

CODING CHANGES FOR **2024**

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LOOKING FOR TROUBLE?

Radiologists Question Benefits of Preventive Whole-Body MRI Scans

THE EDGE OF TOMORROW
AI and photon counting are the future of CT.

IMAGING WITH EASE
Automation and new acquisition techniques address the rising demand for ultrasound.

5 THINGS TO WATCH IN 2024



The Edge of

The background of the entire image is a grayscale CT scan of a human head, showing the internal structure of the brain and skull. A vertical beam of bright, multi-colored light (green, yellow, and blue) passes through the center of the head. At the base of this beam, a silhouette of a person is walking away from the viewer, with their reflection visible on the ground. The light beam appears to be a path or a tunnel, symbolizing the 'edge' of technology.

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Tomorrow

CT technologists and radiology directors are increasingly looking for CT systems that help achieve lower doses, maximize workflow efficiency, and deliver high-quality images. Donald Boshela, CT product manager for Fujifilm Healthcare Americas Corporation, has noticed that providers are gravitating towards equipment that addresses these factors, which helps radiology departments and contributes to enhancing their patients' experiences.

"In particular, there has been a lot of buzz around AI, which is transforming almost every aspect of society, including medical imaging," Boshela says. "In CT, we are seeing that AI could enable further reductions in patient radiation dose through automation and optimization of data acquisition processes, including patient positioning and acquisition parameter settings."

Guillaume Grousset, US vice president of CT for United Imaging, says that although there are always new technologies aimed at improving the fundamentals, such as image quality vs dose and spatial resolution, he feels the most exciting activities and discussions continue to be centered around AI technology.

"AI not only continues to improve image acquisition throughput and

accuracy, as well as image reconstruction, it also opens promising perspectives beyond the image acquisition itself, either before the scan happens or during postprocessing and analysis," he says. "In addition, the main challenges that providers face today in CT are not really technical in nature but more operational or resource based, and AI can also provide solutions to those challenges."

Frans Venker, general manager of CT at Philips, says the CT industry has been focused on the confluence of trends that its customers are facing each day, such as the severe impact of staffing shortages and burnout in radiology.

"With the emergence of new innovations, such as advanced detection technology and, perhaps even more impactful, AI that will help to provide

deep clinical insights, [AI] will improve operational efficiency and reduce the overall cost of care," Venker says.

New Editions

At this year's RSNA, Siemens Healthineers North America once again featured the NAEOTOM Alpha photon-counting CT scanner, the world's first and only clinical photon-counting scanner.

"Despite it being Year Three, photon-counting is what's generating buzz," says Matthew Fuld, PhD, director of photon-counting CT for Siemens Healthineers North America. "People you talk to at any conference or society are talking about how they can get photon-counting or how they are already incorporating it into their clinical practice."

As of November, the company has scanned more than 450,000 patients worldwide. Additionally, more than 230 scientific papers worldwide have been written and published, and the numbers continue to climb.

Olivia Egan, director of CT product marketing for Siemens Healthineers North America, says there has also been a continued buzz relating to cancer care pathways and improvements to cardiovascular care in postpandemic times.

"Health systems want to address not only health disparities and reducing the barriers and challenges that face many of their patients—for example, in rural access to care—but they are also looking to bring more advanced imaging to more communities," Egan says.

At RSNA, the company also launched a new dual-source CT scanner called the SOMATOM Pro.Pulse, which is designed to make dual-source CT technology more accessible. With the capability for advanced cardiovascular CT, the scanner

GE Healthcare's
Revolution Apex
platform



is expected to expand access to quality CT imaging for more patients.

"We also continue to expand the capabilities of the health care hub, which is where photon-counting lives today, and the unique features are typically around radiation dose reduction and ultrahigh resolution—being able to see things we've never been able to see before," Fuld says. "Pairing photon-counting and AI is the driver of CT's future, generating a tremendous amount of buzz in those hubs."

Sonia Sahney, chief marketing officer for molecular imaging and CT at GE HealthCare, says photon-counting CT has generated significant interest among radiologists, and the company is continuing to work towards commercializing a photon-counting product.

The company's photon-counting CT design is engineered to leverage Deep Silicon detectors with the goal of capturing more patient data for clearer images and detailed information to help inform diagnoses across care areas.

And, as with most original equipment manufacturers in the medical imaging space, GE is heavily invested in AI, as technologists and radiologists are interested in the technology more than ever before.

"We're trying to focus on delivering better image quality and enhancing workflow," Sahney says. "We want more consistency, especially in the US, across an entire fleet of scanners."

Cardio Considerations

In addition to AI, Fujifilm's customers have expressed the need for CT systems that have a cardiac motion correction feature, especially as the number of

cardiac CT angiography examinations has increased year by year. Over the last year, Fujifilm released the SCENARIA View Focus Edition CT system in the United States, a premium scanner with an advanced cardiac motion correction feature called Cardio StillShot.

"Just as every person is different, so is every heart," Boshela says. "The rhythm of the heart affects CT image quality and the rhythm of workflow. At stable heart rates, such as 50 to 65 beats per minute, there is adequate time to take images between heartbeats. However, when a patient's heart rate increases, the imaging time window becomes shorter and can cause nondiagnostic images."

Dependable, detailed imaging of the coronary arteries requires high temporal resolution and the ability to capture still images when the heart is in motion, he adds. Fujifilm's Cardio StillShot feature helps clinicians capture clear images of the heart, even on the most challenging heart rhythms, by simultaneously acquiring two data sets in the scan. These data sets are then compared against each other to detect and correct motion.

"The SCENARIA View Focus edition with Cardio StillShot can produce an effective temporal resolution of just 28 milliseconds, compared to 175 milliseconds without Cardio

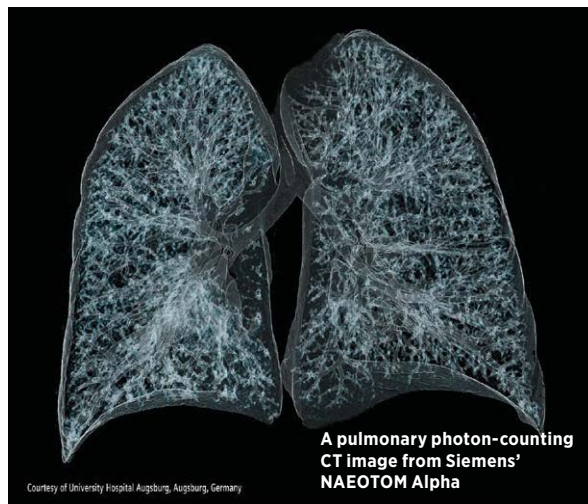
StillShot," Boshela says. "Motion-free cardiac images can be created and, thus, provide improved cardiac diagnosis."

Additionally, Fujifilm showcased its FCT iSTREAM CT system for the first time at RSNA 2023. Currently pending US regulatory requirements, the new system is equipped with advanced imaging technologies and AI-powered reconstruction designed for enhanced image quality and low radiation dose. The system's user interface and simplified workflow improve accuracy and efficiency.

Enhancing Automation

United Imaging is focusing on making its CT operation simpler and reducing variability as much as possible through intelligent automation, and the vast majority of those improvements are AI-based.

"With our modern architecture, our systems are 'Born with AI'—it's involved in the process from the moment the



A pulmonary photon-counting CT image from Siemens' NAEOTOM Alpha

Courtesy of University Hospital Augsburg, Augsburg, Germany

patient enters the imaging suite,” Grousset says. “Some people call this standardization, but it is really automation. Real standardization is at the institution or network level, and it remains a challenge.”

Grousset says United Imaging views innovation in the context of who benefits from it.

“Our new software packages, including AI features, are delivered to all customers with a service contract,” he says. “These are not just stability or feature upgrades—we are essentially making our CT scanners into new systems again and again throughout their useful life. From a technical standpoint, our CTs are more autonomous.”

For example, with the latest 3D real-time camera technology, he says, patients can “hop on the table” and, based on the protocol, the scanner will automatically position the patient (isocenter and scan range) in the bore at the push of a button. The company partners with customers at the time of purchase to make sure they have all the tools they need to handle their patients both at installation and over time.

Spectral Imaging

In 2021, Philips launched its second-generation detector-based spectral CT, the only spectral CT designed for routine clinical use that is able to acquire multi-energy information from the detector rather than using the X-ray source.

“There are many advantages to this acquisition technique,” Venker says. “First and foremost is the integration into clinical workflow. We know that radiology departments are currently stretched thin, dealing with staffing shortages. That’s why we wanted to ensure our system was easy to experience. For the technologist, there is no preplanning or decision tree involved. Every scan is spectral. The data can be viewed prospectively or retrospectively. The results can be planned and sent directly to PACS, where they are available with one click directly from the radiologist’s reading environment, without the need to change seats.”

In addition, because detector-based multi-energy allows for perfect registration, Venker explains, customers are able to get more information with each scan, allowing them to not only see where things are but also answer questions about what they are.

“For example, we have a customer in Denmark that saw the sensitivity in cancer diagnosis go from 77% to 89% with spectral-detector CT,” he says. “At the same time, when they considered incidental renal findings, their ability to confidently identify nonmalignant findings went from 30% to 96%. This means that they are both finding more cancers and are able to rule out additional findings that would have typically needed additional scans and created additional angst for patients.”

Dose Management

Lowering patients’ radiation dose is top of mind for many providers. Today’s CT systems offer features that help with better overall image quality and limit radiation dose.

For example, Fujifilm’s SCENARIO View comes equipped with the company’s latest iterative reconstruction capability, Intelli-IPV, which provides better image quality while reducing dose. Studies on Fujifilm’s Intelli-IPV have noted that clinicians can achieve image noise reduction of up to 90% and radiation dose reduction of up to 83%.

“A key feature that we’re excited about for the new FCT iSTREAM CT system is that it will feature organ dose modulation, a radiation dose reduction technique that modulates radiation dose in angular and/or slice directions based on specific scanning protocols,” Boshela says.

There are many factors that contribute to dose reduction, from hardware to software. United Imaging has developed an integrated detector technology that yields exceptionally low noise, requiring less dose to obtain high-quality images.

“In addition, we have developed AI algorithms to drive our organ-based current modulation and to combine model-based iterative reconstruction with deep-learning denoising—those features also lead to dose reduction,” Grousset says. “The management and utilization of those technologies is most often automated, such as the automatic selection of the optimal kVp [kilovoltage peak] for a specific patient, in order to remove guesswork from a user standpoint.”

Evolving Technology

Today’s current generation of CT systems helps reduce radiation doses while improving image quality and speed.

Fujifilm’s
iStream CT
system



Faster exams and better image quality can be expected.

“CT scanners on the market today will also help reduce total cost of ownership and will be compact in design to accommodate all room sizes,” Boshela says.

In addition, CT scanners have evolved to provide a better patient experience. Patient experience enhancements include systems with wide bores and larger tabletops to accommodate patients of all sizes.

In the future, radiologists and technologists should expect to see faster, more automated, and easier to use CT scanners that leverage AI and automation. The growing interest and demand for these technologies are poised to help streamline workflow, which will help providers address burnout more effectively and allow facilities to scan more patients in a day. It will also help to alleviate the pressures that come with lower reimbursement.

“The industry is reaching already amazingly low dose levels on the order of a chest X-ray, and spatial resolution has been in the submillimeter range for a few years already,” Grousset says. “However, I do expect the modality to continue to evolve towards full automation of the image making process, even for more complex procedures such as cardiac and perfusion.”

Grousset believes that CT, in general, may be poised to become a greater source of functional information, especially in oncology and cardiovascular imaging, where it has already begun to show promise. ■

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