echo (TSE) sequences with a DL reconstruction at 1.5T and 3T.

While prior studies have shown good results for DL in this setting, they have been primarily preclinical or retrospective.

The use of the deep learning reconstruction improves the overall image quality by reducing noise and improving edge sharpness, providing interchangeable results concerning the diagnostic performance, and allowing a reduction in scan time of more than 50% compared to the standard shoulder imaging.

Judith Herrmann, MD

For the new study, researchers prospectively compared the image quality of the 5-minute protocol to that of a standard 2D TSE protocol in 30 patients who underwent shoulder MRI at 1.5T and 3T. Each patient had two MRI examinations: one with a standard TSE (TSES) protocol and the other with a fast TSE with DL reconstruction (TSEDL) and an undersampled k space. Two musculoskeletal radiologists independently assessed image quality and visualization of anatomical structures using a Likert scale ranging from 1 to 5, with 5 representing the best quality. The radiologists also assessed diagnostic performance concerning pathologic shoulder lesions.

Superior Results From Fast Protocol

The radiologists judged the overall quality of the images from the TSEDL protocol to be superior to those from the standard

protocol. They found noise and edge sharpness to be significantly superior in TSEDL versus TSES. No difference was found in qualitative diagnostic confidence and clarity of anatomical structures and quantitative diagnostic performance for pathologic shoulder lesions when comparing the two sequences.

“The use of the deep learning reconstruction improves the overall image quality by reducing noise and improving edge sharpness, providing interchangeable results concerning the diagnostic performance, and allowing a reduction in scan time of more than 50% compared to the standard shoulder imaging,” Dr. Herrmann said.

If larger studies involving multiple centers and different equipment vendors support the results, ultrafast protocols in shoulder MRI could soon become an important option in daily clinical routine, according to Dr. Herrmann.

“This technique increases patient comfort and throughput,” she said.



Herrmann

Access the presentation, “Implementation and Evaluation of a Fast 5-Minute Shoulder MRI Protocol With Accelerated TSE-Sequences and Deep Learning Image Reconstruction for the Assessment of Shoulder Pain at 1.5 and 3 T,” (S4-SSMK02-1) on demand at [Meeting.RSNA.org](https://www.rsna.org).

Physics Quiz

American Association of
Physicists in Medicine

A

[Question on page 4]

d. Modified barium swallows should be assessed at 30 pps and must not be acquired below 15 pps. Using slower frame rates to save dose is not recommended due to the subtle, complex, and fast motion being evaluated.

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Together, We Are Radiology

Photon-Counting CT Opens Door to New Possibilities in Imaging Sinuses

By Nick Klenske

From single section CT scanners to multidetector systems capable of covering the entire heart in a single rotation, CT has experienced a dramatic evolution over the past several decades. As a result, it is now a mainstay of diagnosis in many pathologies—including complex and small anatomical structures.

“Dedicated non-enhanced maxillofacial CT and temporal bone CT are the current reference standard for assessing paranasal sinuses and temporal bone anatomy and pathology,” said Narine Mesropyan, MD, a medical doctor and scientific associate in the Clinic for Diagnostic and Interventional Radiology at the University of Bonn, Germany. “It is also the primary diagnostic tool for procedural planning.”

Despite these advancements, Dr. Mesropyan stressed how it is critical that radiologists continue to optimize scanning protocols, especially in terms of radiation dose reduction, while also maintaining high and sufficient image quality using state-of-the-art imaging techniques and technologies such as photon-counting CT.

An Emerging Technology

Photon-counting detector (PCD)-based CT is an emerging technology that uses new energy-resolving X-ray detectors with

“High spatial resolution is necessary for the sufficient imaging of paranasal sinuses and temporal bone, which typically requires a high radiation dose exposure.”

Narine Mesropyan, MD

mechanisms that differ from those of conventional energy-integrating detector (EID)-based CT systems. PCD CT can count single X-ray photons and discriminate them according to their energy. As a result, this technique allows for improved signal- and contrast-to-noise ratio,

increased spatial resolution and reduced radiation exposure.

This capability to provide CT data at high spatial resolution and with inherent spectral information makes photon-counting CT particularly attractive for the imaging of complex and small—even miniature—anatomical structures.

“High spatial resolution is necessary for the sufficient imaging of paranasal sinuses and temporal bone, which typically requires a high radiation dose exposure,” Dr. Mesropyan explained during a Sunday session.

Being able to reduce radiation exposure is critical due to the proximity of radio-sensitive organs in scan volume (e.g., eye lenses), in pediatric populations, young

adults, and in patients undergoing repetitive examinations.

“This is why further optimizing scan protocols, as well as developing and implementing new CT techniques, are of great clinical importance,” Dr. Mesropyan added.

Drastic Dose Reduction

To support this optimization, Dr. Mesropyan recently led an experimental study that investigated the potential of new clinically implemented photon-counting CT for paranasal sinuses and temporal bone imaging.

The study used different radiation dose settings in comparison to other state-of-the-art CT systems, including dual-layer spectral and dual-energy dual-source CT. Different qualitative and quantitative parameters of image quality and radiation dose exposure using different scan settings were also evaluated and compared.



Mesropyan

The study demonstrated that a photon-counting CT system allows for a drastic reduction in radiation dose while maintaining good and, for clinical use, sufficient image quality up to ultra-low-dose settings, which was also superior to other evaluated CT systems.

According to Dr. Mesropyan, these findings open the door to new possibilities in CT imaging.

“To fully leverage the potential of CT

imaging, it is essential that radiologists and clinicians grasp the principles of recent and upcoming advances, especially with novel techniques such as photon-counting CT on the horizon,” she concluded. “This technique in particular may overcome the limitations of commercially available EID-based CT, allowing us to reduce radiation exposure while maintaining the high image quality that made CT a mainstay in many pathologies in the first place.”

Using a Holistic Value Equation Can Help Radiologists Evaluate Cost Versus Benefits of AI Solutions

By Melissa Silverberg

Geoff Rubin, MD, discussed the idea that radiologists should apply a rubric when thinking about how AI facilitates clinical practice and the value it brings in different areas.

“This is a very important and interesting moment in time for AI and radiology,” said Dr. Rubin, professor and chair of the Department of Medical Imaging at the University of Arizona in Tucson. “I would personally like to see us as a profession following a framework that shows the public, payers, and the government that we are prepared to use these tools responsibly for the betterment of patient experience and outcomes.”



Rubin

“AI solutions can affect any one of those variables, but assessing against all of them can help derive an expectation of whether or not it is reasonable to implement.”

Geoff Rubin, MD

“AI solutions can affect any one of those variables, but assessing against all of them can help derive an expectation of whether or not it is

reasonable to implement,” he said. “The spectrum of clinical applications, value propositions, and integration models for AI and medical imaging are numerous and diverse.”

Dr. Rubin’s presentation also delved into the issue of reimbursement, though it is still relatively rare to see financial reimbursement for AI tools.

“Reimbursement will depend on who derives primary value and must balance delivering patient and societal value

while avoiding overpayment for solutions that bring intrinsic value to hospitals and doctors, risking overutilization, overdiagnosis, and excessive expense,” Dr. Rubin stated. “It’s still early days on this. It’s possible many AI solutions may never see reimbursement, so it will be incumbent on radiologists and their management teams to figure out how to derive the value of these tools in a way that still makes them a net positive.”

For example, he said, if an AI tool allows radiologists to shorten the

amount of time it takes to perform an MRI because it takes raw data and constructs images from them, the hospital or clinic can convert that time savings into increased volume or decreased staffing to find a cost savings that balances the cost of the tool.

“When you think about these things from a holistic view, an AI solution can bring net value without actually having reimbursement,” Dr. Rubin said.

Dr. Rubin said he hopes radiologists think about ways to organize their thoughts around new technologies that are coming out all the time and think about the “ifs” and “hows” to justify bringing them into their clinical practice.

AI Brings Value to Radiology in Myriad Ways, But Not All of Them are Necessary

The value equation, as Dr. Rubin refers to it, looks at factors including the cost of the AI tool, the outcome of the exam including both the quality of the exam itself and the experience from the patient perspective, appropriateness and necessity of the tool for clinical decision making and how much waste it introduces into the process.

Physics Tip



An MR Safety Committee should include a physician overseeing MR (MR Medical Director), a technologist with MR safety training (MR Safety Officer), a physicist with MR safety knowledge (MR Safety Expert) and an administrator over MRI. They should set safety policy, determine course for off-label scanning, and review safety incidents.

CONTINUED FROM PAGE 1

Patient Perspective Key in Defining the Value of Imaging

Overcoming the Challenge of Demonstrating Value

“A major challenge is how we can objectively quantify the patient perception of value to demonstrate its value to the greater medical community,” Dr. Haffty said. “While this may seem difficult to quantify, it can be accomplished through patient-reported outcomes, or PROs.”

With PROs increasingly used as a measure for demonstrating the value of a given intervention or specialty, Dr. Haffty said these metrics are relatively understudied and underreported in radiology literature. Many that have been reported focus on negative aspects of imaging, like anxiety or radiation fears. Yet, the positive impact is equally important to note.

“Research on imaging’s value, based on patient-reported outcomes, is an endeavor worthy of our support,” Dr. Haffty said.

From the time a patient schedules an appointment, through every follow-up, effort should be made to ensure they feel comfortable, informed, supported, seen and heard. “Simple measures like paying



attention to the ambiance of the facility, demonstrating professionalism among patient-facing staff or reducing waiting times can all help,” Dr. Haffty said.

He emphasized the importance of working not only with patients, but also with multidisciplinary partners across the health care spectrum to adequately

evaluate, demonstrate and communicate the value of imaging through research, education, communication and practice.

“The bottom line is to make the patient and their family feel as reassured and comfortable as possible regarding the imaging experience—from start to finish,” Dr. Haffty said. “Image results are the tip of the iceberg. Imaging’s true value through the lens of the patient—quality of life, comfort, peace of mind, certainty, hope and trust—all lies below the surface for us to explore together.”

Access the presentation, “Diagnostic Imaging: Value from the Lens of the Patient,” (S5-PL01) on demand at [Meeting.RSNA.org](https://www.rsna.org).

“Imaging can remove uncertainty, decrease anxiety and give hope.”

Bruce G. Haffty, MD

CONTINUED FROM PAGE 1

Too Many Lives to Save—We Need to Speed Up

“I knew the first 90 days of a new job are important and that during that time I’d be undergoing radiation therapy and not fully myself,” she said. “I chose to be open and honest with my UCD colleagues and in turn I got to know their stories as well.”

The experience taught her that physicians can enrich patient care and their own well-being by opening themselves up to more meaningful and authentic connections—a practice that runs contrary to what physicians are taught in medical school.

“When we don’t take the time to reassure a patient and provide them with access to information, we miss an opportunity for human connection,” she said. “We need to start thinking of the imaging report not as our final product but as a springboard for communicating with our patients.”

Dr. Morris also gained a greater perspective on how difficult it is for patients—especially underprivileged and minority populations—to understand and access cancer screening tests.

“We need to work to provide greater access to screening, to build bridges with our colleagues and to communicate what tests are available to patients.”



With a pandemic of breast cancer that is expected to increase by 50% in the next 20 years, Dr. Morris said there’s no time to waste in making significant changes to the screening process.

“We need to speed up, because there are too many lives to save,” she said. “If we can identify all cancers when they are small enough to be treated


with minimal therapy, cancer can become a chronic disease, not a fatal one.”

As a solution, she proposes that radiologists manage the entire cancer screening value chain by notifying patients of their risk, recommending the appropriate testing and making scheduling as easy as possible. Addressing disparate guidelines is an important first step.


“Guidelines are based mostly on white populations and different groups make different recommendations based on their own biases,” she said. “As radiologists, we understand the in’s and out’s of screening research.”

“I believe the role of radiologists will expand significantly and we’ll be taking greater responsibility for patients,” she said. “Our future is bright.”

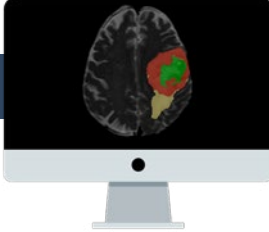
Access the presentation, “Doctor as Patient: Imaging Cancer Survival for All,” (S5-PL01) on demand at [Meeting.RSNA.org](https://www.rsna.org).




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Today's Press Releases

Press releases are distributed to the media throughout the week highlighting research presented at RSNA 2022. RSNA's media outreach helps increase public awareness of radiology and its role in personal health care.

Obesity Linked to Poor Brain Health in Children

Higher weight and body mass index (BMI) in pre-adolescence are associated with decreased connectivity in the functional networks of the brain that involve cognitive control, motivation and reward-based decision-making, according to a new study from the Yale School of Medicine in New Haven, Connecticut. The researchers studied 5,169 children aged 9-10 years from 21 centers across the country using MRI data from the largest long-term study of brain development and child health in the United States. Researchers found that higher weight and BMI z-scores were associated with changes in macrostructures, microstructures and functional connectivity that worsened brain health. Observed changes included significant impairment to the integrity of the white matter as well as a thinning of the cortex, which has been associated with impaired executive function.

See today's presentation “Higher Weight and Body Mass Index Are Associated With Poor Brain Health in U.S. Children” (M6-SSNR05-1) at 1:30 p.m. or access on demand at [Meeting.RSNA.org](https://www.rsna.org).

Advance Releases

Advance press releases were distributed during the week before the meeting for these presentations. View digital posters in the Learning Center and access the presentations on demand at [Meeting.RSNA.org](https://www.rsna.org).

NSAIDS May Worsen Arthritis Inflammation

“Impact of Non-steroidal Anti-inflammatory Drugs (NSAIDs) on Synovitis and The Progression of Osteoarthritis: Data From The Osteoarthritis Initiative (OAI)” (S3B-SPMK-1)

MRI Reveals Significant Brain Abnormalities Post-COVID

“Susceptibility-Weighted Magnetic Resonance Imaging Highlights Brain Alterations in COVID Survivors,” (S2-SSNR01-3)

Lung Cancer Screening Dramatically Increases Long-Term Survival Rate

“20 year Lung Cancer Survival Rates in the International Early Lung Cancer Action Program (I-ELCAP)” (S4-SSCH02-3)

Drinking During Pregnancy Changes Baby's Brain Structure

“The influence of alcohol on in utero brain development: a structural fetal MRI study” (S3A-SPNR-10)

Researchers Identify Brain Markers of ADHD in Children

“Morphologic, Microstructural, and Connectomic Correlates of Attention-Deficit/Hyperactivity Disorder in Adolescents” (S3A-SPNR-1)

Ultra-High-Res MRI Reveals Migraine Brain Changes

“Migraine-Associated Vascular Changes on Structural 7T-MRI” (T5A-SPNR-7)



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