



Daily Bulletin

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INSIDE: TECHNICAL EXHIBITS INDUSTRY FOCUS



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Embracing Change for a Bright Future

By Lynn Antonopoulos

“Radiology has always been a force for change in medicine, revolutionizing diagnostic imaging studies, innovating minimally invasive procedures, and pioneering radiation therapies for cancer,” said RSNA President Matthew A. Mauro, MD. “With innovation as the cornerstone of radiology, we are well positioned to accept the necessity of change to continue to advance our profession.”

Delivering his President’s Address, “Leading Through Change,” during Sunday’s Opening Session, Dr. Mauro drew from real-world business strategies and changes in interventional radiology as he reflected on the necessity and uncertainty of change and the importance of leadership in ensuring the successful navigation of change.

“As leaders—and everyone in this room leads in some capacity—success in managing change requires us to be cognizant, intentional and proactive in leading our teams, departments and organizations through significant changes to our specialty or work environment,” he said.

Acknowledging that medicine is not only a personal calling but also a business, Dr. Mauro noted that, as physicians, radiologists are in the business of helping people. “Our business is impacted by the same rules and forces that affect other businesses,” he said. “When facing change, it’s important to assess our environment and to identify what forces are affecting our business.”

Looking to Business Models for Successful Transformation

Dr. Mauro offered a look at change management frameworks to help evaluate and navigate change successfully. He referred to the Six Forces model developed by Michael Porter, a world-renowned business strategist from Harvard. “The six forces he describes are: the power, vigor and competency of existing competitors, of customers—or in our case, patients—of



Mauro

potential competitors, of suppliers and finally, the possibility that the service we provide can be delivered in a different way,” Dr. Mauro said.

Porter’s model also references a 10x force—powerful enough to transition a business from one state to another until a new equilibrium is reached. According to Dr. Mauro, AI is an example of a 10x force for radiology. “To remain relevant and provide value to our patients, radiologists need to lead through this transformative moment to master the practical and ethical integration of AI into the radiology workflow and practice,” he said.

But what happens when the balance of forces shifts from the old ways of competing and succeeding to new ways? Dr. Mauro referred to this as a strategic inflection point, a concept described by former Intel CEO Andrew Grove.

“Leading through a strategic inflection point will cause confusion and uncertainty for a period of time,” he said. “But if we are committed and have a clear vision, we will come out on the other side better for having taken the journey—with new inspirations and a refreshed outlook toward our specialty and practice.”

Noting that transformation is a process

“If we are committed and have a clear vision, we will come out on the other side better for having taken the journey—with new inspirations and a refreshed outlook toward our specialty and practice.”

Matthew A. Mauro, MD

that requires an effective roadmap, Dr. Mauro shared a framework from John Kotter, an emeritus professor of leadership at Harvard, who recommends establishing a sense of urgency, creating a clear vision, communicating the vision, empowering others to act, planning and creating short term wins, and institutionalizing the new approaches.

“If we constantly embrace change, rapidly adapt to innovations in technology and practice, react and respond to our inflection points, and remain vigilant and maybe even a little bit paranoid, radiology will most certainly enjoy a robust, exciting and bright future,” Dr. Mauro concluded.

Access the presentation, “Leading Through Change,” (S6-PL01A) on demand at [Meeting.RSNA.org](https://www.rsna.org/meeting).

Leveraging History to Prepare for the Future

By Nick Klenske

‘History never repeats itself, but it does often rhyme’ is a quote often credited to Mark Twain. But regardless of the saying’s origin, the notion touches on the point that while we may view today’s events, discoveries and circumstances as being unprecedented, upon closer examination, one will likely find that everything has some historic precedent.

Radiology is no exception.

“Whether we realize it or not, radiologists often grapple with issues that have already occurred in the past,” said Howard B. Chrisman, MD, president and CEO at Northwestern Memorial HealthCare in Chicago. “While these issues may not

be identical, they certainly have a rhyming nature.”

Speaking during Sunday’s opening session, Dr. Chrisman noted that historic parallels can provide an opportunity for radiologists to learn from the past and better prepare for future change.

“Radiology is at an inflection point as new technologies and AI in particular rapidly transform our field,” he said.

While the nature of this disruption and change can be uncomfortable, radiologists must ultimately be ready to embrace it.



Chrisman

CONTINUED ON PAGE 2

Monday At a Glance

Plenary Lecture

Elizabeth S. Burnside, MD, MPH
11 a.m. - noon Arie Crown Theater



Burnside

Leading Through Technology: Valuing Artificial and Human Intelligence
Dr. Burnside will discuss radiology's role in successfully leading many technological revolutions. She will address the challenges and opportunities presented by the introduction of AI to clinical radiology practice.

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

Physics Quiz

Besides physicians, who is allowed to image patients using fluoroscopy?
[Answer on page 4.]

7:30 a.m. - 6 p.m.
"We Are Radiology" String Art Installation Connections Center
8 - 9 a.m.
Science and Education Sessions 9 - 9:30 a.m.
Poster Discussions Learning Center
9 - 9:45 p.m.
RSNA Connect: ChatGPT & Generative AI Connections Center
9 a.m. - 3 p.m.
Learning Center Theater Presentations Learning Center Theaters
10 a.m. - 5 p.m.
Technical Exhibits
Industry Presentations 10 - noon p.m.
Meet the RSNA Journal Editors: Suhny Abbara, MD <i>Radiology: Cardiothoracic Imaging</i> Gary D. Luker, MD <i>Radiology: Imaging Cancer</i> South Hall, Booth 1006
10 a.m. - 5 p.m.
Professional Portrait Studio South Hall, Booth 1029
10:30 - 11:30 a.m.
Science and Education Sessions



10:30 a.m. - 3:45 p.m.
RSNA AI Theater Presentations South Hall, Booth 5149
11 - 11:30 a.m.
RadioGraphics Podcast Discovery Theater
11:45 a.m. - 12:45 p.m.
Poster Discussions Learning Center
12 - 12:45 p.m.
Center Stage Presentations Innovation Theater South Hall, Booth 3315
12:15 - 1:15 p.m.
Kahoot Radiology Competition 1 - 3:30 p.m.
Science and Education Sessions 2:30 - 3:30 p.m.
Science and Education Sessions 4 - 5 p.m.
RSNA AI Challenge AI Theater South Hall, AI Showcase
4:30 - 5:30 p.m.
Image Interpretation Session Arie Crown Theater

Daily Bulletin

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Register for the RSNA 5K Fun Run

Get your blood pumping while you support the RSNA R&E Foundation. The RSNA 5k Fun Run, a popular annual meeting event will take place Tuesday, Nov. 28, at 7 a.m. Register at RSNA.org/Fun-Run or at the

RSNA 5k Fun Run Desk in McCormick Place. The registration fee is \$50. Pre-registrants should visit the desk to pick up their bibs and T-shirts. All registration fees are considered a donation and are nonrefundable.

The RSNA 5k Fun Run supports the Foundation in its efforts to provide grants and awards to individuals and institutions that advance radiologic research, education and practice.

CONTINUED FROM PAGE 1

Radiologists Perfectly Positioned To Embrace Change

Evolving Is Radiology's Superpower

The good news is that, thanks to experience, radiologists are well-positioned to successfully navigate change.

"Before we were even a specialty, people who worked with X-rays were referred to as being 'irrational,' 'irritable' and 'prone to mental disturbances,'" Dr. Chrisman joked. "Yet despite this start, the fact that we are all here today is proof that we've been able to persist and that we will continue to persist."

Dr. Chrisman said that the secret to radiology's staying power is its ability to evolve.

"While history shows that change is often disruptive, I believe radiologists are well-prepared thanks to our agile nature," he said.

Today's AI is Yesterday's PACS

During his presentation, Dr. Chrisman highlighted several examples of how radiologists can leverage historic parallels to

think about AI and adapt to change.

One of those examples is the advent of PACS. As Dr. Chrisman said, prior to PACS, radiology was the hub of the hospital.

"I'm sure many of us remember the days when physicians brought their images to a central room to examine and discuss alongside radiologists—it was a very social process," he recalled.

But then came PACS and everything changed.

"We were essentially the first specialty to be digitized," Dr. Chrisman said.

While this change fundamentally transformed radiology, with many even predicting the practice's imminent extinction, radiologists leveraged this new technology as a means of providing even better service.

According to Dr. Chrisman, today's AI is yesterday's PACS.

"There's no shortage of people who say AI will make radiologists irrelevant, but I believe our history says otherwise," he said.

While there's no denying that AI will have a profound impact on how radiologists practice medicine, Dr. Chrisman is confident that there is no specialty more prepared to deal with change than radiology.

"Change creates a lot of emotion, but the one emotion we shouldn't have is fear," he concluded. "Just as was the case with every technology that has come along since the X-ray, AI will be another extension of our expertise—one that allows us to practice better medicine."

Access the presentation, "History Never Repeats Itself, But It Does Often Rhyme," (S6-PL01B) on demand at Meeting.RSNA.org.

"Change creates a lot of emotion, but the one emotion we shouldn't have is fear. Just as was the case with every technology that has come along since the X-ray, AI will be another extension of our expertise—one that allows us to practice better medicine."

Howard B. Chrisman, MD

Mindset Change From Personal Career Path To Overall Contribution To The Specialty

By Mary Henderson

R. Paul Guillerman, MD, kicked off the Sunday morning session, *Careerism to Professionalism: A Personal and Institutional Imperative*, sponsored by the RSNA Professionalism Committee, offering guidance to radiologists looking to fit in and stand out in their first professional position.

He encouraged physicians to find their purpose and focus on growing their strengths rather than eliminating weaknesses.

“Find out what you’re good at and take advantage of it,” said Dr. Guillerman, professor of radiology at Cincinnati Children’s Hospital Medical Center. “The goal is to master a topic that cannot be outsourced or automated and make yourself non-fungible.”

He said radiologists should continually evaluate their skill set, perhaps through a 360 performance review. When it comes to job choice, he suggested optimizing for the network effect rather than pursuing the best salary, benefits and title.

“Consider who’s there that will actually help you in your career,” he said. “You

want to be around a lot of decent, honest people who are also high performers.”

Avoiding Early-Career Mistakes

Charles Maxfield, MD, outlined a step-by-step process for aspiring academic radiologists to avoid career self-sabotage. He encouraged young physicians to set their sights on a specific goal and to identify a mentor.

“Mentees have a responsibility to their mentor to take initiative for the relationship

and to be receptive to feedback,” said Dr. Maxfield, professor of radiology and pediatrics at Duke University School of Medicine in Durham, NC.

To keep a career on track, he encouraged radiologists to be team players who take initiative but aren’t afraid to ask for help. He also stressed the importance of discerning

when and how to say ‘yes’ and ‘no.’ “In the moment, it may be hard to say no to an opportunity,” said Dr. Maxfield. “To make a more informed decision, take a few days and talk to a mentor before giving a final answer.”

“Effective followers think for themselves, have a positive attitude, and are able to agreeably disagree. You can learn to become a good leader, not by chasing titles, but by learning how to be an effective good follower first.”

Sarah D. Bixby, MD, MBA



Maxfield, Bixby and Guillerman

Sarah D. Bixby, MD, MBA, associate professor of radiology at Harvard Medical School in Boston. “I think the way you follow says a lot about how you’ll lead.”

“Effective followers think for themselves, have a positive attitude, and are able to agreeably disagree,” Dr. Bixby continued. “You can learn to become a good leader, not by chasing titles, but by learning how to be an effective good follower first.”

Access the presentation, “From Careerism to Professionalism: A Personal and Institutional Imperative (Sponsored by the RSNA Professionalism Committee),” (S1-CNPM04) on demand at Meeting.RSNA.org.

Finally, Dr. Maxfield advised young radiologists to embrace work-life balance, which has been shown to increase professional productivity and satisfaction.

The Benefits of Early Career Trial and Error

Early career years afford radiologists an opportunity to lead without a title and to practice good followership.

“Being a good follower is something we all need to learn how to do effectively,” said

Physics Tip

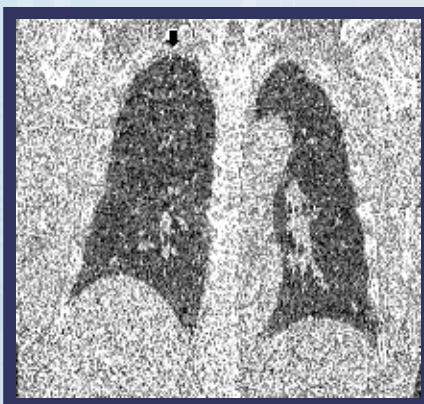


The HU of fat decreases as energy decreases. This is because HU is the attenuation relative to water and water attenuation increases more than fat attenuation as energy decreases.

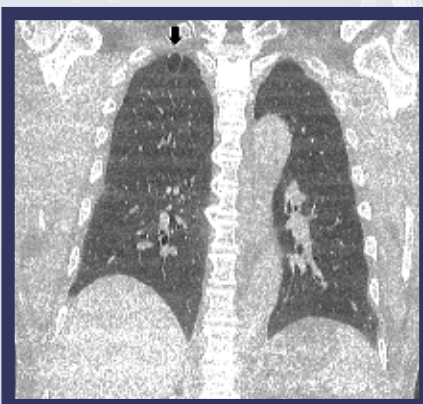
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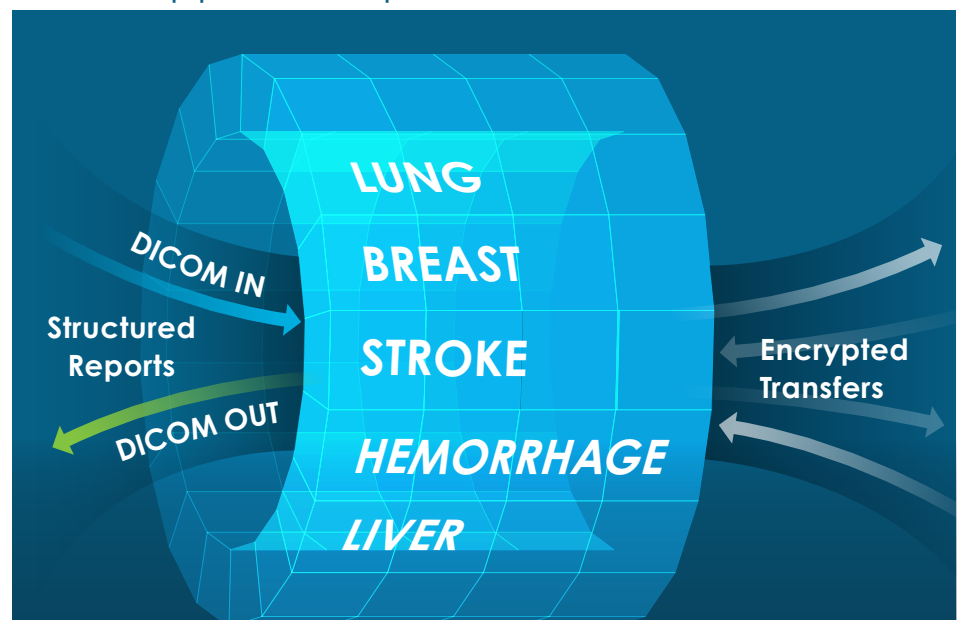
“Could DL-Based CT Denoising Further Improve Image Quality of PCD-CT?: An Experience at Tübingen University Hospital”

Booth: #4147, South Hall, AI Showcase



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RSNA BOOTH 7307

Photon-Counting CT Has Potential To Detect Smaller Liver Lesions

By Melissa Silverberg

Compared to traditional energy integrating CT, photon-counting CT (PCCT) technology has potential for increased spatial resolution and decreased noise for the detection of liver lesions, according to research presented Sunday.

“With any new technology we are looking for opportunities to see if it offers improvements in our work. We wanted to investigate liver lesions because this is such a common use of CT for surveillance and oncology screening,” said Benjamin Wildman-Tobriner, MD, director, abdominal imaging fellowship program and associate professor of radiology at Duke University, Durham, NC.



Wildman-Tobriner

Duke University’s Center for Virtual Imaging, which is a National Center for Biomedical Imaging and Bioengineering supported by the National Institute of Biomedical Imaging and Bioengineering, facilitated this project with virtual imaging to test PCCT. Virtual imaging trials allow researchers to test a hypothesis with fewer resources than it would take to do a similar experiment in real life.

“It’s a virtual rendition of a real patient based on thousands of data points. It’s really amazing and an incredible resource with which to conduct experiments like this,”

Dr. Wildman-Tobriner said. “Time, ethics, and money are all limited when you deal with human subjects, but you can do it in a matter of months when you do it virtually.”

Ongoing Research Could Identify Clinical Benefits

The study produced more than 1,200 scans using 50 anthropomorphic virtual patients, or phantoms, with between one and six liver lesions of various sizes. All scans were then independently evaluated by three subspecialty-trained abdominal radiologists using a web-based platform for image viewing and grading.

Readers marked all identifiable liver lesions in each scan, assigned a confidence rating (0-100) for every detected lesion, and gave an overall image quality score (range 0-100). Reader detection of liver lesions was compared to the known ground truth of the inserted lesions, and performance metrics (sensitivity and precision) and image quality scores were evaluated across all imaging conditions.

Mean sensitivity across all readers for lesion detection was 91.8% for PCCT and 87.7% for traditional CT. For lesions smaller than 1 cm, sensitivity on PCCT was 84.9% compared to 73.5%. Improvements were most visible using low dose radiation and in larger patients.

“We found that there was a small, but real, increase in sensitivity for detection of small liver lesions.

That could have been a predictable result because of the better resolution and reduced noise on a PCCT, but it was nice to confirm with data,” Dr. Wildman-Tobriner said. “We are seeing the benefits of photon-counting play out nicely in real time.”

While PCCT is not being widely used in abdominal radiology yet, Dr. Wildman-Tobriner said that the ability to detect smaller lesions could have a real impact on patient care, particularly among larger patients where improvements were seen to be strongest.

“Having an accurate map of where all of a patient’s liver lesions are can drive treatment decisions and make a difference in what kind of treatment they will receive,” he said.

It could also be an early sign of metastasis and help physicians stage disease. Dr. Wildman-Tobriner said additional studies need to be done to compare PCCT to Dual Energy CT (DECT) which is commonly used.

“This adds to the growing body of literature about the potential uses of photon-counting CT and that we need to continue to investigate where its impact may be the most profound, both in and out of the abdomen,” Dr. Wildman-Tobriner concluded.

“This adds to the growing body of literature about the potential uses of photon-counting CT and that we need to continue to investigate where its impact may be the most profound, both in and out of the abdomen.”

Benjamin Wildman-Tobriner, MD

Access the presentation, “Benefits of Photon Counting CT for Liver Lesion Detection Compared to Conventional Scanners: A Pilot Reader Study Using Virtual Imaging Trials,” (S2-SSGI02-2) on demand at Meeting.RSNA.org.

Using AI to Opportunistically Screen for Cardiomegaly

By Nick Klenske

Cardiomegaly, a pathologic enlargement of the heart that is usually a sign of another condition, affects an estimated 18 million people aged 20 and older in the U.S.

In clinical practice, the condition is generally diagnosed on CT using a subjective visual assessment, which lacks standardization. As a result, the disease often goes undiagnosed and may progress to a future cardiovascular disease (CVD) event such as myocardial infarction, heart failure, stroke, arrhythmias or death.

However, thanks to advancements in AI, this could soon change.

According to a study conducted at the University of Alabama at Birmingham (UAB) and presented during a Sunday session, a fully automated AI algorithm has the potential to opportunistically screen for cardiomegaly on CT images of the chest or abdomen.

“Early detection of cardiomegaly would allow for appropriate workup and management to potentially reduce CVD events, improving individual patient and population health,” said Steven Rothenberg, MD, assistant professor, cardiopulmonary imaging section at UAB and the study’s lead author.

Algorithm Predicts Cardiovascular Disease Events

The retrospective study included a cohort of 14,299 consecutive adult patients

with chest or abdominal CT exams obtained during the first half of 2016. The AI algorithm was trained on external data to select the slice where the heart was the largest, then segment the heart and inner chest in 2D and extract the linear cardiothoracic ratio (CTR), with a CTR of > 0.56 indicating severe cardiomegaly.

“We trained the algorithm on chest and abdominal CT exams without and with contrast from multiple institutions, including technically difficult cases, and then validated it on a separate dataset before deploying at UAB,” Dr. Rothenberg explained.

What researchers found was that when used to quantify CTR, the fully automated

AI algorithm was very good at predicting major CVD events and death. Specifically, the AI found that 60.4% of patients had normal heart size (CTR < 0.50), while 29.3% had mild cardiomegaly (CTR between 0.50 – 0.56). 10.3% of the patient cohort had severe cardiomegaly (CTR ≥ 0.56).

But what really surprised researchers was the fact that a majority of the patients with severe cardiomegaly were unmanaged.

“This is particularly concerning considering the algorithm showed that,

compared to patients with a normal sized heart, those with severe cardiomegaly are 4.2 times more likely to have a myocardial infarction,” Dr. Rothenberg said. “They are also at least twice as likely to have arrhythmia or a stroke, not to mention being over three times more likely to experience heart failure.”

Reducing The Risk Associated With Severe Cardiomegaly

The heart is imaged in nearly 50 million annual chest and abdominal CT exams in the U.S., and unmanaged cardiomegaly may be present in more than 2 million of these patients. According to Dr. Rothenberg, by using AI to opportunistically screen for



Rothenberg

undiagnosed and unmanaged cardiovascular disease, radiologists can help reduce the risks associated with unmanaged severe cardiomegaly.

“Opportunistic screening for cardiomegaly on routine chest and abdominal CT scans adds no patient cost or radiation,” he concluded. “Followed by appropriate care coordination and management with early behavior and lifestyle interventions, it has the potential to markedly reduce the public health burden of CVD.”

Access the presentation, “Opportunistic Screening for Cardiomegaly on Chest or Abdominal CT Using Fully Automated AI,” (S2-SSCA01-3) on demand at Meeting.RSNA.org.

Answer

A

[Question on Page 2.]

Determination of who may apply fluoroscopy to patients is often determined in state law which may differ among states. Further, individual systems may have internal rules governing fluoroscopic practice.

American Association of
Physicians in Medicine

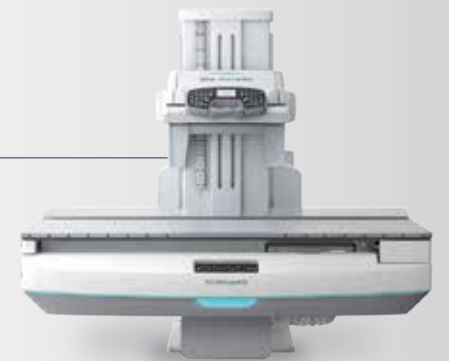


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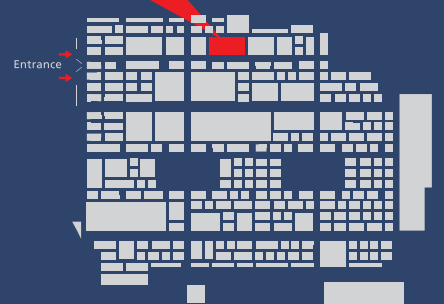
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Santillan Elected to RSNA Board

Cynthia S. Santillan, MD, was elected to the RSNA Board of Directors and will serve a term of three years as liaison for member engagement.

“The practice of radiology has undergone enormous change since I completed residency. In response to these changes, we need to examine how we work, where we work, how we interact with colleagues, and how our work fits into personal and professional wellness,” Dr. Santillan said. “Due to its broad scope and global outreach, RSNA continues to be best suited to guide radiologists as they adapt to these changes and move the profession forward. I am extremely honored to be a part of the RSNA Board to continue this important work and be part of its ongoing innovation.”

Dr. Santillan is a clinical professor at University of California, San Diego, (UCSD) where she has been a faculty member since 2006. Currently vice chair of clinical operations in the Department of Radiology, she previously served as chief of the body imaging division at UCSD.

Recognized as an excellent presenter and educator, Dr. Santillan is frequently invited to speak at national and international conferences, and uses her fluency in Spanish as needed to interact with audiences. She has served as director of radiology review courses at UCSD and at the American Roentgen Ray Society and made significant changes to modernize those courses during her tenure.

As one of the early founders of the Liver Reporting & Data System (LI-RADS®), Dr. Santillan has experience with the steps necessary to develop and disseminate innovations that can change radiology practice. She has worked for over a decade with experts in diagnostic radiology, interventional radiology, hepatology, surgery and

pathology, and she understands the collaboration necessary to gain consensus on complex issues.

Dr. Santillan has a history of service with RSNA, including as an invited speaker for essentials and refresher courses and hands-on workshops. Dr. Santillan has served on scientific program committees in bowel imaging, hepatocellular carcinoma imaging and health services research, and has acted as a session moderator at multiple annual meetings. She will serve as the RSNA Board liaison for member engagement.

A fellow of the Society of Abdominal Radiology, Dr. Santillan’s colleagues recognized her expertise in gastrointestinal and hepatic imaging by honoring her with a San Diego County Medical Society physician of excellence “Top Doc” award. Early in her career, she was awarded a prestigious GE-Radiology Research Academic Fellowship (GERRAF).

After receiving Bachelor of Science degrees in biology and chemical engineering from the Massachusetts Institute of Technology in Cambridge, Dr. Santillan earned her medical degree at Washington University School of Medicine (WUSM) in St. Louis. She completed her diagnostic radiology residency at



Santillan

“The practice of radiology has undergone enormous change since I completed residency. In response to these changes, we need to examine how we work, where we work, how we interact with colleagues, and how our work fits into personal and professional wellness”

Cynthia S. Santillan, MD

WUSM’s Mallinckrodt Institute of Radiology, followed by a body imaging fellowship at UCSD.

Soto Elected to RSNA Board of Directors

Jorge A. Soto, MD, has been elected to the RSNA Board of Directors as the liaison for international affairs.

Dr. Soto is a professor of radiology at Boston University (BU) School of Medicine and chair of the Department of Radiology, Boston Medical Center. With primary interests focused on imaging of traumatic and non-traumatic abdominal emergencies and pancreatico-biliary imaging, Dr. Soto has more than 130 peer-reviewed journal articles, 65 review articles or book chapters, and is the editor of five books.

Dedicated to advancing medical imaging research and education, Dr. Soto serves or has served on the editorial board of multiple journals, including *Radiology*. Dr. Soto served as chair of the Annual Meeting Program Planning Committee from 2021 to 2023, also serving on the RSNA Education and Science councils. He was faculty with the former RSNA Visiting Professor Program. He is also a member of the RSNA Committee on Diversity, Equity and Inclusion.

“It is an immense honor to be nominated to serve RSNA on its Board of Directors. In the early 1990’s RSNA gave me the opportunity to fully experience the values of a career in radiology, and my close association with the Society over the past three decades has been a determinant factor in shaping my own career,” Dr. Soto said. “The prospect of working closely with RSNA staff and volunteers, including many colleagues who



Soto

I admire and respect, towards strengthening our multifaceted collaborations with radiologists and trainees across the world is incredibly exciting.”

Dr. Soto is an RSNA Lifetime Honored Educator and has received numerous additional awards and recognitions, including the Marshak Distinguished Lecturer Award of the Society of Abdominal Radiology. In 2018, Dr. Soto was named Honorary Member of the Sociedad Espanola de Radiologia e Imagenes (SERAM) and received the Gold Medal of the InterAmerican College of Radiology in 2022. He is past president of the New England Roentgen Ray Society and the American Society of Emergency Radiology.

Dr. Soto serves as chair of the International Outreach Committee of the American Roentgen Ray Society. He is a Fellow of the Society of Abdominal Radiology and of the American Society of Emergency Radiology.

Dr. Soto completed his medical training at the Instituto de Ciencias de la Salud in Medellin, Colombia, where he also completed his radiology residency training. Dr. Soto subsequently completed fellowship training in abdominal imaging at BU School of Medicine.

It is an immense honor to be nominated to serve RSNA on its Board of Directors. In the early 1990’s RSNA gave me the opportunity to fully experience the values of a career in radiology, and my close association with the Society over the past three decades has been a determinant factor in shaping my own career. The prospect of working closely with RSNA staff and volunteers, including many colleagues who I admire and respect, towards strengthening our multifaceted collaborations with radiologists and trainees across the world is incredibly exciting.

Jorge A. Soto, MD

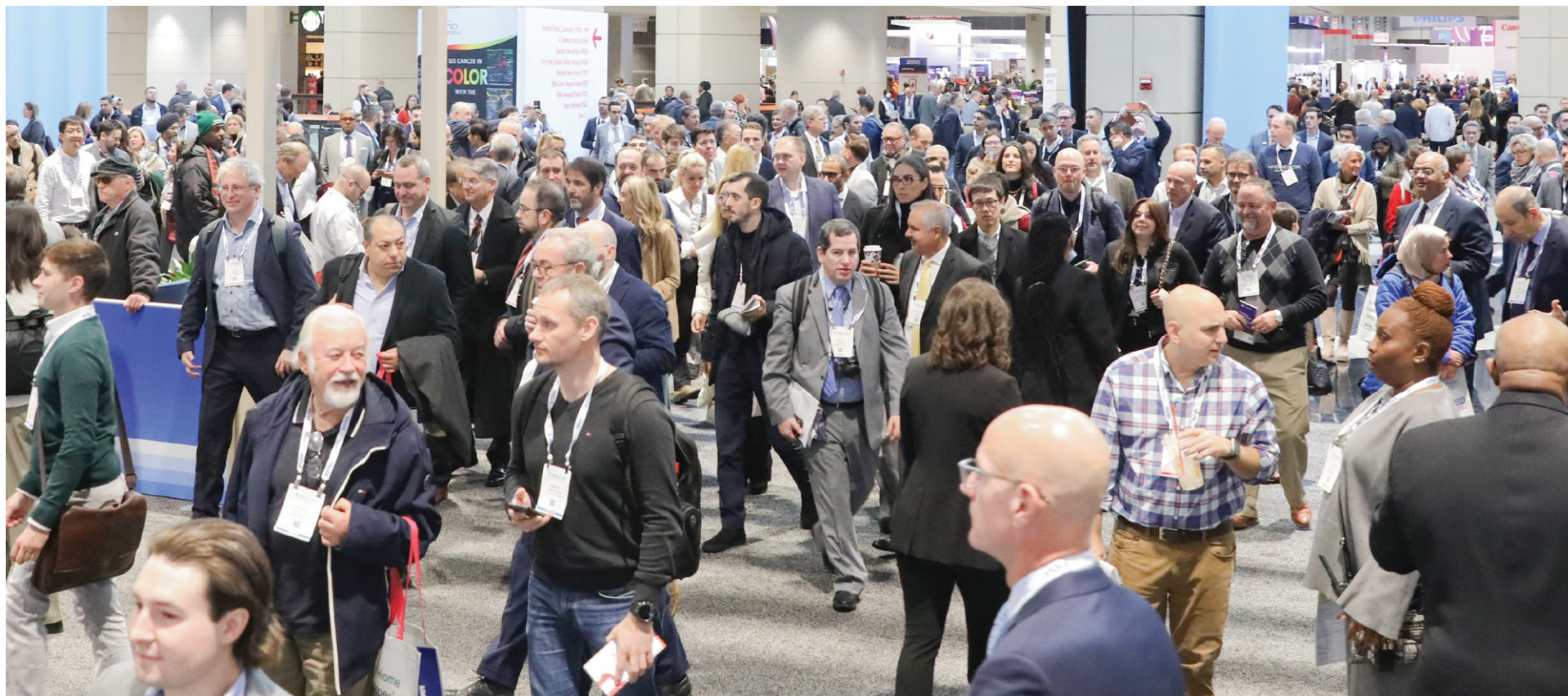
Partnering in Innovation



Throughout the day, the RSNA AI Theater showcased innovations in medical imaging AI, machine learning and deep learning.



Attendees experienced real-world clinical scenarios at the Imaging AI in Practice Demonstration where the partnership between radiology and technology was on display.



RSNA 2023 attendees eagerly headed onto the floor of the Technical Exhibits to engage with nearly 700 leading manufacturers, suppliers and medical information and technology developers.



Radiology is poised to maximize the potential of AI to benefit patient care. Learn all about RSNA's AI-related resources and educational opportunities at the RSNAI Resource Center.



If you haven't been to the AI Showcase, what are you waiting for? More than 90 companies are there to share the latest AI software and product demonstrations and solutions.

Radiology Workforce Shortage Hits Hard in Rural Systems



(Left to right) Everett, Duszak, Hughes, and Jha

A committed effort from radiologists—and, in some cases, an injection of private equity funds—is needed to expand radiology access to U.S. rural and underserved areas, according to experts presenting on Sunday.

The immediate picture for rural radiology access is bleak, in part due to the nationwide physician shortage and a spate of hospital closures. Between 2013 and 2023, 131 rural hospitals closed, said presenter Danny Hughes, PhD, an economist and professor at Arizona State University's College of Health Solutions.

Making a practice work as a business in this environment is especially challenging,

Dr. Hughes said. Practices need large enough patient volumes to spread costs, but the rural population is declining. Recruitment and retention of radiologists in the face of professional isolation, potentially lower pay and increasing subspecialization is difficult.

"If you're part of the group of younger radiologists who are increasingly subspecialized, it's not very attractive to want to be a rural practitioner because you're going to spend most of your time doing general diagnostic services," said Dr. Hughes.

Though often regarded warily by physicians, private equity investment can improve access for patients in rural areas, according

to Catherine Joyce Everett, MD, MBA, a private practice radiologist in North Carolina.

Attracted by government subsidies and real estate value, among other things, private equity investors buy into radiology practices with a hope of realizing an increase in value. In return, radiology practices get cash, personnel, management and operations support.

This support can be critical in rural areas. Dr. Everett shared a story of a mass casualty event that occurred when a tornado hit Kentucky in December 2021. With local hospitals overwhelmed, radiologist Bruce Burton, MD, called in RP Matrix, the internal remote reading division of Radiology Partners.

"Over two days, they read over 650 trauma cases, which is pretty amazing," Dr. Everett said.

Boosting Access in Rural Areas

With or without private investment, running a radiology department that services a rural region requires a unique blend of business savvy and cultural competency.

Richard Duszak, MD, has seen this firsthand in his position as professor and chair of the Department of Radiology at University of Mississippi Medical Center (UMMC) in Jackson, MS.

In a little over a year, Dr. Duszak and UMMC leaders have driven major improvements in access. Average wait times at UMMC have improved to zero to two days for most modalities. Interventional radiology procedures by month rose from 380 in July 2022 to 676 in August 2023.

The department has been able to reduce

"We are striving to create a workforce that is representative of the people we take care of, but it's going to take a multi-decade journey to get there."

Richard Duszak, MD

the number of no-shows by connecting people with agencies that provide reliable transportation and using face-to-face meetings and telephone calls to combat high levels of illiteracy. Building trust through cultural competency also has increased the chances that patients follow recommendations and return for appointments.

"We are striving to create a workforce that is representative of the people we take care of, but it's going to take a multi-decade journey to get there," Dr. Duszak said.

After the presentations, session moderator Saurabh Jha, MD, associate professor of radiology at the University of Pennsylvania in Philadelphia, asked about the challenges of recruiting radiologists to rural areas.

"How do you get people who are on the fence to move and practice in rural communities?" he asked.

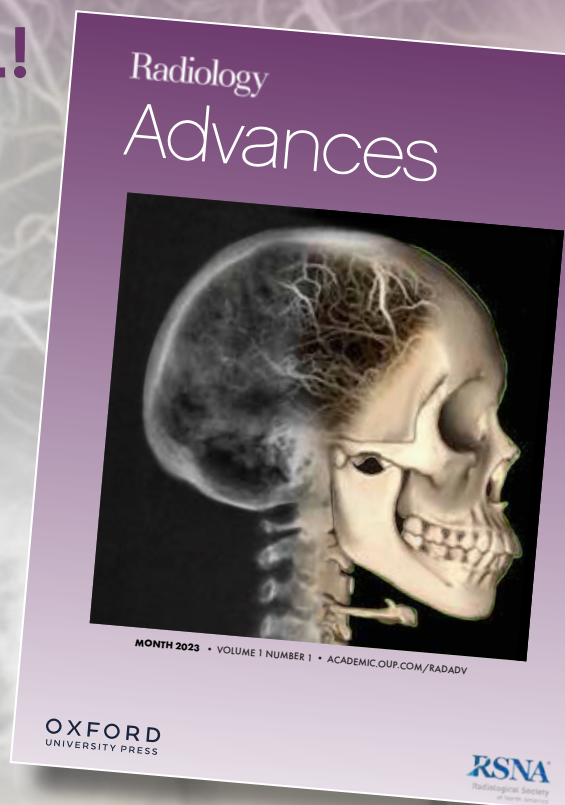
"Looking at the data, radiologists in rural areas have so much more variety in their workload and that is going to be very attractive to a lot of folks," Dr. Hughes responded.

Access the course, "Radiology Workforce Shortage: Considerations for Rural and Sprawling Systems," (S2-CNPM20) on demand at Meeting.RSNA.org.

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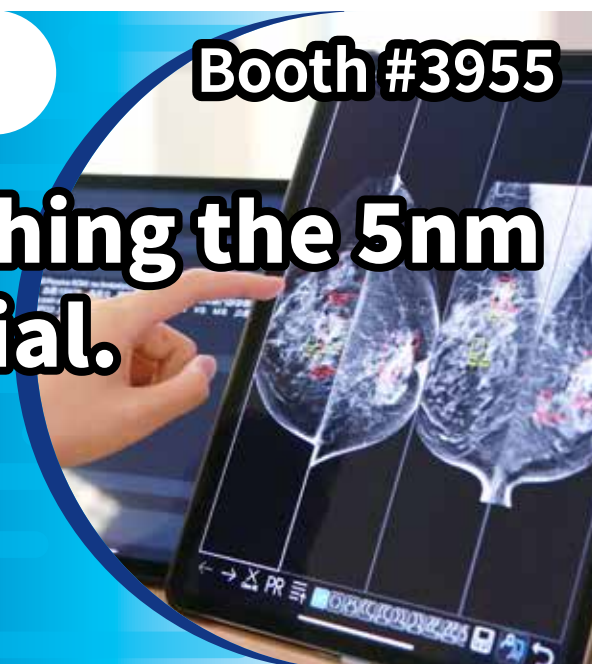
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INDUSTRY FOCUS

When Minutes Matter, Mobility Is Critical for Point-of-Care CT

By Evonne Acevedo

In interventional, surgical and emergency settings, timely care is crucial—and access to high-quality CT imaging on the spot can help radiologists deliver fast and accurate diagnoses without skipping a beat in workflow.

For NeuroLogica, a subsidiary of Samsung Electronics Co. Ltd., “Leading Through Change” means freeing CT imaging from the static radiology suite, pioneering CT scanners that enable mobility without a compromise in quality.

“We were the first to put CT on wheels,” said Renaud Maloberti, NeuroLogica’s head of mobile CT. “The idea was, instead of bringing the patient to a radiology suite, we brought the radiology suite to the patient.”



Maloberti

Clinicians know that “time is brain” in a case of stroke, and that negative outcomes compound by the minute when care is delayed. Additionally, transport can pose risks to critically ill patients. Mobilizing CT imaging and improving patient outcomes was NeuroLogica’s goal when it was founded in 2004.

The following year, the company launched its CereTom® portable 8-slice head and neck CT scanner, and its utility branched out to intensive care units, neurosurgical operating rooms, emergency departments and mobile stroke units worldwide.

“We’ve evolved from there,” Maloberti said. “While the neurology segment is still part of our core business, we now have full-body mobile CT—a 32-slice scanner and a 64-slice scanner—that can do the same thing and provide the same quality that a static CT machine can do.”

“That’s what amazes our customers,” he added. “There is really no compromise.”

There’s no compromise in safety, either, according to Maloberti. The mobile CT units are built with internal lead shielding, minimizing radiation exposure without the need to build a dedicated room.

At RSNA 2023, NeuroLogica will introduce its latest system, the OmniTom® Elite Photon Counting mobile CT scanner. The photon counting technology has the potential to improve image quality with fewer artifacts, enhanced differentiation of gray and white matter, ability for material decomposition and density differentiation—all with reduced radiation dose. At this point, the OmniTom® Elite Photon Counting CT scanner is US FDA 510(k) cleared for having multi-energy CT functionality, including high resolution scanning and spectral capability for material decomposition and virtual monoenergetic images (VMI).

Like its predecessors, the photon counting scanner boasts omni-directional wheels and an integrated drive system that allows it to be easily transported around the facility, along with an auto-align feature that aids easy setup, even in a small room.

Maloberti cites another area in which NeuroLogica leads through change: Its customer support model. “I’m always amazed by the team here at NeuroLogica. They go the extra mile to make sure that the systems deliver on our promise to bring top-of-the-line, super high capability imaging to the point of care,” he said.

And the applications keep expanding. NeuroLogica’s CT products are now employed in diagnostic centers, brachytherapy suites, medical examiner facilities, and veterinary hospitals, for example.

“When we talk to people who work in interventional radiology or the ICU we hear that they don’t want to disturb the

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workflow in the main radiology suite,” Maloberti said. “We can bring radiology capability to where the patient needs it. Customers are continually surprised by what they can do with our CT.”

Visit Samsung at Booth 6113 during RSNA 2023 to see product demonstrations and get more information about CT, radiography and ultrasound.

Technical Exhibits Halls: Your Source for Innovation and Socialization

Engage with industry experts and explore a wide array of medical imaging industry presentations, product demonstrations, workshops and symposiums at the RSNA 2023 Technical Exhibits. With more than 650 leading manufacturers, suppliers and medical information and technology developers on hand, you will be immersed in medical imaging innovation.

Don’t forget to join RSNA 2023 exhibitors on Tuesday, Nov. 28, for Exhibit Hall Happy Hour.



During this free event, participating exhibitors will be serving appetizers, alcoholic beverages and other refreshments from 2 to 5 p.m. at their respective booths. Don’t miss the fun including live music and giant Jenga and Connect Four games.

Enjoy this opportunity to connect with industry influencers, colleagues and friends in a relaxed and social atmosphere.

Technical Exhibit Hours

Sunday–Wednesday 10:00 a.m.–5:00 p.m.

South Hall A, Level 3
(Booths 1000–5900)

North Hall B, Level 3
(Booths 6000–8599)



Deep Learning Model for T2-Weighted Breast MR Can Slash Acquisition Times While Minimizing Noise

By Evonne Acevedo

A novel deep learning (DL) sequence for T2-weighted breast MR images can reduce acquisition time by 59%—and employs super resolution that, in most cases, yielded sharper diagnostic images.

Caroline Wilpert, MD, a radiologist at the Clinic for Diagnostic and Interventional Radiology at University Medical Center Freiburg in Germany, presented findings from a prospective study involving 140 women who underwent 3T breast MR imaging with both a standard T2-weighted protocol and a DL-reconstructed sequence with a doubled acceleration factor, reduced phase resolution and identical spatial resolution.

With the DL sequence, acquisition time was reduced by 59%. Compared with a standard T2-weighted Dixon sequence, numerous image quality characteristics—including signal-to-noise ratio in breast structures and contrast-to-noise ratio in breast cancers—were improved with DL. “We did not find any additional artifacts in our sequences, and the subjective noise was lower in the DL sequence,” Dr. Wilpert said.

The DL technique employs both a “denoising” network and a super-resolution network, Dr. Wilpert explained.

These networks were trained by an outside vendor on 25,000 images acquired at 1.5T and 14,000 acquired at 3T, from various body regions. An undersampled k-space dataset was used for image reconstruction.

“To enable gain in time, only half of the matrix was acquired for the DL network—305 by 576 versus 576 by 576—and acceleration was doubled for the DL sequence, with a factor of 4 instead of the standard 2,” Dr. Wilpert said. “The denoising network successfully compensated for the lower signal-to-noise ratio.”

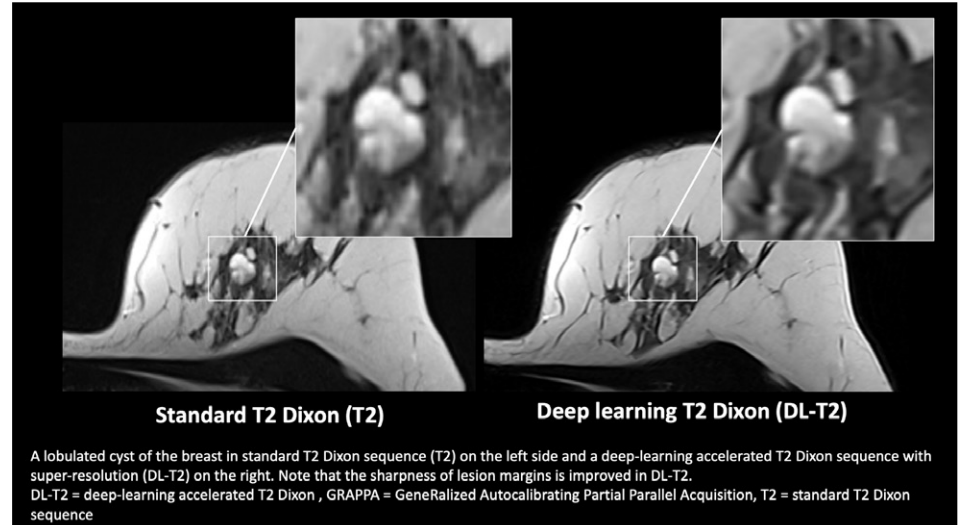
Super Resolution Creates Superior Image

In addition, the investigators employed a super-resolution network, which interpolates image sequencing to produce a spatial resolution of 0.3 x 0.3 by 3.0 mm³ versus the standard 0.6 x 0.6 by 3.0 mm³, explained Dr. Wilpert.

“As a result, the images appear sharper,” she said.

The team found it surprising that the image quality was so tangibly improved. “The effect of the reduced motion artifacts was most impressive, as it increased the value of the sequences,” Dr. Wilpert said.

Also surprisingly, however, the opposite was true when it came to bone



A lobulated cyst of the breast in standard T2 Dixon sequence (T2) on the left side and a deep-learning accelerated T2 Dixon sequence with super-resolution (DL-T2) on the right. Note that the sharpness of lesion margins is improved in DL-T2.
DL-T2 = deep-learning accelerated T2 Dixon, GRAPPA = GeneRalized Autocalibrating Partial Parallel Acquisition, T2 = standard T2 Dixon sequence

Image courtesy of Caroline Wilpert, MD

marrow. That was an interesting finding we did not expect,” Dr. Wilpert said. She suggested that bone marrow might be more susceptible to loss of structural details in the DW sequences because of its more heterogeneous structure. This could be an effect of the edge enhancement combined with denoising, she said, emphasizing that the technique should not be used to evaluate bone marrow pathologies.

For breast imaging, Dr. Wilpert’s team believes DL-based reconstruction could have a big impact on the efficiency of MR protocols.

“In times of limited scanner availability,

both time and cost efficiency are becoming more important and should be addressed to meet the increased demand for breast MR imaging,” Dr. Wilpert said. “In the future, a paradigm shift toward accepting lower image quality for the sake of ultra-fast acquisitions could be conceivable. This could be partially compensated by the DL networks.”

Access the presentation, “Reduced Acquisition Time of Deep-Learning Accelerated T2-Weighted Breast MR Imaging at 3T with Super Resolution: A Prospective Study on Image Quality,” (S2-SSBR01-06) on demand at [Meeting.RSNA.org](https://www.rsna.org).



Wilpert

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