visions

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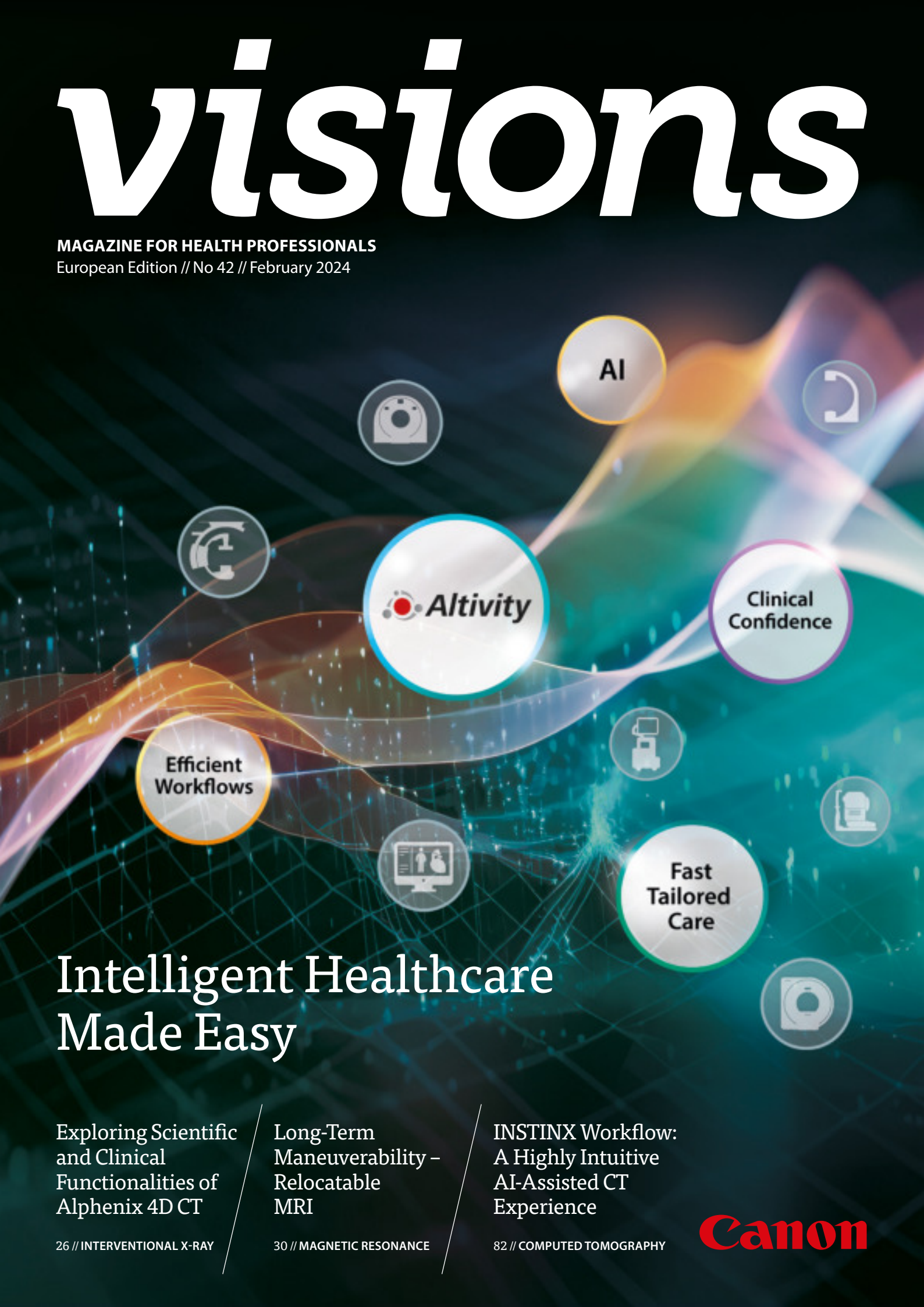

Intelligent Healthcare Made Easy

Canon

Cover image:
Stock photo, edited with some of the unique features of our latest clinical solutions, presented in this edition of VISIONS magazine.

VISIONS magazine is a publication of Canon Medical Systems Europe and is offered free of charge to health professionals.

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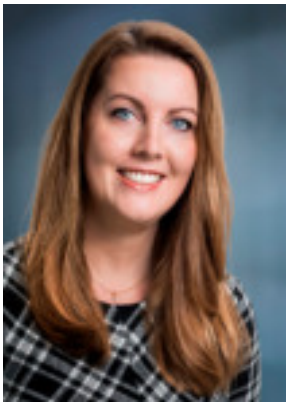
// EDITORIAL



Dear Readers,

I am delighted to introduce the 42nd edition of our European VISIONS magazine. This will be my last VISIONS as the Editor-in-Chief as I have started a new role as European Strategic Brand Manager at Canon Medical Systems Europe.

Strategic Branding involves creating a distinct identity to differentiate in the ever growing and fast evolving medical imaging market. This includes defining a clear value proposition, establishing a consistent visual identity, and communicating our key messages about clinical solutions, reliability, and patient care. It encompasses visual elements, as well as intangible aspects such as brand personality and messaging and it often involves ongoing evaluation and adaptation to align with business objectives and customer needs. The valuable insights of our customers, partners, and not to forget the patients, are what enables Canon Medical to continuously build on its Made for Life philosophy.

One of the communication channels we use to share more about our corporate philosophy, is our VISIONS magazine. For over 20 years, it has given healthcare professionals the opportunity to share their experiences from daily practice with their peers via either the physical magazine, the digital edition, or the dedicated VISIONS Blog. Our users, together with our dedicated employees, are our greatest ambassadors and therefore major contributors to the growth and brand awareness of Canon Medical. Reoccurring positive themes from surveys are the impeccable level of service, the high quality of our imaging solutions, and the hard-working people behind the brand.

This edition of VISIONS delivers extensive insights into Canon Medical's remarkable world-class clinical solutions to support healthcare professionals in their daily challenges. We also elaborate how our innovations are geared to meet the challenges of tomorrow through the eyes of some of the world's leading experts in their fields.

Kind regards,

JACQUELINE DE GRAAF - DEGROS
European Strategic Brand Manager
Canon Medical Systems Europe

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Aquilion ONE

Introducing the Aquilion ONE / INSIGHT Edition

Canon Medical Systems launched the Aquilion ONE / INSIGHT Edition at RSNA (Radiological Society of North America) 2023, held in Chicago, USA, in December. The all-new premium CT scanner is built with INSTINX workflow and the latest Deep Learning Reconstruction technology. The scanner simplifies complicated scans, elevates those that are more routine and is easy to operate regardless of level of experience or how specialized the scan. With the INSIGHT Edition, Canon has streamlined the system design and workflow experience to enable fast, safe, and efficient CT exams while keeping the needs of the patients top of mind.

"With the launch of the Aquilion ONE / INSIGHT Edition, Canon continues to expand and strengthen the capabilities of its premium CT," remarked Roy Verlaan, European Director CT at Canon Medical Systems Europe. With first installations in two top European healthcare facilities - the University of Strasbourg, France, and the Royal Bournemouth Hospital in the UK – the Aquilion ONE / INSIGHT Edition represents a major innovation in medical imaging with a focus on improving healthcare outcomes and operational excellence, he continued.

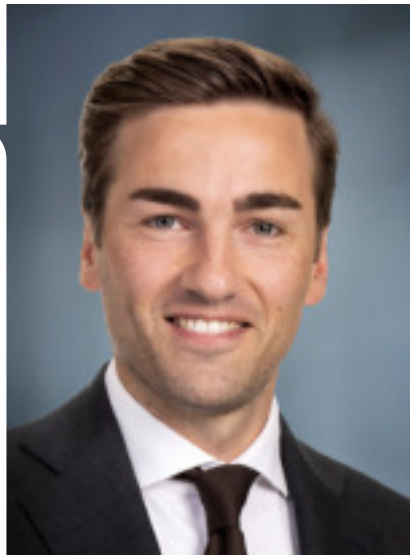
Exceptional performance

The Aquilion ONE / INSIGHT Edition's all-new imaging chain features the CoolNovus X-ray tube and PUREINSIGHT detector, designed to withstand the extreme forces generated during ultra-fast 0.24 second gantry rotations.

The Canon CoolNovus X-ray tube is designed for precise operation at a force of 50 g combined with outstanding heat dissipation and longer tube life while the PUREINSIGHT detector reduces electronic noise which adds to better image quality.

"With the launch of the Aquilion ONE / INSIGHT Edition, Canon continues to expand and strengthen the capabilities of its premium CT."

Roy Verlaan, European Director CT, Canon Medical Systems Europe.



"The Aquilion ONE / INSIGHT Edition delivers exceptional image quality thanks to cutting-edge deep learning reconstruction technology."

The combination of Deep Learning Reconstruction and low kV acquisition (70 kV) and high mA (1400 mA) makes it possible to minimize the amount of contrast media injected in vascular imaging.

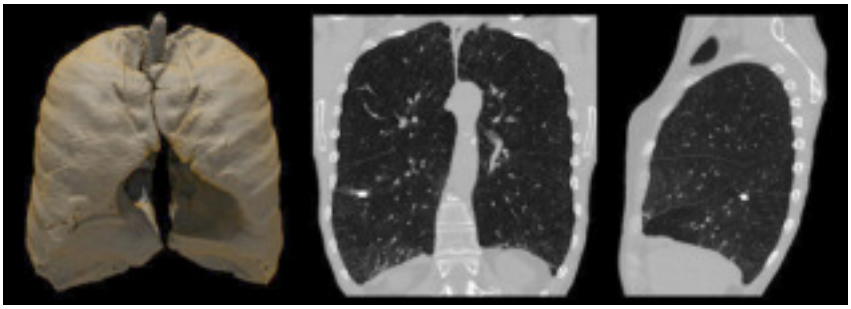
INSTINX

In addition, the Aquilion ONE / INSIGHT Edition features INSTINX, Canon's holistic workflow solution designed to enhance every aspect of imaging – from referral to diagnosis- creates new standards in efficiency and consistency. It is driven by a host of Canon's most advanced technologies and innovations and employs automation whenever possible to make operation easier, faster and more consistent with a 40% reduction in workflow steps.

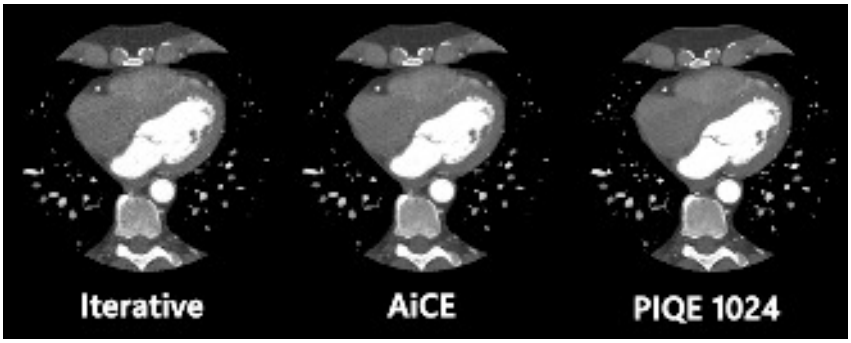
Its 80 cm diameter, uniquely flared gantry, enhances patient comfort while two built-in cameras simplify patient positioning where AI-based anatomical detection executes automatic scan planning, making every scan accessible to operators of all levels. And with the new, easy to learn, intuitive CT interface, training time can be significantly reduced.

Super Resolution

After the successful introduction of Advanced intelligent Clear-IQ Engine (AiCE), Precise IQ Engine (PIQE) is the next step in Deep Learning Reconstruction bringing together extraordinary spatial resolution and reduced noise. PIQE shows sharper anatomical details in 1024 image matrix for better delineation of small



SilverBeam scan with a calcified lesion at the right inferior lobe.



Different cardiac CTA reconstructions clearly showing improved noise and spatial resolution in the PIQE 1024 reconstruction.

Runoff with PIQE 1024 reconstruction showing multiple calcifications in both legs.

anatomical structures for a more accurate diagnosis of complex pathologies, particularly in cardiology, oncology or pediatric imaging.

"Through the new system, we are reaffirming our continued commitment to our Made For Life Philosophy."

Growing body of strength in CT

With the launch of the Aquilion ONE / INSIGHT Edition Canon continues to expand and strengthen the capabilities of its premium CTs.

"We are delighted with the response to the Aquilion ONE / INSIGHT Edition, through which we offer a more advanced version of our PIQE DLR that harnesses the potential of DLR even further to support incredibly high-quality imaging at low doses, provide a solution that significantly simplifies and streamlines CT work flows and makes the scan experience more efficient for patients and operators".

"Through the new system, we are reaffirming our continued commitment to our Made For Life Philosophy." //

Key product features of the Aquilion ONE/ INSIGHT Edition

- *INSTINX total new workflow experience*
- *80 cm gantry bore*
- *Up to 0.24 sec rotation time*
- *New CoolNovus X-ray tube*
- *New PURE INSIGHT Detector*
- *Two built-in positioning cameras*
- *Gantry touch panels for one touch patient positioning*
- *Lateral table slide (± 85 mm)*
- *Automatic scan planning with 3D Landmark Scan*
- *SilverBeam Filter*
- *Automatic hanging protocols for reviewing*
- *Advanced intelligent Clear-IQ Engine (AiCE)*
- *PIQE for cardiac and body*
- *Deep Learning Spectral imaging*

Scan the code or click HERE to find out more about the Aquilion ONE / INSIGHT Edition.

Scan the code or click HERE to explore the new system through the eyes of some of Europe's leading healthcare professionals.


Xavion
Xavion
Xavion

Xavion - New AI-Supported RF System Shines at ECR

Canon Medical Systems Europe introduced a new, state-of-the-art, AI-Supported RF System – the Xavion – at the European Congress of Radiology 2024 (ECR) in Vienna, Austria (February 28 – March 03). The Xavion utilizes the latest AI technology developed and features an advanced performance remote-controlled table, wireless detector, and cutting-edge software suite that revolutionizes the RF workflow. With the flexibility to perform both standard static radiography exams and dynamic exams with a full digital solution, the Xavion is a comprehensive imaging system that is suitable for a wide range of diagnostic procedures.

Wireless detector

The Xavion's ground-breaking, wireless Canon CXDI-B1 detector enables both static and dynamic imaging. Its large imaging surface and capacity to deliver exceptional image quality, even at high speeds, ensures accurate diagnostics. The user-friendly Canon detector, can be effortlessly removed, bringing added convenience to manual exposures, especially for patients who need to be imaged while in-bed, or examinations of extremities. Cost-effectiveness is enhanced considerably, as a second detector for out-tray examinations is not required.

Innovation

Through automation and optimized interfaces, Xavion elevates patient experience and enhances workflow efficiency for operators. Automatic adjustment ensure the right examination setting for all patients, reduces operation time and enhances focus on ALARA requirements. And safety technologies along the entire imaging chain facilitate reduced dose, and support outstanding cybersecurity.

"This is the latest in a stream of high quality, innovative new products across all modalities that have been launched by Canon Medical to address the significant new challenges that have emerged in medical imaging," said Frank Gerritsen, Clinical Market Manager X-Ray at Canon Medical Systems Europe. "Xavion combines cutting-edge technology, operational efficiency, and exceptional patient care to create unparalleled diagnostic experiences."

"Crafted for optimal workflow, high throughput, and gold standards in diagnostic excellence, the Xavion is an AI-supported RF table that can conquer a wide variety of day-to-day challenges."

Milan van Holstein, European Director Diagnostic X-Ray at Canon Medical Systems Europe.

First European installation of Canon's Xavion at the University Hospital of Montpellier (CHU), France.

"Crafted for optimal workflow, high throughput, and gold standards in diagnostic excellence, the Xavion is an AI-supported RF table that can conquer a wide variety of day-to-day challenges," added Milan van Holstein, European Director Diagnostic X-Ray at Canon Medical Systems Europe. "Its deep learning post-processing software provides exceptional clarity in both soft -and dense tissue, offering healthcare professionals an invaluable tool for accurate diagnosis. Also, this innovative technology adapts dynamically to various conditions, ensuring that the radiologist receives the most relevant information for diagnosis."

Flexibility

The Xavion demonstrates remarkable flexibility. It can be operated effortlessly from five different angles to accommodate a wide range of specific examination needs. Repositioning is precise and easy.

Benefits of the Xavion at a glance

- *Canon Wireless Dynamic Detector.*
- *Xavion AI-Supported RF Software*
  - *Outstanding workflow*
  - *Innovations in dose-free positioning*
  - *Modern design*
  - *Deep-learning reconstruction algorithm*

Unprecedented comfort

As well as providing advanced imaging functionality, Xavion has been designed for optimal comfort for patient and user. It's design features ambient lighting, music, and microphone options for a calm atmosphere.

Meeting complex demands daily

The new generation RF system is suitable for use across various specialties and procedures, including Urology, Pulmonary, Tomography, Gynecology, Nephrology, Arthroscopy, Pediatrics, Angiography, Orthopedics, Accident & Emergency, and Gastrointestinal Medicine.

"The Xavion was well-received by leading experts across Europe at ECR 2024," remarked Frank Gerritsen. "Piloted in the Faculty of Medicine at the University Hospital of Montpellier, in France, there is already widespread recognition that the new solution has the flexibility, versatility and sophistication to meet the complex demands and high standards of today's medical imaging environment." //

Find out more about the Xavion RF System here:

Scan the code or click HERE to go to the Xavion webpages.

See also the interview with the University Hospital of Montpellier (CHU), France, in this edition of VISIONS magazine.

High technical specifications for the best flexibility and adaptability

- *Independent movement of the X-ray tube and the selector/detector block.*
- *Motorized tilting : +/- 90°*
- *Transverse movement of the tabletop : 35 cm (+/- 17.5 cm)*
- *Optional longitudinal movement of the tabletop 100 cm (+/- 50 cm)*
- *Wide range of table height : minimum 48 cm, maximum 130 cm.*
- *Large tablet integrated into the tube.*
- *Motorized tube rotation : +/- 180°*
- *Oblique projection : +/- 45°.*
- *Tabletop dimensions : 240 x 85 cm.*
- *Patient coverage : 201 cm.*
- *Electrical cabinet that is integrated into the table.*
- *Silent brushless motors for excellent motion control, stability and precision, with absolute encoders for fast and accurate positioning.*
- *Outstanding patient access.*
- *Integration of an innovative control system that permits monitoring and automatic control of the table and the collimator.*
- *Mobile detector and wireless functionality.*
- *Modifications that ensure optimal dose reduction.*

Thank you very much for your continued support. Since 1914, when we began the development of the first X-ray tubes in Japan, our company has been furthering our medical device business through collaboration with medical professionals for over 100 years. In 2003, in order to respond to the rapidly changing environment surrounding medicine, we consolidated our development, manufacturing, sales, and service functions and created a business management system that integrated manufacturing and sales. Last year marks the 20th anniversary of the creation of that structure.

By following our Made for Life philosophy over these years, our vision to be a company that contributes to medical care has become even stronger and clearer. We are committed to providing value by working together with medical professionals to overcome the challenges of medical care. We use our latest innovations to provide the technology, products, services, and support that medical facilities require, while receiving clinical feedback and advancing our technology. In this way, through partnerships with many medical professionals around the world, we have been contributing to medical care that protects precious life.

Last year, we launched our "Global Marketing Center" within Canon Healthcare USA which was established in January. We will build a stronger global network of medical professionals which will aid in the development of products and proposals of solutions that match the latest medical trends and clinical needs. We remain committed to our Made for Life philosophy and will continue to grow as a company that creates additional value and supports the future of medical care.

TOSHIO TAKIGUCHI
President and Chief Executive Officer
Canon Medical Systems Corporation

The New Aplio me Provides Powerful Support in Meeting Growing Ultrasound Needs

Visitors to ECR 2024 got the chance to get to know the new Aplio me ultrasound system. The latest product introduced in Canon's Aplio series is a high-performance, mobile, quiet and intelligent diagnostic imaging device that delivers exceptional patient care and efficiency. Aplio me's advanced AI-enabled features enhance workflow and diagnostic accuracy, as well as power to accelerate through workloads efficiently, while it's supreme maneuverability enables scans to be conducted in any setting.

"The Aplio me was designed to meet today's medical imaging challenges across a range of different clinical environments," remarked Satoshi Matsunaga, European Modality Director Ultrasound at Canon Medical Systems Europe. "It excels in delivering high resolution imaging in an impressively compact system and is a game-changer for users who demand high throughput without sacrificing quality."


Aplio
Canon
ABDOMEN
Canon

"The Aplio me excels in delivering high resolution imaging in an impressively compact footprint and is a game-changer."

Satoshi Matsunaga, European Modality Director Ultrasound, Canon Medical Systems Europe.

Ease of use

Ergonomic considerations were key in the new system's design. An adjustable, easy-to-use control panel makes it quick and easy to learn to use and get into the flow of daily use. An intuitive probe design ensures seamless integration into any clinical workflow while improving user comfort and efficiency.

Aplio me also sets new standards in terms of sharing and support. Tools such as ApliCam and ApliGate encourage collaboration between experts, while the system's silent operation ensures a soothing environment for patients and a focused workspace for healthcare professionals.

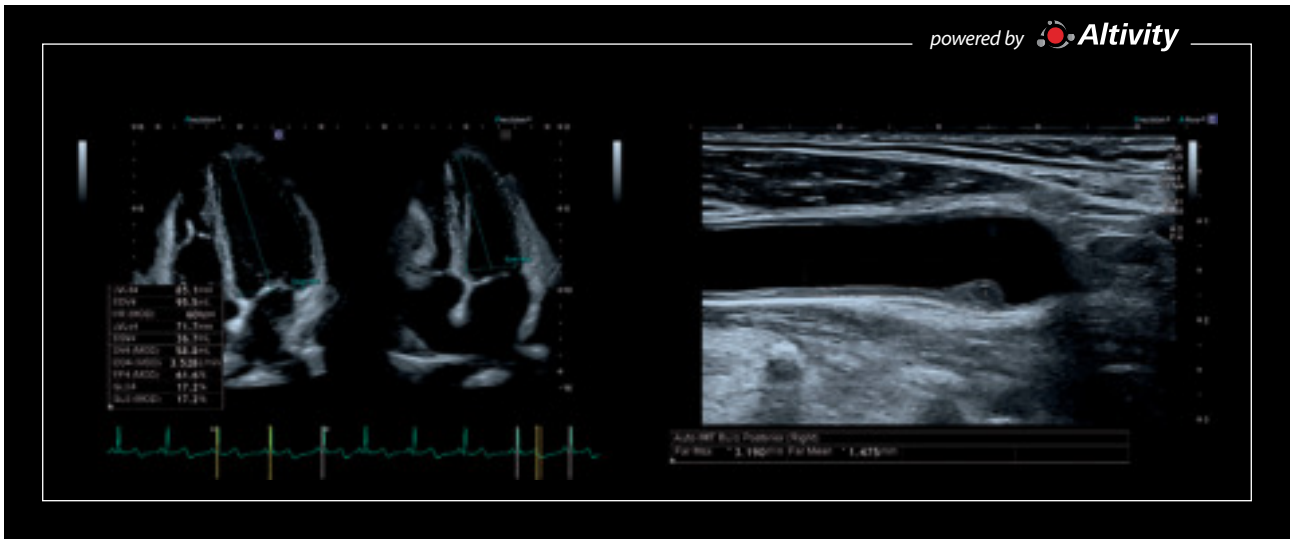
Quiet operation

Aplio me promotes a peaceful working environment thanks to its library-quiet operation. This feature combines advanced imaging capabilities with quiet operation, that reduces patient anxiety and provides healthcare professionals with a serene workspace for optimal concentration, exemplifying a powerful combination of cutting-edge technology and patient-centric design in modern healthcare.

Smart investment

Beyond its technological prowess, Aplio me has a lightweight, compact design that enables a solid return on investment.

"Aligned with Canon Medical's CSR objectives, Aplio me is designed to reduce energy consumption, making it an environmentally friendly choice in medical imaging technology," added Satoshi Matsunaga.



A suite of automated measurement and analysis tools, such as Auto GLS (Quick Strain), and, Auto EF for the left ventricle or automated IMT measurements, can help you increase the accuracy, consistency and speed of your exams.

Canon's Aplio me.

In a nutshell...

Benefits of Aplio me

- *Robust and consistent diagnostic results*
- *Easily fits into current working environment due to its small footprint.*
- *22MHz hockey stick probe*
- *New linear, single crystal abdominal and high-frequency hockeystick probes for enhanced imaging performance.*
- *Extensive height adjustability and optimal ergonomics.*
- *Promotes the improvement of examination workflows.*
- *The onyx black control panel helps reduce eye strain due to decreased light-dark adaptation in dark examination rooms.*
- *Increased collaboration opportunities using ApliGate and ApliCam.*

Features that add functionality

- *Lightweight U-series transducers: Light, flexible cables that support examiner ergonomics and comfort.*
- *Attenuation Imaging (ATI): The analysis of liver fat content.*
- *Shearwave Elastography (SWE) : The analysis of stiffness of the liver.*
- *Multi parametric report : Report includes all metrics to evaluate the complete liver.*
- *Auto IMT: Deep Learning AI technology that calculates the thickness of the intima-media layers of the carotid walls quickly & automatically provides, accurate & reproducible quantification.*
- *Auto EF: Automatically traces contours and calculates the Ejection Fraction providing robust, reproducible, measurements that reduce time consuming measuring tasks and improve overall productivity.*
- *High contrast resolution and good uniformity for a wide range of clinical targets. Exclusive Differential Tissue Harmonic Imaging (D-THI) provides images of unsurpassed spatial resolution and contrast, alongside greatly increased penetration.*
- *Precision Imaging Plus: Delivers smooth, outstandingly detailed images with sharpened lesion borders alongside enhanced image uniformity and reduced clutter.*
- *ApliCam/ApliGate collaboration tools to communicate amongst experts.*

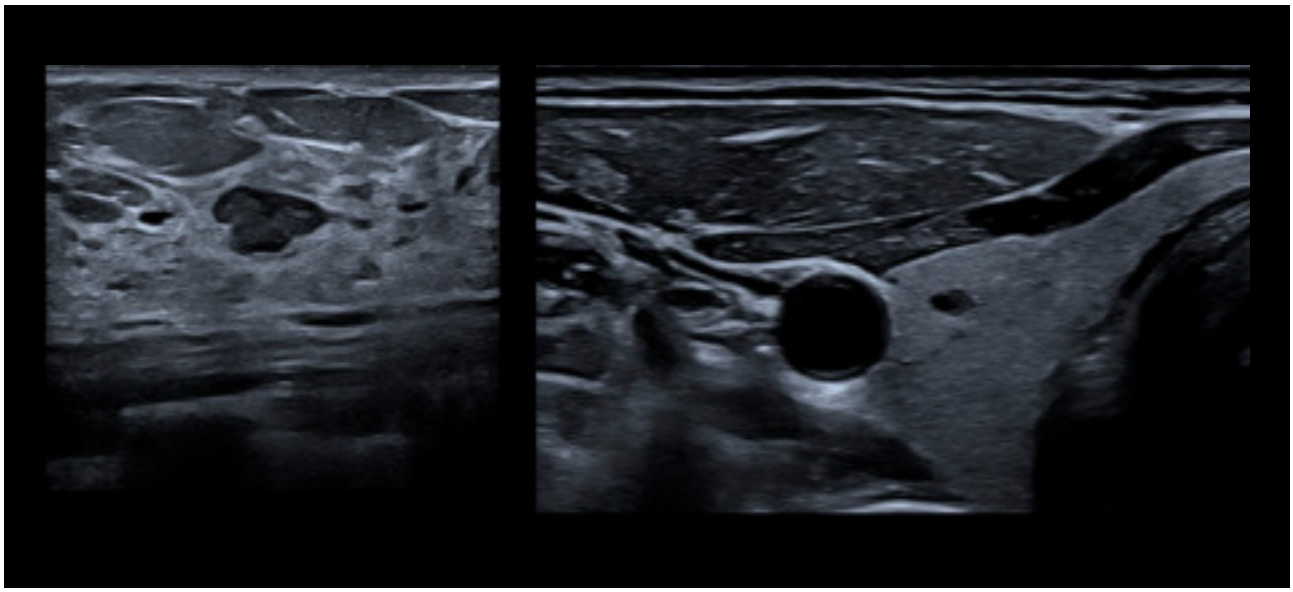
Welcomed across Europe

The Aplio me has already been evaluated by several key ultrasound centers in Europe, who have welcomed the new features it provides.

The official European launch of the Aplio me is held at the ECR (European Congress of Radiology) 2024 congress. Visitors were able to explore the new system up-close at the Canon Medical booth.

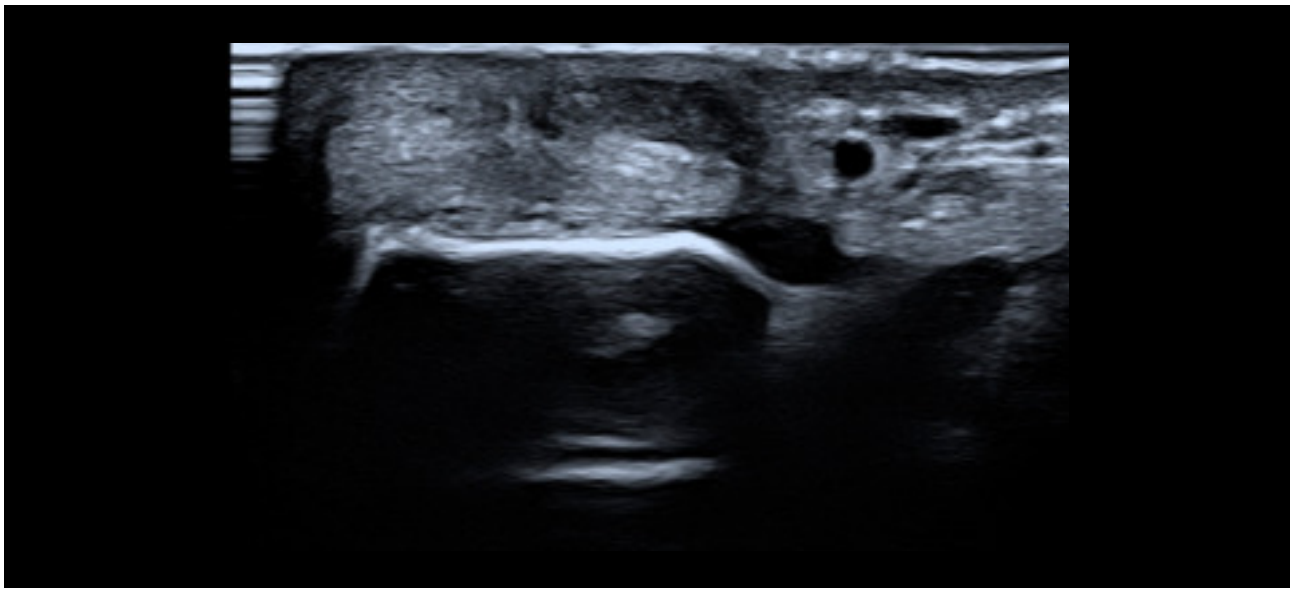
"Canon Medical continues to lead the ultrasound medical imaging driven by a commitment to innovation, quality and environmental sustainability," said Satoshi Matsunaga. "The launch of the Aplio me is additional proof of our commitment to offering advanced medical technology for improved patient care and streamlined clinical operations." //

Excellent resolution and penetration on the liver study.

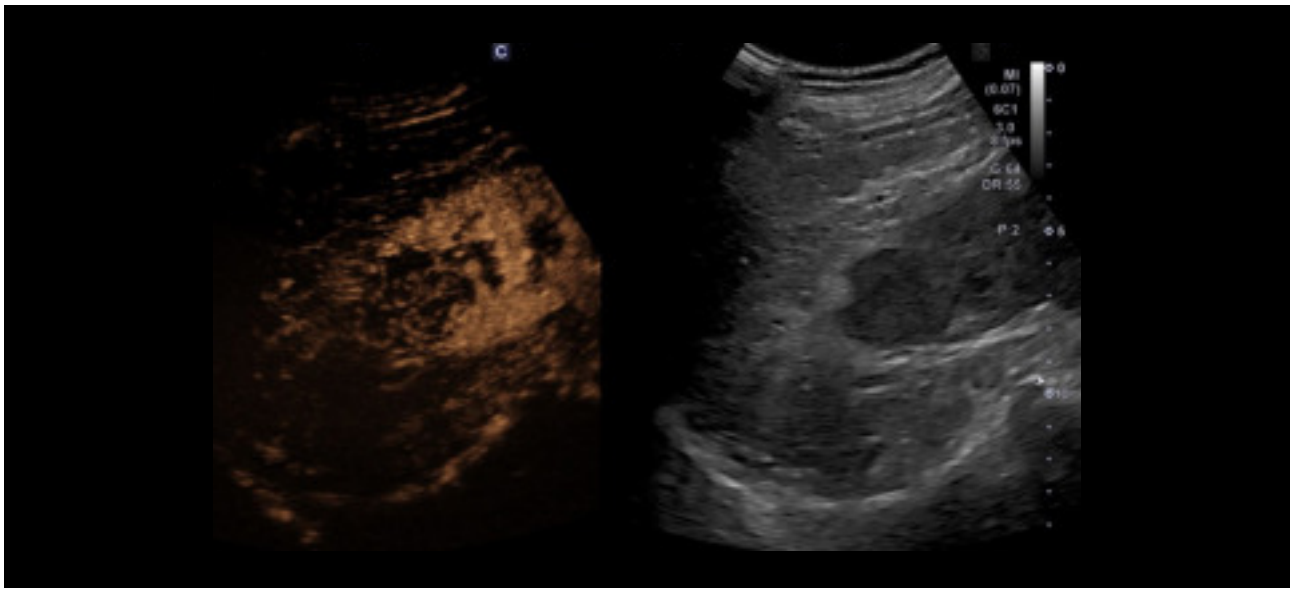


Breat lesion. Perfect balance and resolution.

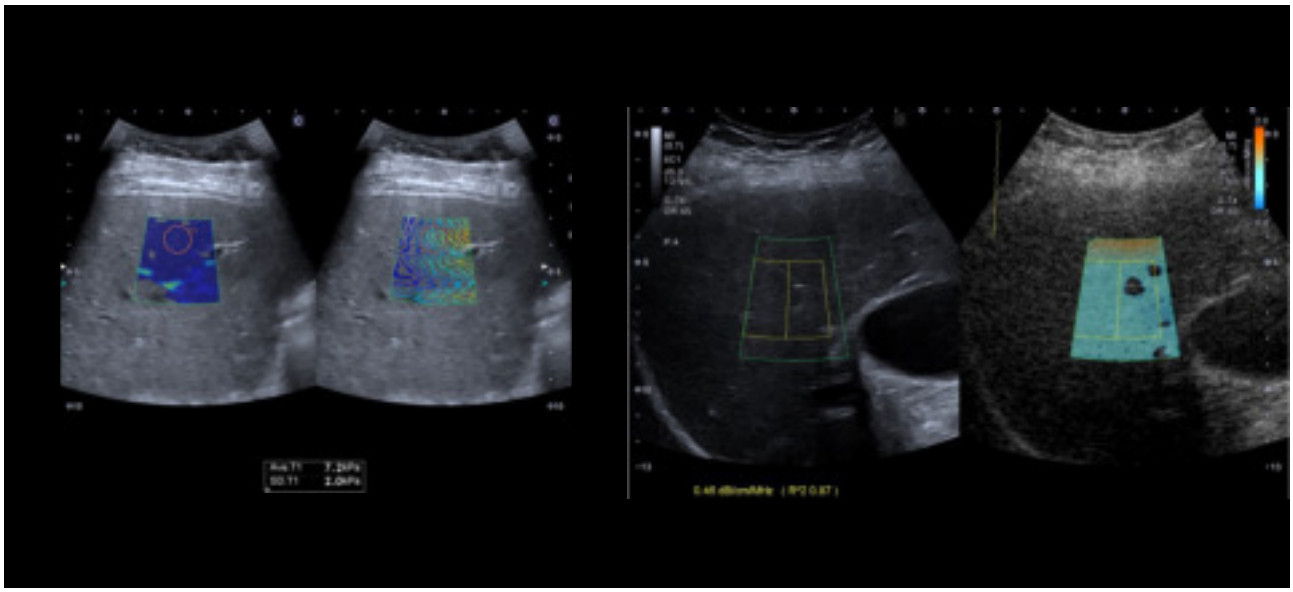
left thyroid lobe.



Superficial study using 22MHz hockey stick probe.



Liver lesion with CEUS.



Shearwave Elastography (SWE). A reliable tool for fibrosis evaluation.

Attenuation Imaging (ATI). Steatosis assessment in an easy way.


Canon
Aquilion Serve SP

Meet Canon's Aquilion Serve SP

Canon Medical Systems new Aquilion Serve SP CT was introduced at RSNA (Radiological Society of North America) 2023. The Aquilion Serve SP supports faster throughput with more time for the patient, consistent imaging results with less training, and better image quality with lower radiation dose.

The new CT has been developed to help ease mounting pressures on healthcare professionals from continuously increasing workload, imaging needs that have become significantly more complex, staff shortages, financial limitations, and the growing need for better sustainability.

A powerful workhorse

The new CT system features INSTINX, Canon Medical's holistic workflow solution that creates new standards in efficiency and consistency and was specially designed to enhance every aspect of the imaging chain. Through its easy to learn operations, the Aquilion Serve SP reduces training time required for staff. Moreover, the system's 40% reduction in workflow steps saves time, reduces pressure on overloaded staff, and enhances opportunities to serve more patients, while preserving optimal accuracy. INSTINX comes with a 24% reduction in time to perform scan planning and a 97% accuracy in setting the scan range, including the Field of View. In addition, the ease of use of INSTINX ensures greater consistency in scanning when used by multiple technologists and enables more flexible staff allocation.

"Combining the power of Canon Medical AI-enabled technologies with a completely redesigned workflow that makes scanning easier than ever, the Aquilion Serve SP is designed to meet all clinical needs with superior performance," said Roy Verlaan, Canon Medical System's European Director CT. "Employing the latest technologies and applications to enhance image quality and support diagnostic speed and accuracy, it has all clinical needs covered. From routine to complex imaging needs, Aquilion Serve SP is a scanner that can do it all."

Lung screening

Lung cancer is one of the leading causes of cancer death worldwide. Its early detection of with low dose CT enables earlier treatment options and a better prognosis. However, the biggest concern in lung screening with CT is dose, and secondly, how healthcare organizations can integrate the additional throughput of large numbers of screening candidates. As well as providing the capacity for high throughput, the Aquilion Serve SP features a 'Game-Changer' in Low-Dose Lung Imaging – SilverBeam.

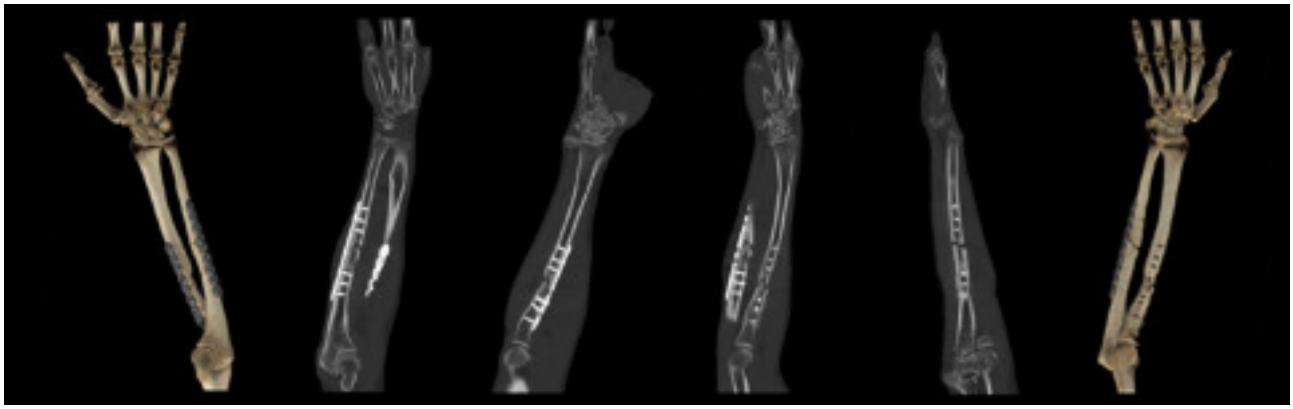
Canon Medical's SilverBeam Filter combined with INSTINX and Deep Learning Reconstruction for CT delivers a reduction in radiation dose, an increased patient throughput, enhanced image quality with minimized image noise preserving overall image quality and diagnostic accuracy.

Obvious added value

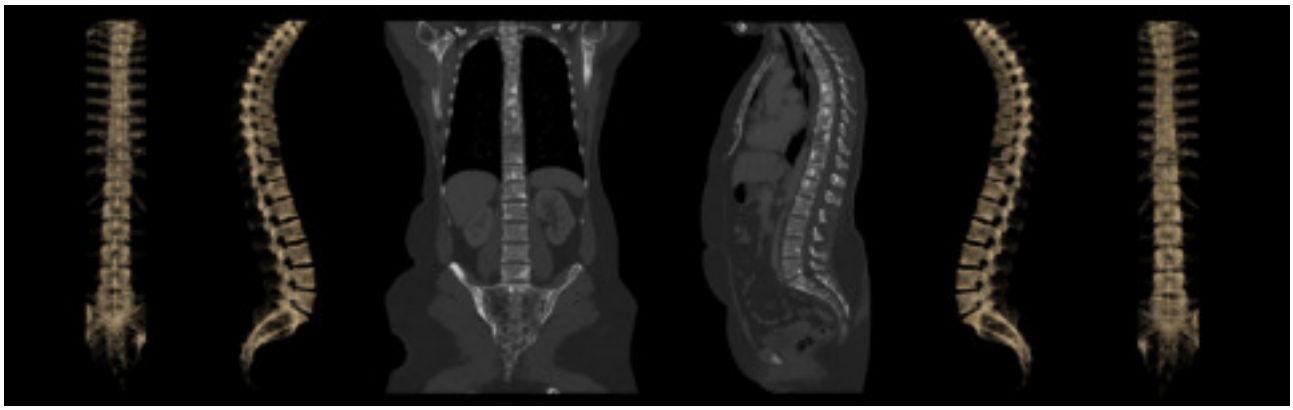
With its powerful performance and updated workflow experience, the Aquilion Serve SP quickly demonstrates its value to clinical teams looking to reduce scan times, simplify training, and keep energy costs and infrastructure requirements to a minimum.

Key product features of the Aquilion Serve SP

- *INSTINX workflow*
- *80 cm gantry bore*
- *7,5MHU tube – 72 kW*
- *0.35 s/r scan, suitable for cardiac scanning*
- *Two built-in optical Canon cameras*
- *Gantry Touch panels – one button patient positioning*
- *Lateral table slide (± 85 mm)*
- *3D Landmark Scan with Anatomical Landmark Detection for automated scan planning*
- *SilverBeam Filter for low dose scanning*
- *Advanced intelligent Clear-IQ Engine (AiCE)*
- *DE-Helical scan*
- *Precise IQ Engine (PIQE) 512 & 1024 matrix ready*
- *Automatic Hanging layouts for image review*



MPR's and Global Illumination images with osteosynthesis of the forearm.



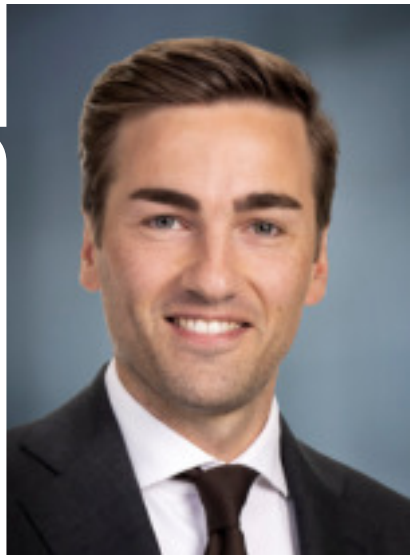
Multiple metastases are clearly visible in the MPR bone reconstructions and Global Illumination Rendering.

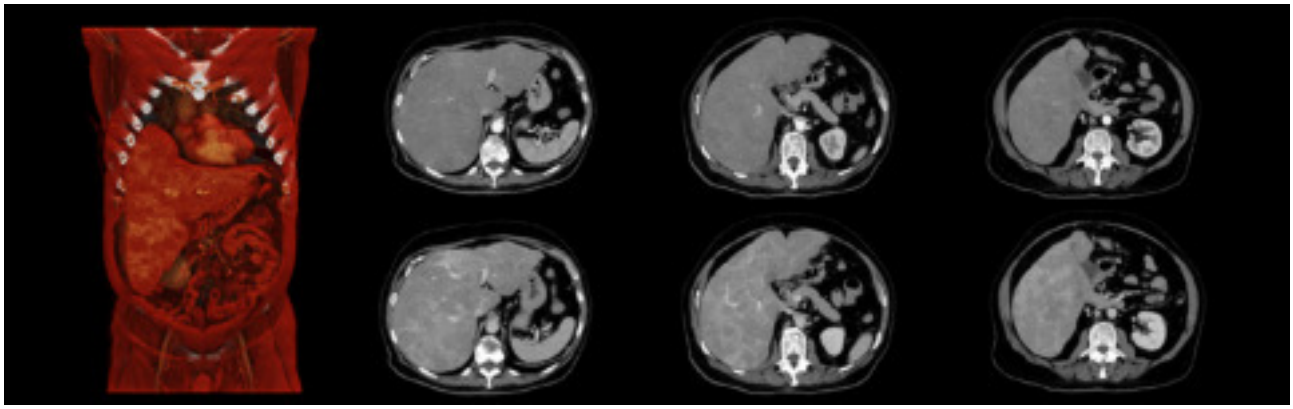
"It's an exciting time for Canon," says Roy Verlaan. "With the launch of the Aquilion ONE / INSIGHT Edition and the Aquilion Serve SP, we are simplifying and streamlining CT workflows, making the scan experience more efficient for patients and operators.

On top of that, we reaffirm our Made for Life philosophy by introducing Deep Learning Reconstruction across our entire CT portfolio to support fast and high-quality imaging at low dose for all patients." //

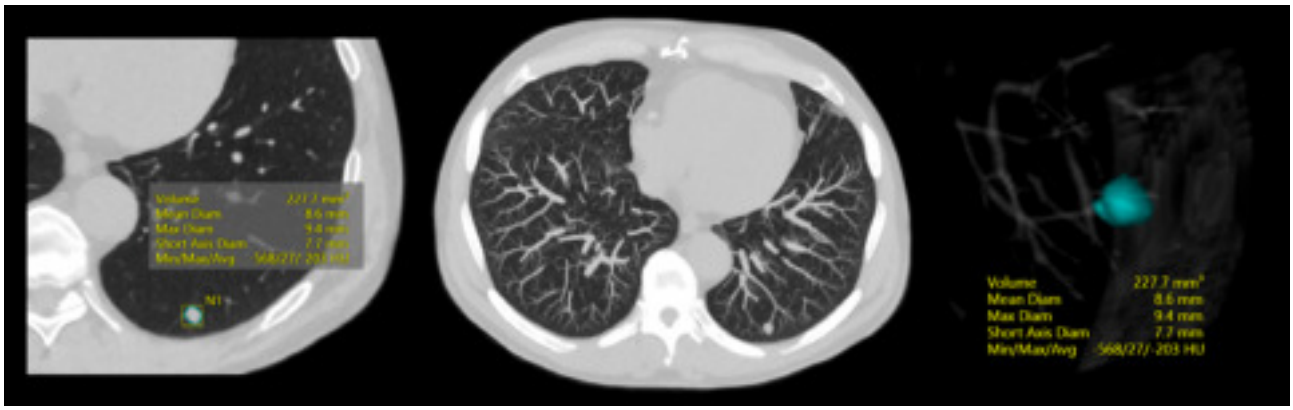
"From routine to complex imaging needs, the Aquilion Serve SP CT can do it all."

Roy Verlaan, European Director CT, Canon Medical Systems Europe.

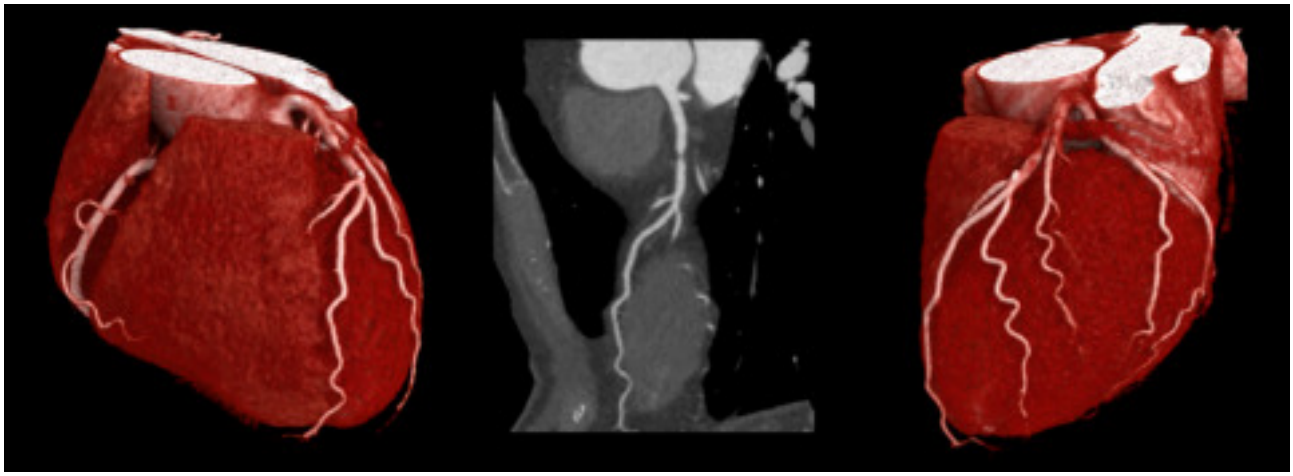




Arterial and venous Chest/Abdo/Pelvis examination showing an enlarged liver with multiple lesions.



Solitary Pulmonary Nodule with volume measurements.



Cardiac CTA with a stenosis of the proximal part of the LAD.

Scan the code or click HERE to find out more about the Aquilion Serve SP.

Exploring Scientific and Clinical Functionalities of Alphenix 4D CT in UZ Brussels

Prof. Johan de Mey, M.Sc. Pieter T. Boonen, Prof. Nico Buls, Prof. Dimitri Aerden

The Alphenix 4D CT has been revolutionizing research in Interventional Radiology at the Department of Radiology, UZ Brussels University Hospital (Brussels, Belgium). Prof. Johan de Mey, the Head of Department, has selected Canon's Alphenix 4D CT to bridge the powerful image quality of CT with the versatility and flexibility of angiography. Together with his team, M.Sc. Pieter T. Boonen, Prof. Nico Buls, Prof. Dimitri Aerden, and Prof. Jef Vandemeulebroucke, he showed the benefit of using the Alphenix 4D CT to improve the evaluation of critical limb ischemia, providing valuable information on the anatomy of the blood vessels, the hemodynamic of the blood flow, and the tissue perfusion. In the future, Prof. de Mey and his department are eager to look forward and take advantage of all the clinical capabilities that this clinical system offers.

Meeting UZ Brussels

UZ Brussels is a university hospital that is part of the Vrije Universiteit Brussel (VUB) located in Belgium. This hospital offers a broad high-quality medical service, investing in innovative and cutting-edge medical equipment, and developing novel research. In 2020, the Alphenix 4D CT from Canon was installed in the Department of Radiology.

Scientific team, UZ Brussels, Belgium in front of their Alphenix 4D CT. From left to right: Pieter T Boonen, Prof. Johan de Mey and Prof. Nico Buls.

The department encompasses both diagnosis and intervention, being also involved in several research projects on medical applications. On a daily basis, Alphenix 4D CT is used for biopsies to collect clinical information regarding suspicious tissue in the body. However, more can be done in interventional radiology, for instance, with a system that integrates two powerful and robust medical modalities, CT and angiography, in only one room. Following a patient-centric approach, the patient does not need to be transferred between two rooms anymore to be diagnosed, treated, or verified after treatment. This possibility of easily switching between CT and angiography in one setting without moving the patient, improves patient care, decreases procedure time, and makes the procedure less logistically challenged. Therefore envisioning the improvement of clinical workflow and integration of cutting-edge methods and technology, Alphenix 4D CT brought to the department the urge to search for new and innovative methodologies for cardiology and interventional oncology.

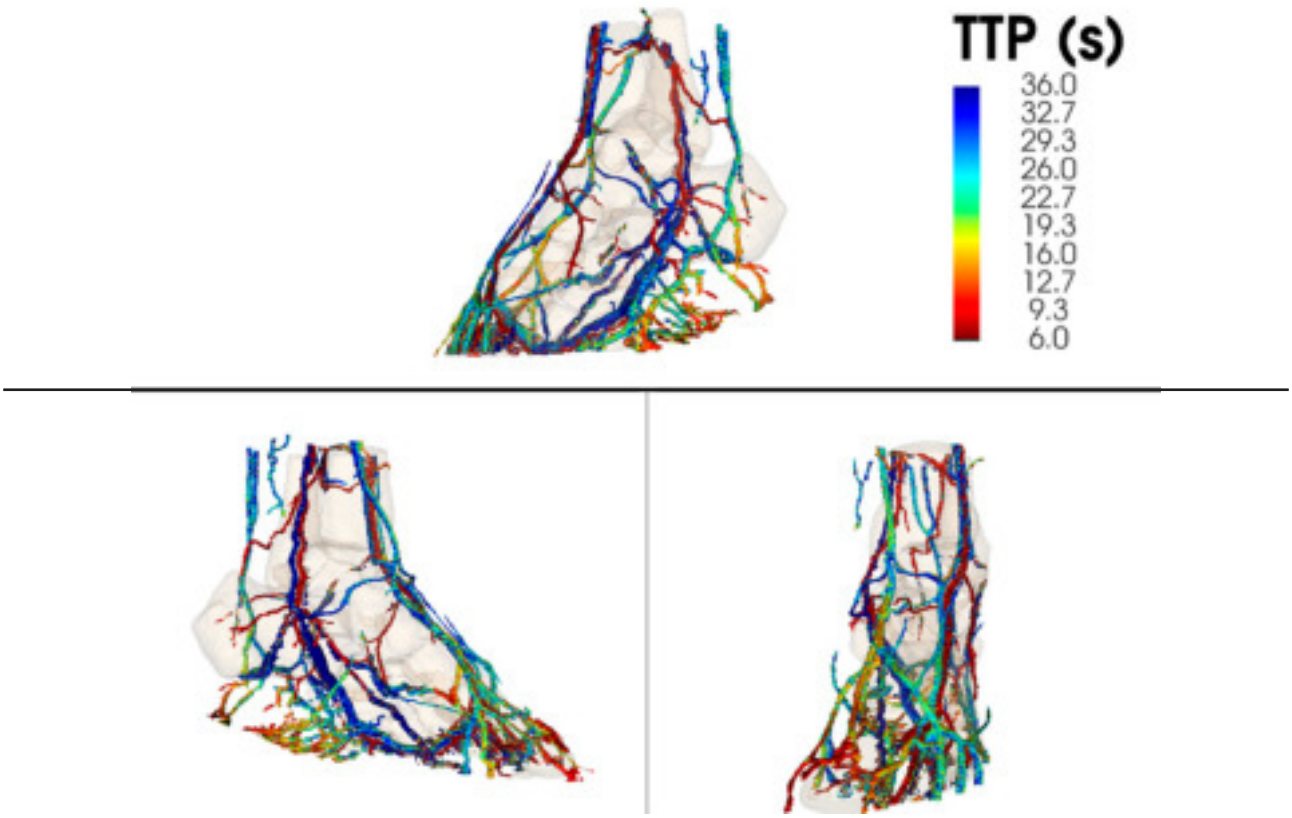


Illustration from the scientific study from Boonen et al. published in European Radiology Experimental[2]. This figure shows the parametric map indicating the contrast arrival (time-to-peak in seconds) for blood vessels, being red indicating the early arrival of the contrast and blue indicating the late arrival of the contrast.

Breakthroughs in the diabetic foot field

The most recent work from Pieter T. Boonen, Prof. Nico Buls, Prof. Dimitri Aerden, Prof. Jef Vandemeulebroucke, Prof. Johan de Mey, and their team was published in Radiology and European Radiology Experimental[1,2]. Radiology and European Radiology Experimental are two highly esteemed academic journals in the field of radiology and medical imaging. In these papers, they presented a methodology to assess the hemodynamic effect of critical limb ischemia in the foot using Alphenix 4D CT functionalities and perfusion imaging. In the first publication, the researchers applied this methodology to one patient with diabetic foot disease and already showed the benefits of using it to evaluate and plan the treatment of this disease. In the second publication, they extended the work to two more patients. This methodology, requiring a minimal contrast of only 2 mL, enables the acquisition of valuable information on blood vessel anatomy, hemodynamics, and tissue perfusion. The obtained hemodynamic parameters correlated well with intra-arterial digital subtraction angiography (IADSA) findings, surpassing it in assessing venous blood flow and inflammatory hyperperfusion.

This study integrates into the peripheral arterial disease (PAD) field. PAD manifests as a circulatory problem that results in the narrowing or blockage of the peripheral arteries, reducing the blood flow to the extremities. Typically, it results in patients developing critical limb ischemia, which leads to severe consequences for patients with diabetes (e.g., diabetic food disease). This disease is usually assessed with IADSA, which provides morphological and hemodynamic information about the lesion, but it does not provide information on tissue perfusion. In addition to this, IADSA only delivers 2D information on the structures. Therefore, an image modality that allows for volume projections, like dynamic four-dimensional computed tomography (dynamic 4D CT) may be an alternative to get more details about the structures in the image. However, recent studies reported the use of high levels of the contrast agent when acquiring dynamic 4D CT images.

"Acquiring the dynamic 4D CT images with intra-arterial contrast administration, substantially reduced the amount of contrast agent used (2 mL)."

In this work, the researchers included data from three patients with diabetic foot disease and a high suspicion of critical limb ischemia. Between January 2021 and August 2021, these patients underwent a dynamic 4D CT examination in combination with a diagnostic IADSA in the Alphenix 4D CT room at the UZ Brussel diabetic foot clinic.

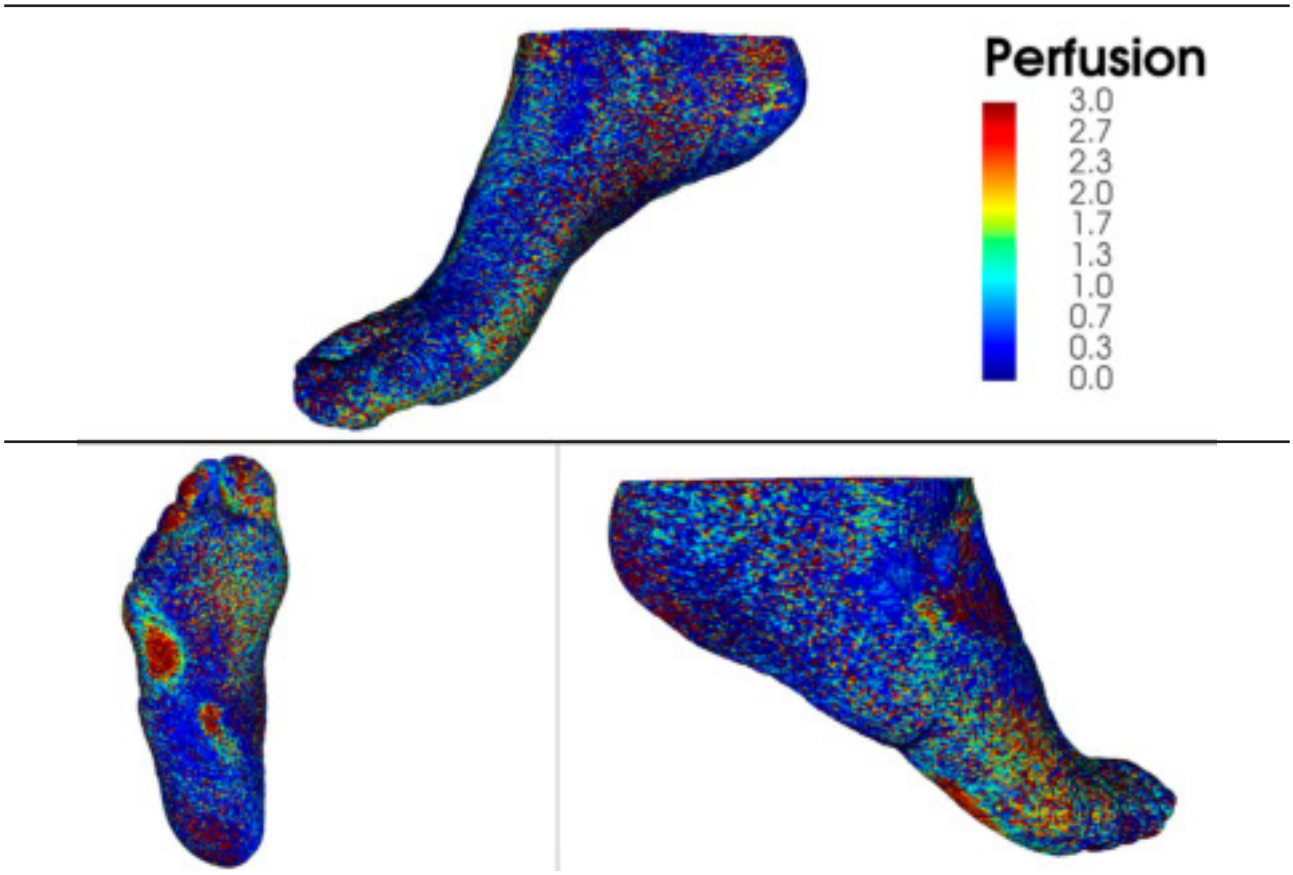


Illustration from the scientific study from Boonen et al. published in European Radiology Experimental[2]. This figure shows the parametric blood flow map indicating the perfusion values (mL/g/s) derived from dynamic 4D CT imaging, being blue indicating the low perfusion values and red indicating the high perfusion values.

With the approach of acquiring the dynamic 4D CT images using the Alphenix 4D CT, the amount of contrast agent used was very low (2 mL) as a result of the selective intra-arterial injection for the CT acquisition. Other studies reported the intravenous injections of 40 to 80 mL of contrast agent when the patient undergoes a dynamic 4D CT examination. The use of only 2 mL of contrast agent in these procedures has a clinical benefit, especially for patients with diabetes and chronic kidney disease, since the use of a high amount of contrast increases the risk of contrast-induced nephropathy in these patients.

In addition, a more detailed and informative assessment of blood flow and tissue perfusion was achieved with dynamic 4D CT images than with stand-alone IADSA. On the morphological and hemodynamical levels, dynamic 4D CT and IADSA correlated. However, as previously mentioned, dynamic 4D CT also allows obtaining perfusion maps, in which, as expected, the values of the affected tissues were significantly higher than those of the normal tissue, which is suggestive of inflammatory hyperperfusion.

Canon's Alphenix 4D CT installed in the Department of Radiology, UZ Brussels, Belgium.

In closing, this exploratory study showed that the methodology introduced by the researchers has the potential to provide anatomical and hemodynamic information on vascular structures, and insights on tissue perfusion with a minimal amount of contrast. The technique has the potential to contribute to a better diagnosis of critical limb ischemia in the future.

"Angio CT allows for 3D image fusion guidance that can improve the procedure time and reduce the amount of used contrast."

Stepping into the future in UZ Brussels

After the successful outcomes already achieved by the team, they are now planning to move forward and incorporate the cutting-edge multimodal capabilities of our Alphenix 4D CT into new research and clinical applications. Cardiology, interventional oncology, and interventional radiology are three clinical pillars for which they see the benefit of using Alphenix 4D CT not only for advanced diagnosis but also for advanced treatment. In cardiovascular applications, dynamic 4D CT imaging offers a dynamic visualization of the heart and blood vessels, providing crucial insights into cardiac function and blood flow.

This technology could enhance diagnostic precision in identifying coronary artery diseases, aneurysms, and other cardiovascular conditions, leading to more informed treatment decisions. In interventional oncology, the implementation of dynamic 4D CT imaging allows for real-time imaging during minimally invasive procedures. By capturing dynamic changes in tumor vascularity and surrounding structures, clinicians could navigate interventions with increased accuracy, potentially improving the efficacy of treatments such as embolization and ablation.

Finally, in interventional radiology, Canon's Alphenix 4D CT can be a perfect solution for Endovascular Aneurysm Repair (EVAR) procedures and its most common related complication called endoleaks. EVAR is a minimally invasive technique that is commonly conducted to repair abdominal aortic aneurysms (AAAs) using a stent-graft. This treatment has emerged as an alternative to open aneurysm repair procedures. However, EVAR can be affected by endoleaks, which are blood leaks outside the stent-graft and back into the aneurysm sac. There are different types of endoleaks, depending on the vessels that cause the inflow into the aneurysm sac. With Alphenix 4D CT, it will be possible to assess and treat this clinical complication within one room and by avoiding extra logistic actions. Moreover, using dynamic 4D CT imaging would be highly beneficial to determine the information about the hemodynamics of the blood flow to improve the endoleaks diagnosis and treatment. Next to these clear advantages, image fusion between CT image data and angiography is fast and straightforward since the patient is positioned on the same table, which means that no registration between the two imaging modalities is necessary. This three-dimensional image fusion guidance can improve the procedure time and reduce the amount of used contrast. Another strong advantage of this image fusion is the additional confidence given to the vascular surgeon and/or interventional radiologist during the procedure to improve patient outcome.

The Alphenix 4D CT is therefore shaping up to be a game-changer in the Department of Radiology, at UZ Brussels. With their interest in integrating the Alphenix 4D CT into their clinical routine, we can foresee that the road ahead is bright, bringing improved diagnostics and better treatment for all. //

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References

[1] *Boonen, Pieter T., and Dimitri Aerden. "Intraarterial Four-dimensional CT Angiography with Soft Tissue Perfusion Evaluation in Diabetic Feet." Radiology 307.4 (2023): e222663.*

[2] *Boonen, Pieter T., et al. "Combined evaluation of blood flow and tissue perfusion in diabetic feet by intra-arterial dynamic 4D CT imaging." European Radiology Experimental 7.1 (2023): 44.*

Long-Term Maneuverability – Relocatable MRI

Canon Medical recently installed its first relocatable MRI in Europe. The system, which incorporates a Vantage Fortian 1.5T MRI, was commissioned by a private healthcare facility in Norway. It will enable the clinic to start offering much needed MRI imaging services while its expansion is completed over the next few years. VISIONS explores how the new development went.

The relocatable MRI, which incorporates a new Fortian MRI scanner, is uniquely available through the Refurbished and Mobile Imaging Solutions Department of Canon Medical Systems Europe.

"Canon Medical System Europe's Refurbished & Mobile Imaging Solutions combines a unique set of skills and capabilities, and in this groundbreaking case, has extended its expertise even further, collaborating closely with the MR team at Canon to deliver the first relocatable MRI," said Johan Vochteloo, Director of Refurbished & Mobile Imaging Solutions. "Our highly specialized branch excels in bringing new high quality options to customers that fit their unique and diverse challenges."

Scanin is a small private diagnostic center located in Arendal in southern Norway. It was established in 2022 by Ron Astrup, CEO, to provide diagnostic services. He started Stoa Fysikalske Senter 18 years ago, a facility for therapeutic services in physical therapy, including musculoskeletal (MSK), for patients in the surrounding area. At Scanin there are currently two radiologists and two radiographers.

"I started this new center of physical therapy straight after I completed training as a physiotherapist almost 20 years ago. I had been working with a lot of Norwegian athletes from elite level including Norway's top cycling team and first division football and handball teams, through to ordinary sporters," said Ron. "We now have 10 physiotherapists, a radiologist, and a masseur therapist and specialize in the treatment of musculoskeletal problems."

The installation of Canon's first relocatable MRI in Arendal in southern Norway.

"Eight years ago, I started doing ultrasound myself to support this work," he continued. "However, I realized that we needed more options in the practice. Southern Norway is quite large and it takes quite a time for patients to schedule in an MRI via existing services, as well as travel to it. In addition, I thought that MRI was something we could do better from here."

Expansion

However, Scanin is expanding with the development of a new 2,000 m2 center under construction alongside its existing building.

"Building our new facility will take two to three years to complete, but I wanted to have our MRI capabilities up and running sooner," said Ron. "Canon Medical Systems Europe and Tromp Medical, Norway (Distributor of Canon Medical Systems Europe) came up with a solution – a relocatable MRI - I am very happy, because it solves the issue and we didn't have to think about all the details inside the container. We are relative beginners in MRI, and designing and equipping the unit was one less thing we had to think about."

The solution incorporates a new Vantage Fortian 1.5T MRI system featuring innovative workflow

Canon's relocatable with the Vantage Fortian 1.5T MRI, in Arendal, Norway.

solutions, image enhancement, and accelerated scan technology, housed within a fully equipped, relocatable container.

"This was the first time we had a request for an installation of a MRI system in a relocatable," remarked Mark Herfst, Project Manager at Canon Medical Systems Europe. "Each relocatable is designed specifically for an end user and tailor-made for a specific region. The environment can have serious impact on the image quality of the magnet in an MRI. The relocatable for Norway was equipped with floor heating, heating for the protection of water-pipes, condense lines, and an Artic Type A/C to avoid freezing up the condenser."

"In order to avoid any issues, we measured upfront if any disturbance in the electromagnetic field was applicable that could affect the working of the MRI's magnet later on," he continued. An old oil tank located under the desired position of the MRI was removed. The floor of the relocatable was carefully designed and partly constructed in stainless steel to avoid shimming issues. All the ferromagnetic steel was evaluated and approved. Specially designed steel shielding was required for correcting the 5Gauss back into the relocatable to meet the European regulations for magnetic field lines in public areas.

"Building our new facility will take two to three years to complete, but I wanted to have our MRI capabilities up and running sooner and Canon came up with a solution – a relocatable MRI."

Ron Astrup, CEO at Scanin, Arendal, Norway.

And besides the steel layers, a cupper layer was integrated in the walls, floor and roof these layers to meet a damping rate of 100dB. This enables optimum images without artefacts from outside to be produced.

"In addition, together with Scanin, we also decided on specific options, such as no changing cabin, a larger desk, quench pipe outlet direction, exterior design and interior color scheme," added Mark.

Careful installation

The unit was installed on site in July this year. It required careful positioning because of the presence of heavy cranes and containers in the direct vicinity of the relocatable, which might have disturbed the magnetic field. Canon proposed two suitable positions for the relocatable on site.

"The location chosen by the customer posed some physical challenges as it was on a hillside close to a cliff, but we were able to propose construction of a base frame for the relocatable to provide suitable structural support," said Mark.

The relocatable unit, which was 4.1 meters in width, required special road assistance over the entire route from the production site in Wroclaw, Poland to Arendal, Norway. With the use of heavy rigging cranes, unloading the unit went smoothly.

The installation of Canon's first relocatable MRI in Arendal in southern Norway.

Another challenge was the electrical compliance of the relocatable with the local regulations, but the whole electrical design was completed according to Norwegian standards.

Once the container unit was installed, the MRI could be introduced a couple of weeks later and staff at Scanin were trained in using the new system soon after.

"We carried out training on site with the help of Canon," said Hans Petter, Senior Product Manager, Tromp Medical, Norway (Distributor of Canon Medical Systems Europe).

"The new radiographer hired by Scanin was appointed on August 1, 2023. The training went well and it was repeated after a few weeks."

"Canon's Refurbished & Mobile Imaging Solutions combines a unique set of skills and capabilities, and now also delivers the first relocatable MRI."

Johan Vochteloo, Director of Refurbished & Mobile Imaging Solutions, Canon Medical Systems Europe.

New imaging and workflow capabilities welcomed

Following training, Ron and his team have taken time to set up protocols with Canon's Vantage Fortian and is now fully operational.

"We have had a good response on the new MRI capabilities of the Vantage Fortian from doctors in the south part of Norway as well as our own radiologist and radiographers, and our patients," remarked Ron."

"I am impressed by the enhanced image quality possible with Canon's Vantage Fortian at Scanin," said Nazeer Dareez, Radiologist at Scanin. "It utilizes Advanced intelligent Clear-IQ Engine (AiCE) technology, which leverages deep learning reconstruction (DLR) technology to deliver noise-free images, especially when the procedure needs high-resolution images, highly accelerated scan time, and/or both simultaneously. by removing noise and restoring SNR. It enables me to see clear details of anatomical structures and tiny abnormalities that we previously were having challenges to visualize. The focus of the clinic will initially be on high quality musculoskeletal imaging, in addition to neuro and spine examinations."

"Each relocatable is designed specifically for an end user and tailormade for a specific region."

Mark Herfst, Project Manager, Canon Medical Systems Europe.

"I like the automated scan procedures, which confirms set-up steps and saves time," added Marianne Rognli, Scanin's Radiographer.

Support at every step

While the project has been realized through the collaboration between Canon Medical Systems Europe, Tromp Medical, JMP and Lingetrans, Canon Medical support and service continues to lead Scanin ahead with integrating the Fortian into full service.

"Support from Canon has been very good throughout," said Ron. "I could tell straight away in our research for an MRI partner that they were able to give us the assistance that we needed. It is so important to have a good personal relationship with the vendor. I felt strongly that Canon wanted this as much as we did. We continue to have excellent support in use of the system." //


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Aquilion ONE / INSIGHT Edition – Making A Difference

Royal Bournemouth Hospital in the UK was the first in Europe to receive the new Aquilion ONE / INSIGHT Edition CT scanner. Dr. Russell Bull, MD, Consultant Radiologist and Lead CT at the Radiology Department of the Hospital explains how it has already brought about big changes.

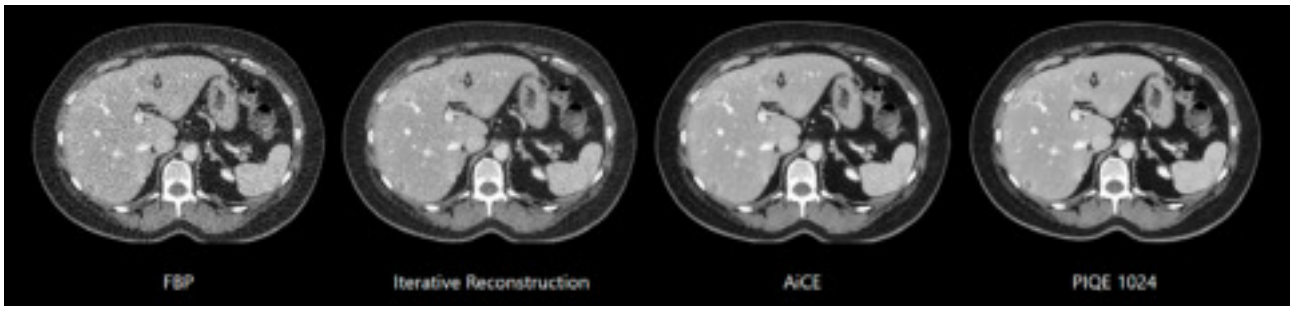
The Royal Bournemouth Hospital is a general hospital in Bournemouth, Dorset, UK. It has approximately 600 inpatient beds and 123 day care beds. The hospital provides urgent and emergency care, medical care, surgery, critical care, end of life care, outpatient and diagnostic services. The Royal Bournemouth provides services for a population of around 550,000 local people – a number which rises during the summer months due to the attraction of the area as a destination for tourists. The hospital's radiology department has collaborated with Canon Medical for many years. In addition to the new Aquilion ONE / INSIGHT Edition CT, the department has other Canon CT scanners including an Aquilion ONE / GENESIS Edition and an Aquilion Serve.

(left) Mr. Matthew Benbow (Superintendent Radiographer of CT and MRI) and Dr. Russell Bull (MD, Consultant Radiologist and Lead CT at the Radiology Department) at the Royal Bournemouth Hospital, UK, with Canon's Aquilion ONE / INSIGHT Edition.

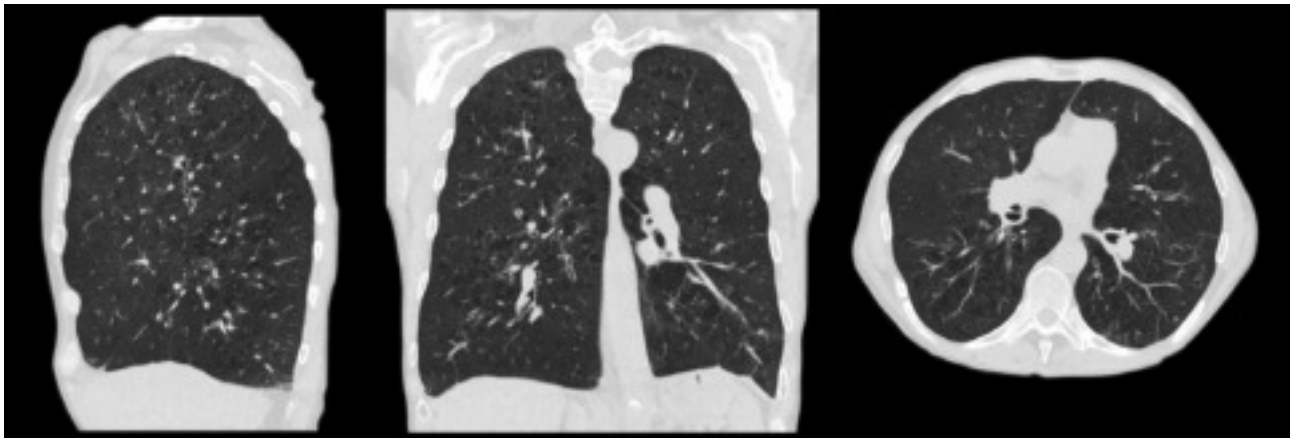
Training a large team

The Aquilion ONE / INSIGHT Edition has already delivered many benefits to the 24-strong team of radiologists and 30 radiographers.

"It's been very easy to train the radiographers on the Aquilion ONE / INSIGHT Edition, because it's much simpler due to the new efficient INSTINX workflow solution. In fact, it guides the radiographers through the process in a way that the previous one didn't. It's much more logical. It's much more intuitive," remarked Dr. Bull.



Abdominal images reconstructed with different reconstruction algorithms on 0.5 mm slice thickness.



A 0.2 mSv SilverBeam chest scan from a patient with lung emphysema.

"The benefit of PIQE 1024 is that it gives us much higher spatial resolution but without increasing the radiation dose."

Dr. Russell Bull, Royal Bournemouth Hospital, UK.

"All of the radiographers prefer the new interface to the other one. And they are scanning much faster as well. It's easier to train and they are quicker," he continued.

Improved resolution

With the Aquilion ONE / INSIGHT Edition's advanced Deep Learning Reconstruction (DLR), Dr. Bull sees a big improvement in image quality.

"The images are a lot less noisy and have fewer artefacts. We get better images, but without increasing the radiation dose," he said. "Generally, the Deep Learning Reconstruction has been very well accepted by our radiologists. The Aquilion ONE / INSIGHT Edition utilizes two types of DLR, one of them is Advanced intelligent Clear-IQ Engine (AiCE), which we tend to use in the body, and Precise IQ Engine (PIQE), which we tend to use for the coronary arteries at the moment but is also available for body examinations."

"The benefit of PIQE 1024 is that it gives us much higher spatial resolution without increasing radiation dose. As it improves spatial resolution, we can image coronary arteries with calcification and stents and we can reduce blooming artefacts. We've only had it five weeks, but we are much more confident in our diagnosis because the resolution is much higher," he added.

High quality at very low dose

Dr. Bull and his team also use the SilverBeam Filter for high-quality images at very low dose.

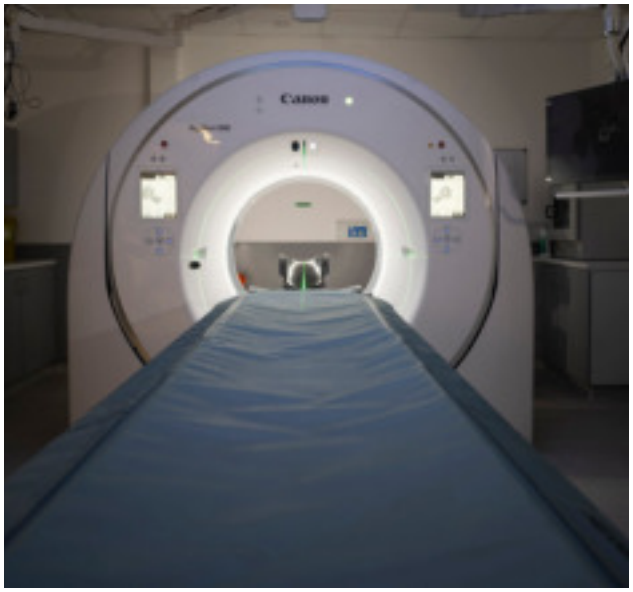
"We are not just going for low dose - we aim for high image quality at low dose. We are able to do that with SilverBeam," he remarked. "We don't just use it for lung cancer screening, we use it for standard chest imaging. We also use it for bone imaging because we get much fewer artefacts and the dose is so much lower. If it's a spine or sinuses, or if we are looking for a hip fracture, we will use SilverBeam."

Dr. Russell Bull

Dr. Russell Bull was appointed as a consultant radiologist at Bournemouth, UK, in 2000. Dr. Bull initially worked as a general cross-sectional radiologist and started a cardiac CT service at Bournemouth in 2004 using a Canon Aquilion 16. For the last 13 years he has worked almost exclusively as a cardiothoracic radiologist with his time split between cardiac CT and MRI. His interests include the promotion of CT as a low-dose technique and increasing efficiency within radiology departments by optimizing technology and workflows.

Aquilion ONE / INSIGHT Edition

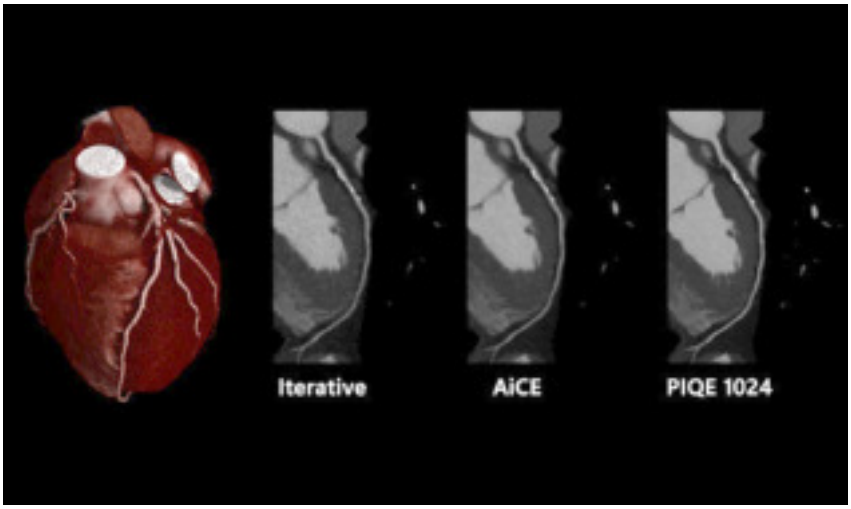
The Aquilion ONE / INSIGHT Edition delivers exceptional image quality thanks to cutting-edge Deep Learning Reconstruction technology. It provides super resolution imaging of the whole body, which is essential for the accurate diagnosis of complex pathologies, particularly in cardiology, oncology, and emergency care.



Better contrast enhancement

Dr. Bull and his team use 70kVp when they want better contrast enhancement.

"We use 70-kVp to do delayed imaging of the heart to see if there is a blood clot in the left atrial appendage. We use 70-kVp because you get much better contrast enhancement. We also use it when we want to use a very small amount of contrast with patients who have poor kidney function. We have specific CTA protocols, like CTPA, set up in our scanner for these patients."



Cardiac CTA with different reconstructions algorithms of the LAD showing increased spatial resolution with PIQE 1024.

Scanning challenging patients

The whole team at the Radiology Department were surprised how much better the Aquilion ONE / INSIGHT Edition was for scanning larger patients.

"As the tube is much more powerful and the detector is much more efficient, we are able to image larger patients with fewer artefacts and image noise than on our previous systems," said Dr. Bull. "Also the faster rotation speed allows us to perform coronary CTA in patients with higher heart rates."

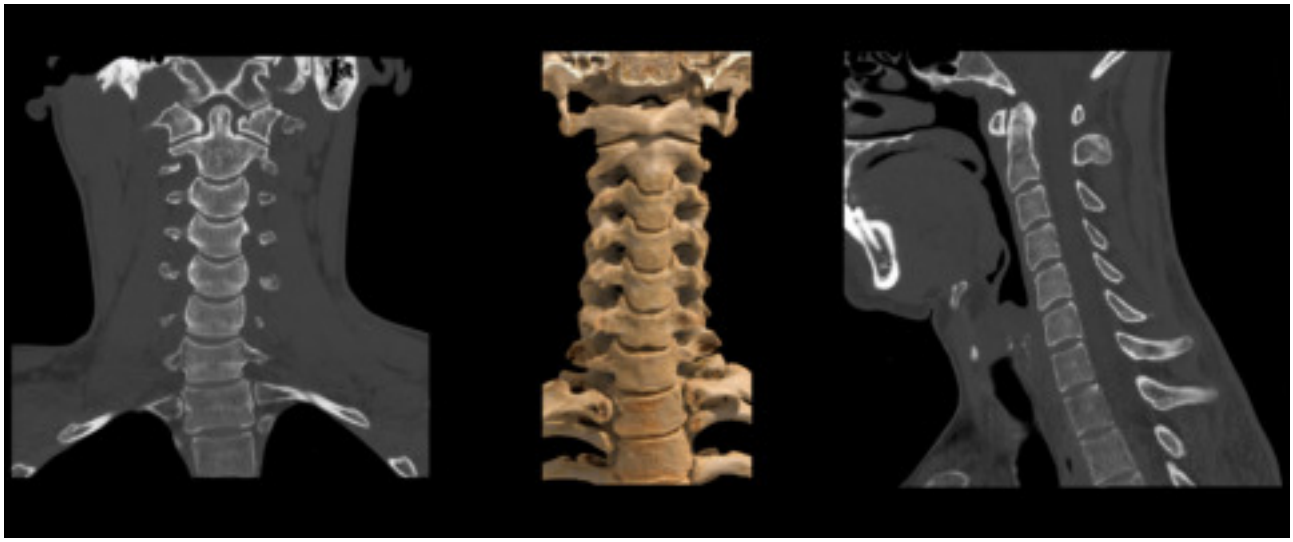
Smooth transition to new technology

Installing and integrating the new system at the hospital has been seamless, and with the support of Canon Medical, the department has been able to adopt the new technology.

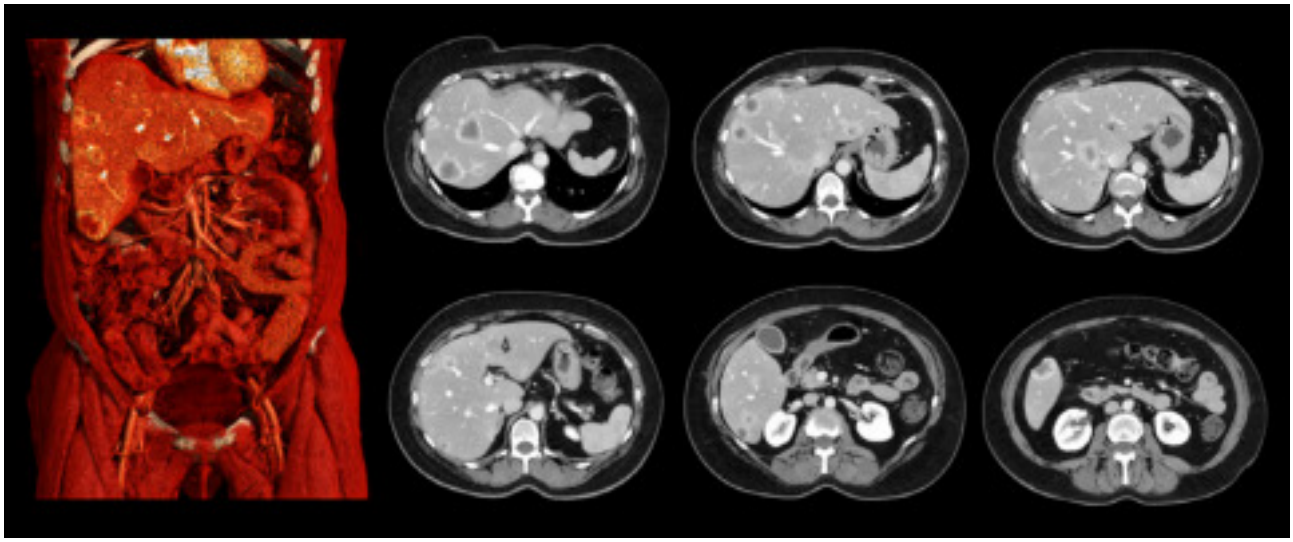
"We had great support both from Canon Medical Systems UK, Canon Medical Systems Europe and Canon Medical Systems Corporation (Japan)," he said. "All of these people supporting us has made a huge difference. It was wonderful. It really helped us because the new technology is quite different. I think we are still learning, but we learned much faster because of the excellent support." //

Precise IQ Engine (PIQE)

PIQE is a Deep Learning Reconstruction algorithm that maximizes the inherent resolution of a CT to provide Super Resolution 1024 matrix images. PIQE images show sharper anatomical detail for better delineation of small anatomical structures for a more definitive diagnosis.



SilverBeam scan of the cervical spine. Images are showing reduced artefacts in the shoulder region.



0.5 mm slice thickness PIQE 1024 abdominal images showing increased spatial resolution in this patient with liver lesions.

INSTINX

INSTINX is a total workflow experience redesigned from the ground up to set new standards in efficiency and consistency. Every detail of the workflow has been thoroughly refined based on clinical testing in medical centers around the world. Now every operation is more intuitive and can be learned faster than ever before. This ease of use contributes to work satisfaction, time savings and flexible allocation of resources.

SilverBeam Filter

SilverBeam is a filter for Aquilion CT that incorporates silver to selectively optimize the beam energy. It removes low-energy photons from the beam spectrum, which do not contribute to image quality, but do increase dose and scatter. When combined with Canon Medical's Advanced intelligent Clear IQ Engine (AiCE) technology, this beam-shaping energy filter can harness the power of AI to deliver high image quality and low noise for dedicated applications.

Xavion - Creating Added Patient Comfort

The University Hospital of Montpellier (CHU) in Montpellier, France, Europe's oldest medical faculty, was the very first in Europe to install the new Xavion RF System. The potential of the AI-supported remote controlled table, wireless detector, and intuitive software suite were the key factors in CHU's choice. VISIONS spoke to Prof. Boris Guiu and Mr. Guillaume Giangrasso of the Radiology department to find out in detail how the system has already significantly streamlined their workflows, improved the management of examinations and enhanced patient comfort.

Prof. Boris Guiu is the Head of Radiology and the Digestive Poli at the Hospital, which encompasses the departments of anesthesia-intensive care, hepatology, gastroenterology, digestive surgery, as well as radiology. He leads a team that is specialized in digestive radiology, oncology, functional- and bariatric imaging and treatment. The team consists of 11 specialists, 39 radiographers, and 10 secretaries.


Xavion
CHU

Canon's Xavion.

"Our main challenge is to provide continuous improvement in the quality of care for patients referred to us or treated by Interventional Radiology," he remarked. "Our old radiology table reached the end of its lifespan. We researched a replacement carefully, for over a year, which involved consulting manufacturers."

A ground-breaking detector

The Xavion system is equipped with a Canon CXDI-B1 detector for radiographic and fluoroscopic imaging. This unique, wireless detector combines outstanding static imaging capabilities with high sensitivity, and high-resolution dynamic capabilities.

"Canon's Xavion solution features a mobile, wireless detector that allows us to image bedridden patients without moving them, which stood out as a particularly strong benefit." Said Prof. Guiu.

Comfort zone

Canon has ensured that the Xavion offers optimal comfort and ease of use for patients, as well as users. The system is adaptable for an extremely wide variety of patient needs including those of children, elderly, and obese patients. This enables the provision of comprehensive care for a diverse patient population. Xavion's table can lower to a height of 48 cm and it is driven by silent motors for precise motion control and quiet maneuverability, adding to patient comfort. With Xavion's built in ambient lighting and Music, a relaxing atmosphere can be created for examinations to ease anxiety.

Well-positioned

Advanced software innovations within the Xavion vastly improve patient

"In addition to the unique detector, the system's ergonomics are very welcoming for the patient and make it easy to use."

Prof. Boris Guiu, Head of Radiology and the Digestive Poli at the University Hospital of Montpellier (CHU), France.

(left) Prof. Boris Guiu, Head of Radiology and the Digestive Poli. (right) Guillaume Giangrasso, Chief Radiographer at St-Eloi hospital, University Hospital of Montpellier (CHU), France.

positioning. Its automated workflow adapts filters and dose settings based on the patients morphology, allowing for a smoother and more efficient user experience. The newly developed user interface, with a touchscreen in the examination room, provides fluid control of table movements and imaging and allows for further personalization of the patient experience through easy adjustment of settings by operators.

Other special positioning features include, fast tilting, with a +/- 90° motorized adjustment for access and positioning; 'Get-the-Position', which enables users to follow table movements on the LIH image displayed on the monitor and 'Go-to-Position, which allows auto positioning of the table with a simple click on the LIH image.

"In addition to the unique detector, the system's ergonomics are very welcoming for the patient and make it easy to use," added Prof. Guiu. "The 'intelligent' placement of the patient which is possible with the Xavion means less radiation and fluoroscopy are required. Both are great plus points!"

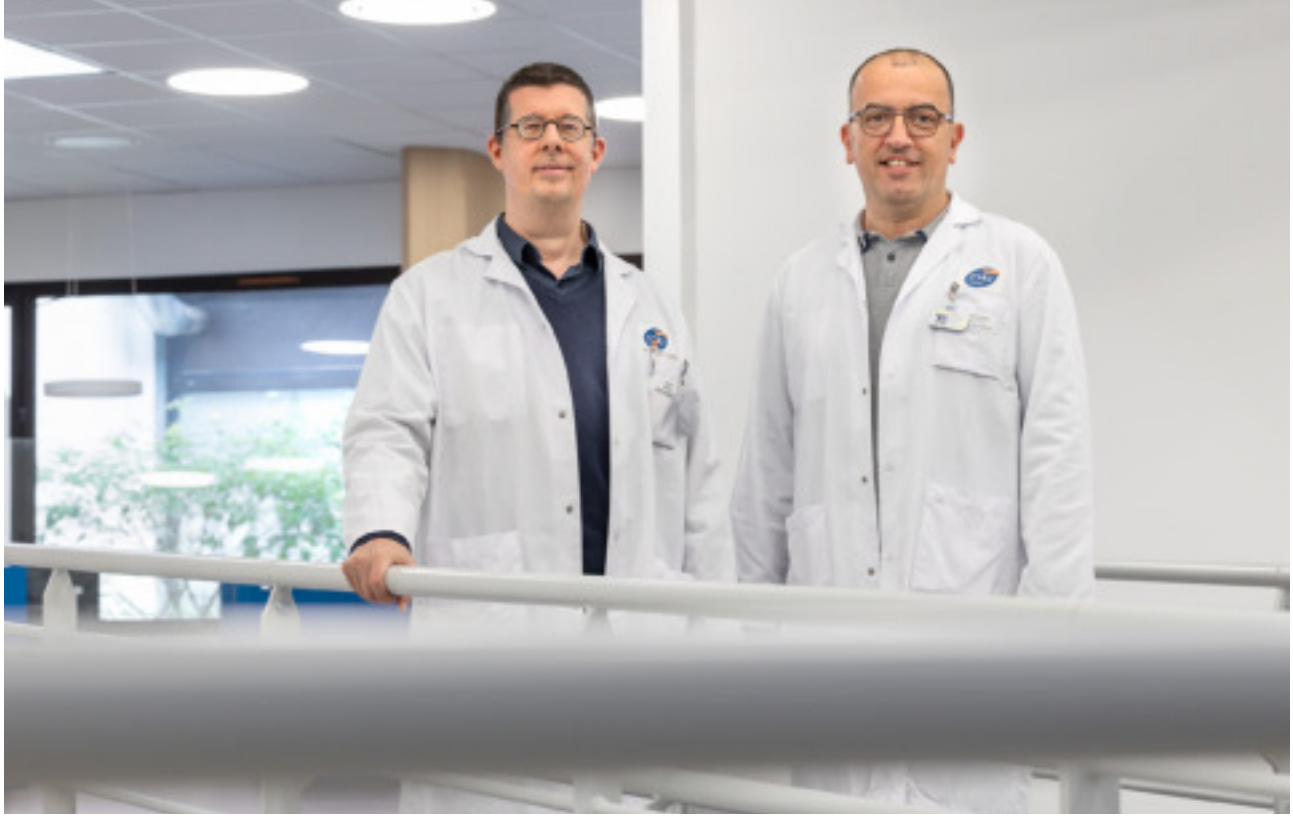
Exceptional imaging capabilities

The Canon CXDI-B1 detector has a very large imaging surface capability (effective imaging area of 41.5 cm x 42.5 cm) and capacity to deliver exceptional image quality, even at high speeds, (160µ for radiography, fluoroscopy and serial examinations and fluoroscopy with up to 30 fps) ensure accurate diagnostics.

Guillaume Giangrasso, Chief Radiographer at the Hospital, explained what a difference the new system has made in his work.

"Xavion simplifies workflow management thanks to its intuitive design, efficient management of system protocols and ergonomic screen layout ensure fast, error-free operation."

Guillaume Giangrasso, Chief Radiographer at the ST-Eloi Hospital, University Hospital of Montpellier (CHU), France.



(left) Prof. Boris Guiu, Head of Radiology and the Digestive Poli. (right) Guillaume Giangrasso, Chief Radiographer at St-Eloi hospital, University Hospital of Montpellier (CHU), France.

"The integrated Canon detector ensures high-quality images, providing precise and detailed results for accurate diagnostics," he remarked. "The light and easy-to-handle detector and the easy removal process for the detector tray are an additional benefit and facilitate manual exposures with in-bed patients."

Smart image processing

The Xavion system incorporates advanced features like automatic patient morphology selection, preset radio/fluoroscopy parameters, and smart image processing, significantly reducing radiation dose and optimizing patient safety.

"The Xavion software enhances efficiency by allowing radiographers to focus on patients and examinations. Its intuitive design ensures that necessary steps are clear and do not require extensive training, even for those who haven't operated the system recently," said Guillaume. "Xavion dose-saving features asymmetric collimation and auto-positioning of patients through Last Image Hold, eliminate the need for X-rays during positioning."

Transforming workflows

Xavion software transforms the imaging workflow through intuitive navigation, efficiency and automation. It simplifies operations by providing the right tool at the right time, minimizing wasted time and clicks. This modern, user-friendly platform, featuring a customizable touch screen, optimizes workflow and ensures consistent imaging processes, bringing the next generation of RF technology to reality. This contributes towards helping the team work more effectively, particularly in dealing with the challenges posed by extended patient lists.

"Xavion simplifies workflow management thanks to its intuitive design, efficient management of system protocols and ergonomic screen layout ensure fast, error-free operation," said Guillaume. "

"The system provides ease of use with features such as adjustable working height (up to 130 cm), a 7-axis hands-free positioning pedal, and sufficient working space around the table for effective patient transfer and positioning," he added ."And it offers operational flexibility, allowing control of table movements from five different points in the room and enhancing workflow efficiency based on the radiographer's and patient's needs.

AI-based imaging

Xavion's AI software intelligently adjusts imaging parameters, reducing the likelihood of retakes and ensuring optimum image quality."

AI-supported noise suppression, combined with simultaneous edge and contrast enhancement, creates an imaging experience like never seen before in the RF market. The deep learning post-processing software results in exceptional clarity in both soft and dense tissue, offering healthcare professionals an invaluable tool for accurate diagnosis. Also, this innovative technology adapts dynamically to various conditions, ensuring the radiologist receives the most relevant information for diagnosis.

Not just a diagnostic tool

The Xavion offers the flexibility to perform both standard static radiography exams and dynamic exams with its full digital solution. This versatility makes it a comprehensive imaging system suitable for a wide range of diagnostic procedures.

"Patients benefit from a more comfortable environment during procedures, ultimately leading to improved examination outcomes," added Guillaume. //

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CT Examination of Three Symptomatic Wild Seals

Seals are wild animals and are, therefore, rarely brought to vets when they are sick. One exception from this is seen at seal sanctuaries, which administer medical care to sick or young stranded seals that have been rescued and admitted. An example of this is the non-profit organization, A-Seal, in Stellendam, the Netherlands. This organization rescues and rehabilitates seals that have been stranded along the nearby Dutch coastline. These seals are often pups that have been separated from their mothers, but they can also be young or adult seals that are sick or injured. When treatment and rehabilitation are successful and complete, the seals are released back into the wild.

Veterinarians face various challenges when they examine wild seals because they are often not cooperative. Other practical problems are encountered due to seals' stocky build and thick layer of blubber, which can make manual examination difficult, especially of the spine, limbs or joints. In cases of a suspected ear problem, otoscopy can also be very difficult to perform, as seals have a very narrow external auditory canal.

To overcome some of these problems, radiographic examinations are often carried out in rehabilitation centers, mainly of bony structures and the lungs. However, in some patients a CT scan can be a quick and non-invasive way to obtain additional and more detailed information.

The following series of clinical cases illustrates the importance of performing CT scanning in wildlife. The cases demonstrate that CT is suitable for assessing anatomical structures that are not clearly visible on plain radiography.

Three young seals, recently rescued on the beach, were examined by the responsible veterinarian, Dr. Machteld Geut. The clinical findings of the three cases were then discussed with veterinarians, Dr. Gert ter Haar and Dr. Susanne A.E.B. Boroffka. This multidisciplinary consultation concluded that CT examination is necessary for optimal imaging and evaluation of the submitted seals.

Anesthesia

Specific problems can arise during anesthesia in pinnipeds due to the anatomical and physiological adjustments they have for long-term diving. The so-called 'dive response' causes apnea and deep bradycardia. The same apnea response is often observed in combination with treatment or during anesthesia. This can lead to hypoxemia and in severe cases to cardiac arrest[1]. A special anesthesia protocol developed by Geraldine Lacave, marine mammal veterinarian, was used.

All seals were first anesthetized with an intramuscular injection (butorphanol).

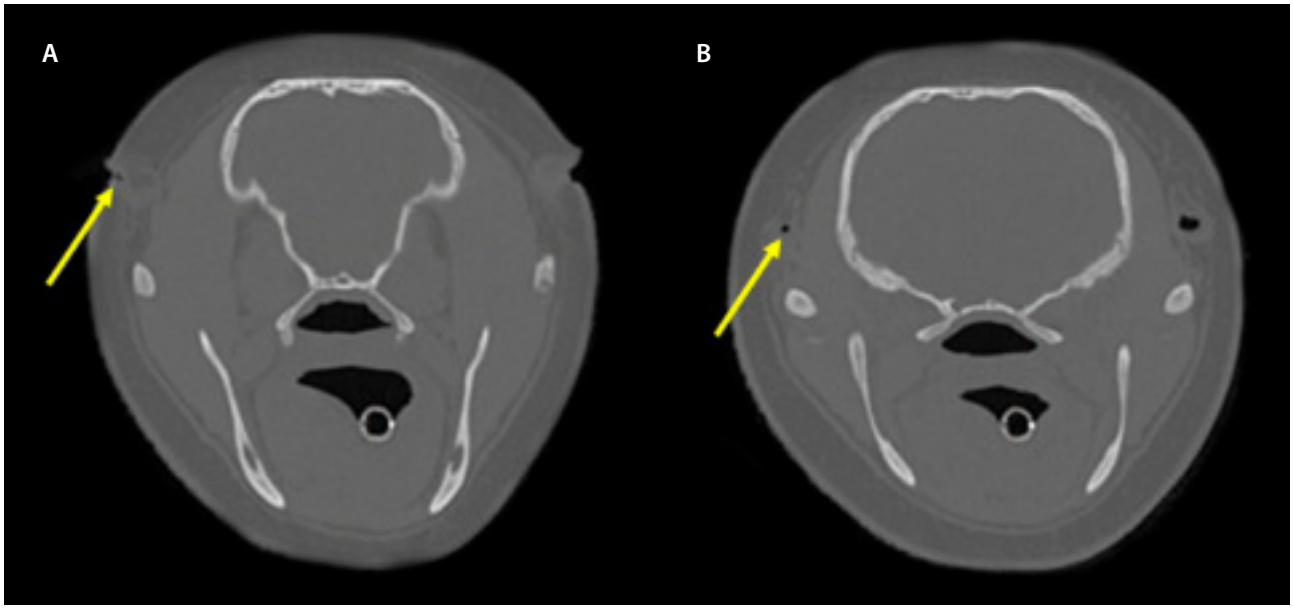

Figure 1a and 1b show the patient's ear canal (yellow arrows) in bone filter reconstructions. The transverse images show the narrow ear canal (a) and the obvious narrowing of the left external ear canal (b).

After they were sufficiently anesthetized, the induction medication (propofol) was administered via the extradural epidural vertebral vein (vertebral sinus) in the lumbar back, which is well-developed in all pinnipeds.

After induction, the seals were intubated and connected to a loop ventilation system with mechanical ventilation. Anesthesia was maintained with isoflurane in oxygen. The anesthetized seals were then taken to the CT room and placed in sternal position on the CT table. Pre- and post-contrast CT examinations were performed over the entire body.

Seal 01: Vincent

Vincent presented with chronic purulent discharge from his left ear. Therefore, it was particularly important to evaluate the external auditory canal, middle and inner ear. Seals do not have an external auricle; they have a small opening that closes underwater.

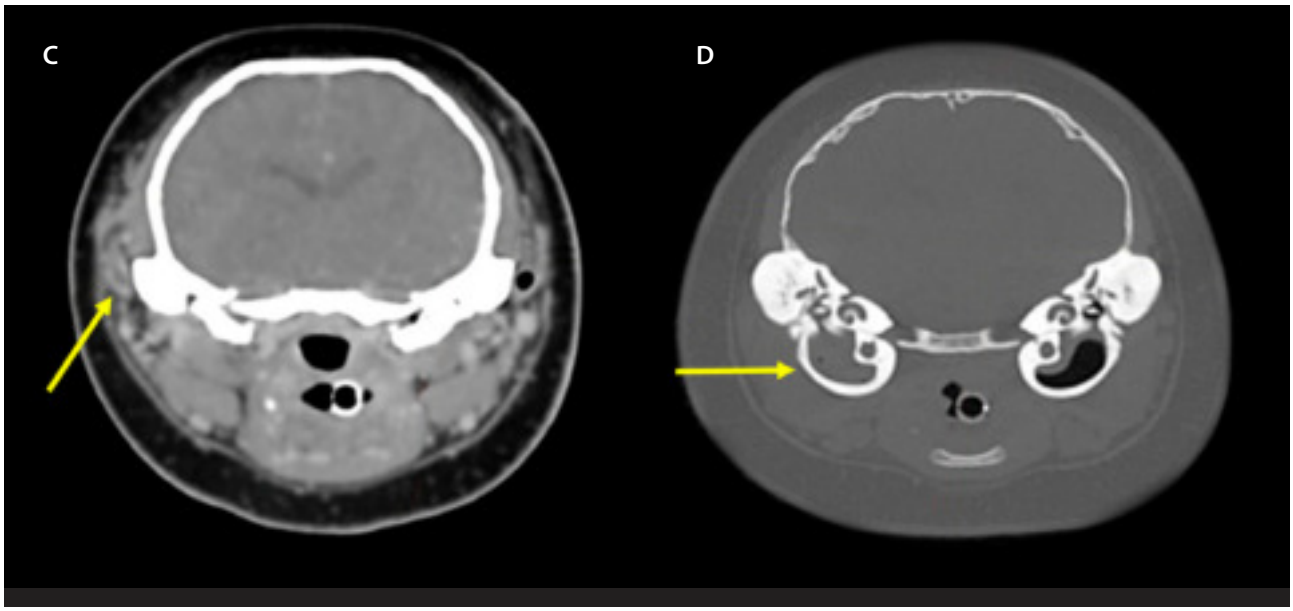

Figure 1c and 1d. Image 1c shows the blocked ear canal in the soft tissue filter reconstruction and image 1d shows the fluid-filled bulla in the bone filter reconstruction.

The CT examination showed a clear complete closure of the left external auditory canal due to thickening of soft tissue (Figure 1). Moreover, the left tympanic bulla was filled with soft tissue. The right bulla was filled with air, as normal.

After administration of contrast fluid, a contrast enhancement of the slightly thickened wall of the left external auditory canal was observed, but the contents of the cavity did not suggest an accumulation of fluid, cerumen or mucus. The contents of the left bulla showed no contrast enhancement.

The narrowed external auditory canal and irregular wall thickening corresponded with an external ear infection.

Vincent underwent medical treatment for the external ear infection several times without success. After a multidisciplinary consultation, it was decided that he should undergo surgery for full recovery. After surgery and recovery, Vincent was returned to A-Seal, where he was kept out of the water for several days before being released into a pool of salt water.

Seal 02: Cascada

Cascada presented with a lop-sided head positioning indicating an inner ear problem, but without any discharge from the ears. A CT examination was performed to rule out otitis media/otitis interna. Transverse and dorsal CT images show normal air attenuation in both tympanic bullae (Figure 2). Based on the CT scan, a middle ear infection was ruled out.

Seal 03: Elvis

Elvis showed an abnormal gait which indicated pain in the pelvis. To prevent problems such as spinal fractures or to rule out luxation, or a fracture of the pelvis, a CT scan was performed (Figure 3). The CT scan showed no signs of fractures or dislocations.

Once the appropriate protocols for anesthetizing the seals were administered, CT examination enabled optimal imaging and evaluation of the seals which meant that certain conditions could at least be ruled out in these cases by veterinarians and more detail provided towards a clear diagnosis.

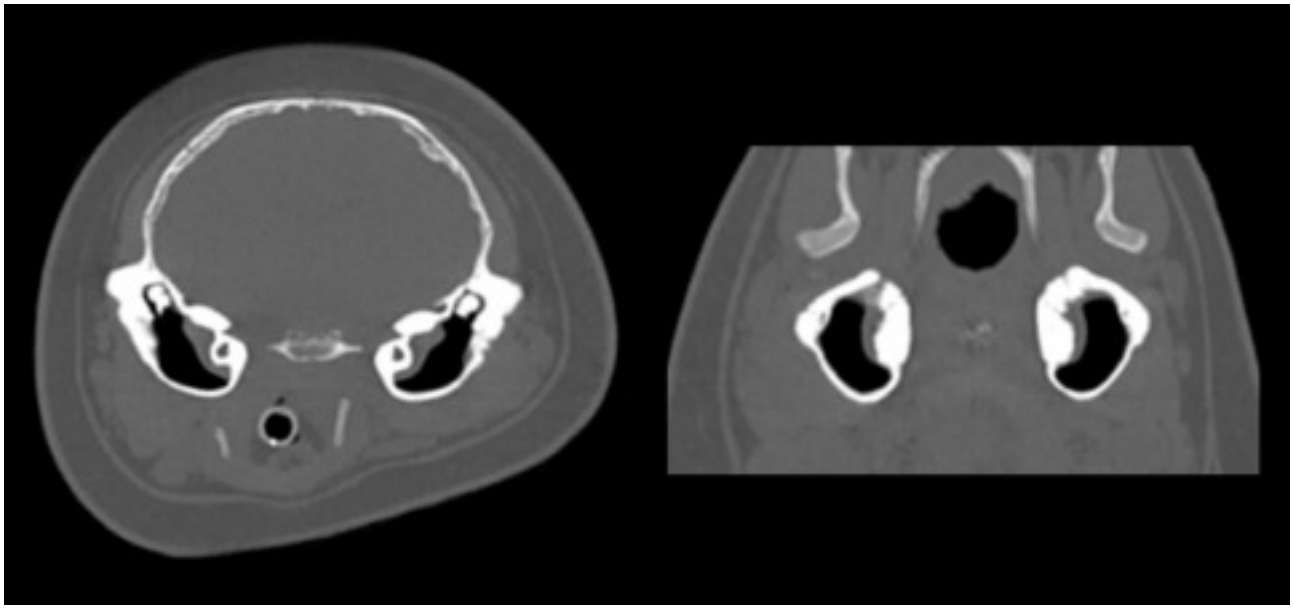

Figure 2: No abnormalities were observed on both bone filter reconstructions.

In the diagnosis of health problems in wildlife, there is usually no case history to work from. Examination and treatment of wild animals is not as easy as in domestic animals that are used to being handled. In addition, the conditions that affect wildlife can be very specific, even species' specific, due to their physiology and habitat. In the case of wildlife rescue, resources such as veterinary care are often very limited, which places further emphasis on getting diagnoses and treatment right first time. Undoubtedly, CT has an important role in optimizing wildlife healthcare. //

Drs. Bas Wetzels, *Resident ECVDI*
Drs. Machteld Geut, *Veterinarian specialized in marine mammals*
Dr. Susanne A.E.B. Boroffka, *PhD, DECVDI*
Dr. Gert ter Haar, *PhD, DECVS*

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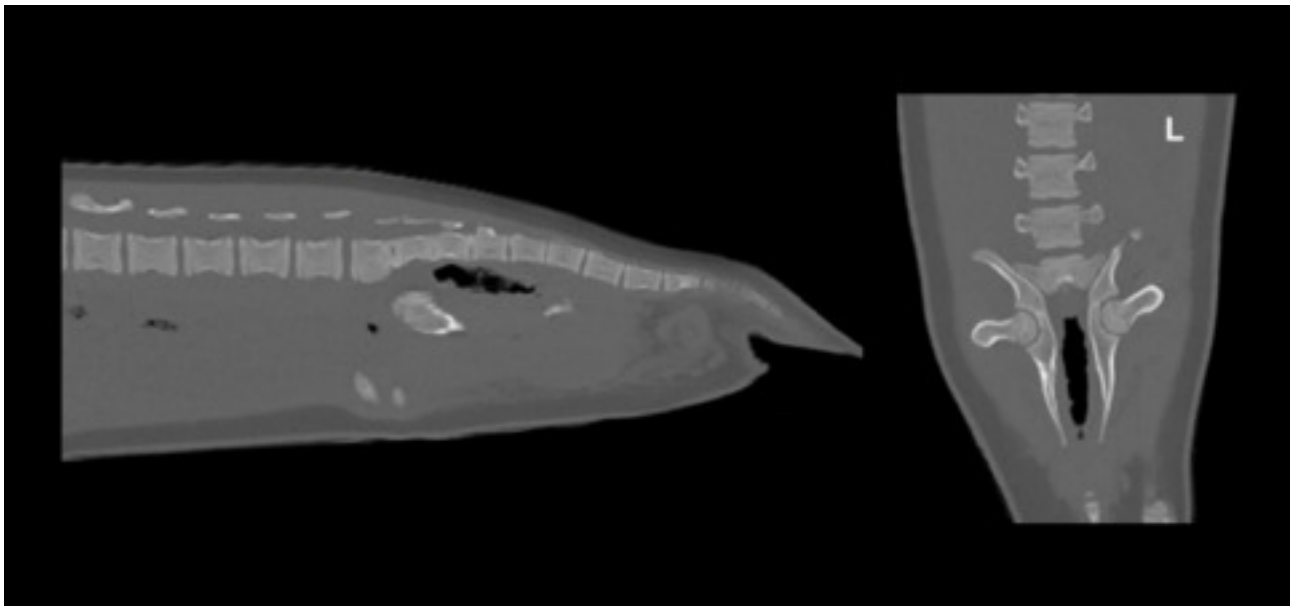
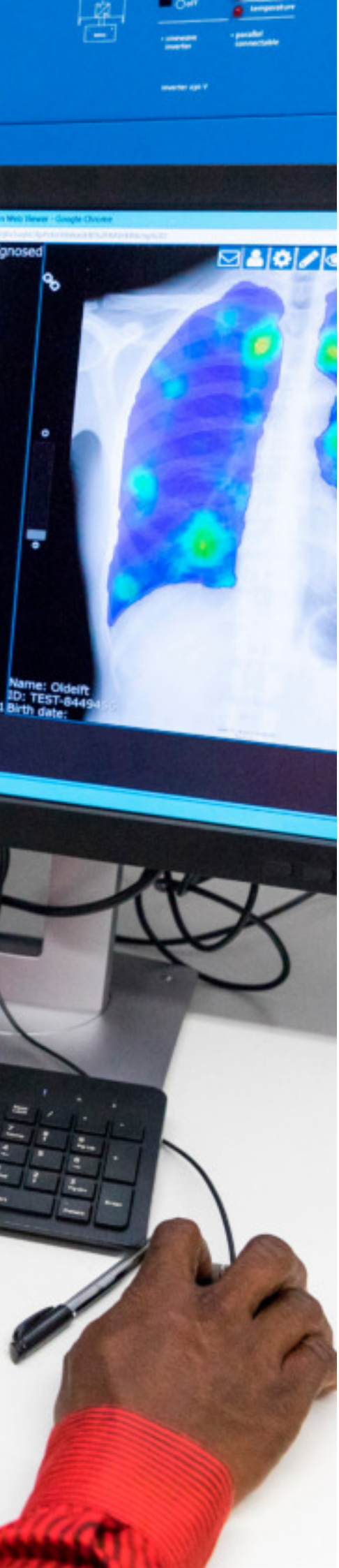


Figure 3: No abnormalities were seen in either view of the bone filter reconstructions of the spine and pelvis in Elvis.


Total abnormality score: 14



Tackling Tuberculosis in Ghana

By combining ultra-portable X-ray systems and innovative AI software, Canon Medical subsidiary, Oldelft Benelux, and leading solutions provider, Delft Imaging, have created a health system strengthening program in Ghana, Africa, to screen for tuberculosis.

Tuberculosis (TB) is a highly infectious bacterial disease that most often affects the lungs. It spreads through the air when infected people cough, sneeze or spit. It is the 13th leading cause of death and the second leading infectious killer after COVID-19 globally. In 2021, an estimated 10.6 million people contracted TB worldwide[1]. While it can be fatal if untreated, TB can be prevented and cured. The World Health Organization (WHO) and other global health bodies are striving to eradicate the disease by 2030. Early detection of TB improves treatment outcomes and prevents the spread of the disease. Chest X-ray is one of the most effective screening methods for TB, but in developing countries such as Ghana, with minimal resources and often challenging access to the large and ever-increasing population, this has previously been difficult to implement.

Solutions for screening

To tackle this issue, Delft Imaging developed an AI-based software, called CAD4TB (Computer-Aided Detection for Tuberculosis) to operate on the Easy DR mobile X-ray system.

"At the moment, the population of Africa is 1.2 billion people. It will be 2.4 billion people in 2050. And it will be four billion people at the end of the century," said Guido Geerts, CEO of Delft Imaging.

"As well as being large, Africa's population is extremely young and they don't have many highly skilled healthcare workers at the moment. So, how do you solve that? We believe that the combination of hardware and AI will be the solution for a lot of healthcare issues in Africa."

"Delft Imaging's main activity is screening for TB. Our biggest innovation is in using Artificial Intelligence to recognize TB on an X-ray with a software solution called CAD4TB," he continued. "We have invested more than 10 years in its development. With the first prototype introduced in 2012, we are now recognized by the World Health Organization (WHO) as not only the inventor, but they have endorsed our AI as the way to go forward for screening of TB."

EasyDR was our X-ray solution," he said. "We deliberately chose EasyDR because it's a multifunctional system. It's perfect to use for screening tuberculosis, but you can also use it as a multifunctional system. We can turn it to do abdominal, extremities and all kind of other issues. It has potential as a health system strengthening program. In a lot of the African countries there are too few X-ray systems. With the X-ray in place for TB screening, it could potentially be used for exploring other conditions."

Screening for TB has previously always involved an X-ray and a doctor. Now it has become X-ray and AI.

"This shows the impact," he added. "All the years that we invested in CAD4TB, we simply believed in this product and that it should become available. We focused on Tuberculosis and eradicating this before 2030. That is also the WHO's aim, and we are trying to support that."

Ghana 1

Ghana 1 is a government-to-government project between the Dutch Government and Ghanian Government that has enabled the screening to be implemented in Ghana. To date 52 'screening units' – containers equipped with an EasyDR running CAD4TB – have been successfully installed in the country.

"Preparations for the project began in 2010 and we were able to start with the project in 2016," said Guido. "You have to plan for years ahead to be effective in an environment that is very complex and difficult. And you have to be extremely flexible and, in your planning, and how you execute the plan. I think that's the biggest challenge. I think this is only possible for a certain size of company."

CAD4TB automatically analyses the images from the X-ray with the aim to make the screening process as simple as possible.

"We installed approximately 52 X-rays all over Ghana in containers with solar panels in areas where they didn't have any X-ray at all. We could screen for tuberculosis but also all kinds of other diseases. The Royal Institute for Tropical Diseases (Katholieke Instituut voor de Tropen (KIT) in Dutch – the Royal Institute for Tropical Diseases in English) here, in The Netherlands analyzed the project and there was definitely an impact on reduction of TB cases at the start of the program." said Guido.

"Unfortunately during the COVID-19 pandemic the program stood still for two years and a lot of the benefits of the TB screening that we began with were lost. However, what they found out, which was for them also remarkable, is that it was not only a TB project, but very much a health system strengthening project. Within three months we taught the CAD4TB AI solution to recognize COVID-19 as well and installed this for free to provide support during the pandemic. The KIT were very positive about the end result and we are now fully up to speed again with the screening program. So, we are talking about a potential second project, Ghana 2, with the Ghanian Government again."

"Our solutions not only support TB & COVID-19 response, but also support resilient and sustainable systems for health (RSSH). Additionally,

"The Easy DR is integrated into the container with solar panels and the CAD4TB box with its main purpose to provide a solution which in all circumstances is adapted to the country its specific needs. With this we aim to provide a sustainable impact on United Nations' TB reduction targets."

Luc Wijnhoven, Managing Director – Oldelft Benelux (Oldelft Benelux is a subsidiary of Canon Medical Systems Europe specialized in diagnostic x-ray solutions).

they contribute towards achieving universal health coverage (UHC)." – Impact Analysis 2022.

Screening in remote villages

Together with Oldelft Benelux, Delft Imaging have also developed a solution to enable TB screening smaller, more remote villages with difficult access.

"Delft Light is a backpack X-ray. It's a very small machine with Canon detectors inside," explained Guido. "Everything is carried on your back. So you can go by scooter or by canoe if it's near a river to the village and you can completely screen the whole population and then go back to the city to analyze the results. That's something that wasn't possible with the EasyDR as its stationary and quite big but now we have other solutions like Delft Light so you simply carry it on your back."

Maintenance plan

One of the longer-term issues in the project was to address maintenance and service.

"Whatever you deliver, it is essential that it is easy to maintain, stable, and easy-to-use," said Guido. "The EasyDR is an extremely robust system that was developed with the main objectives of being simple but high quality. The first EasyDRs delivered around 15 years ago are still functioning. That is what we did with all the solutions that we are delivering. Easy to maintain, very high quality, but not too complex, if it isn't necessary, and where possible, we add AI."

"Before we started, there was no maintenance or service infrastructure for the X-ray systems in Ghana. So, from the very beginning, we included this and after many years all the systems are still perfectly up and running," he also remarked. "Initially, all the installations were carried out by Oldelft Benelux. Then gradually, we started developing a local organization with local people who could take over the support. We now have a team of 30 people in Ghana. Our Ghanian colleagues are now trained on the EasyDR, but in one or two years the local Ghanian health service will take over the maintenance."

A great deal of flexibility and practical entrepreneurship is required to be effective under these conditions,

"That's exactly what the staff of Oldelft Benelux provide," said Guido. "They are used to the fact that every situation is different and have a certain mindset and skill set that enables them to succeed and remain extremely positive. For Ghana 2, we will also collaborate with Oldelft Benelux."

"We are delighted that our solution has been able to ease the situation for district hospitals, provide some stability to existing systems by dealing with the screening in small villages, spread resources, and take pressure off the doctors that are there."

Guido Geerts, CEO of Delft Imaging, the Netherlands.

Dynamic potential

With the EasyDR in a truck, it is possible to move around the field a bit with a complete clinic in one truck creating possibilities for other roles in healthcare.

"We have also in Ghana and other countries, complete trucks with EasyDR inside as well as a small lab, so we could screen on multi diseases," said Guido. "We often screen for HIV AIDS, but there are a lot of other possibilities. That is what we are trying to stimulate. It goes slowly, but it is possible."

Making healthcare a work of art

As they are, the containers used for screening are somewhat ugly and resemble sea containers. Delft Imaging organized an art project around the project to improve their appearance and improve the perception of screening within local populations.

"Some people have a stigma about TB screening, were scared of the containers and did not want to go inside," said Guido. "So, we came up with the idea to invite local artists to paint the containers. There are 50 containers that are completely painted by local artists.

We funded the artists and paint, and we made a small booklet showcasing all the different containers that are painted with promotion of the local artist, It's a perfect art project. It is so beautiful."

Ghana 2

With the Royal Tropical Institute positive about the health system strengthening of the project, Delft Imaging is already planning a second version of the scheme, Ghana 2, with an even wider reach.

"We are delighted that our solution has been able to ease the situation for district hospitals, provide some stability to existing systems by dealing with the screening in small villages, spread resources, and take pressure off the doctors that are there," remarked Guido. "Africa is still very remote in places in every area, because the continent is so extremely huge and it's difficult to keep up with the pace of the population growth. Africa continues to require a huge amount of investment in care." //

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[1] https://www.who.int/news-room/fact-sheets/detail/tuberculosis

Partners in innovation

Oldelft Benelux

Oldelft Benelux is a Systems Integrator and Service Provider specialized in the installation, commissioning, and maintenance of analog and digital medical equipment and innovative Healthcare ICT systems in hospitals and care centers. Oldelft Benelux BV is a subsidiary of Canon Medical Systems Europe. Oldelft Benelux supports Delft Imaging with several TB screening projects such as the Ghana 1 project. As an organization they want to make an impact and create value for the healthcare of communities in developing countries. Oldelft Benelux together with Delft Imaging Systems want to create fully adapted solutions to specific needs.

Scan the code or click HERE to find out more.

Delft Imaging

Delft Imaging is a leading total solutions provider. It is the global leader in TB screenings with more than 1,200 installations in over 75 countries worldwide.

Scan the code or click HERE to find out more.

Delft Light - The Backpack X-ray

The Delft Light is an easy-to-set-up, portable X-ray system featuring Canon flat panel detectors that is packed in a backpack for easy transport by car, motorcycle, or boat. It is especially suited for tuberculosis screening projects at remote locations. The Delft Light is specifically designed for use in areas with high ambient temperatures and elevated humidity.

Scan the code or click HERE to find out more.

Easy DR

The Easy DR system combines the advantages of a compact, easy to install system with proven Canon digital imaging technology. This extremely robust system can be installed in a mobile vehicle or in container which can be a major benefit for field deployable requirements. The versatile Easy DR is ideal for chest imaging but also suited for general radiography.

Canon Flat Panel Detectors have been well-proven for many years and are renowned for their quality and reliability in both mainstream and in highly challenging environments. Canon FPD's provide extremely high-resolution images, require very low patient X-ray dose and provide a long operational life.

Easy DR uses Canon's intuitive 'CXDI-NE' Graphical User Interface (GUI) which is common to all DelftDI digital radiography modalities. This commonality of Canon GUI across the DR product range is a major advantage when it comes to speed of operator training and user familiarity and convenience. The configuration options ensure a GUI that is right for you; comprehensive image processing choices guarantee optimized image quality every time and the industry standard DICOM interface ensures multi-vendor and cross-platform connectivity in any situation.

Scan the code or click HERE to find out more.

CAD4TB: Computer-Aided Detection for Tuberculosis

CAD4TB is a Class IIb medical software which quickly analyses a digital chest X-ray image and gives an indication if the subject on the image has abnormalities that may be related to pulmonary TB. The software has been trained in the detection of TB-related abnormalities by applying deep learning. CAD4TB has also received expert feedback from lung specialists, making it extremely accurate and reliable.

Scan the code or click HERE to find out more.


CHARITÉ

VISIONS spoke with Viktoria Wieske, Radiologist from the DISCHARGE Trial Coordination Center at the Charité University Hospital, Berlin, Germany.

CT of the Heart and Cardiac Catheterization are Equivalent in Non-Obstructive CAD

Coronary artery disease (CAD) is one of the most common heart diseases. More than 3.5 million cardiac catheterizations are performed in Europe every year, of which more than half are not followed by treatment.

The main findings of the European Commission-funded DISCHARGE Trial – a collaborative multinational research project, were published recently in the New England Journal of Medicine. They show that non-invasive computed tomography (CT) of the heart is a reliable, non-invasive method for diagnosing or excluding CAD.

Canon Medical interviewed Viktoria Wieske, Radiologist at the Coordination Center of the study, within the Charité University Hospital, Berlin, Germany. She has played an important role in the study, along with Professor Marc Dewey, Deputy Director of the Radiology Clinic at the Hospital, who led the study. A total of 3,561 patients from 26 clinical centers across 16 European countries were enrolled in the trial. All patients presented with an indication for a cardiac catheterization based on the presence of chest pain. Another key inclusion criterion was the presence of a medium pre-test probability (10-60%) for a CAD.

How did the study go?

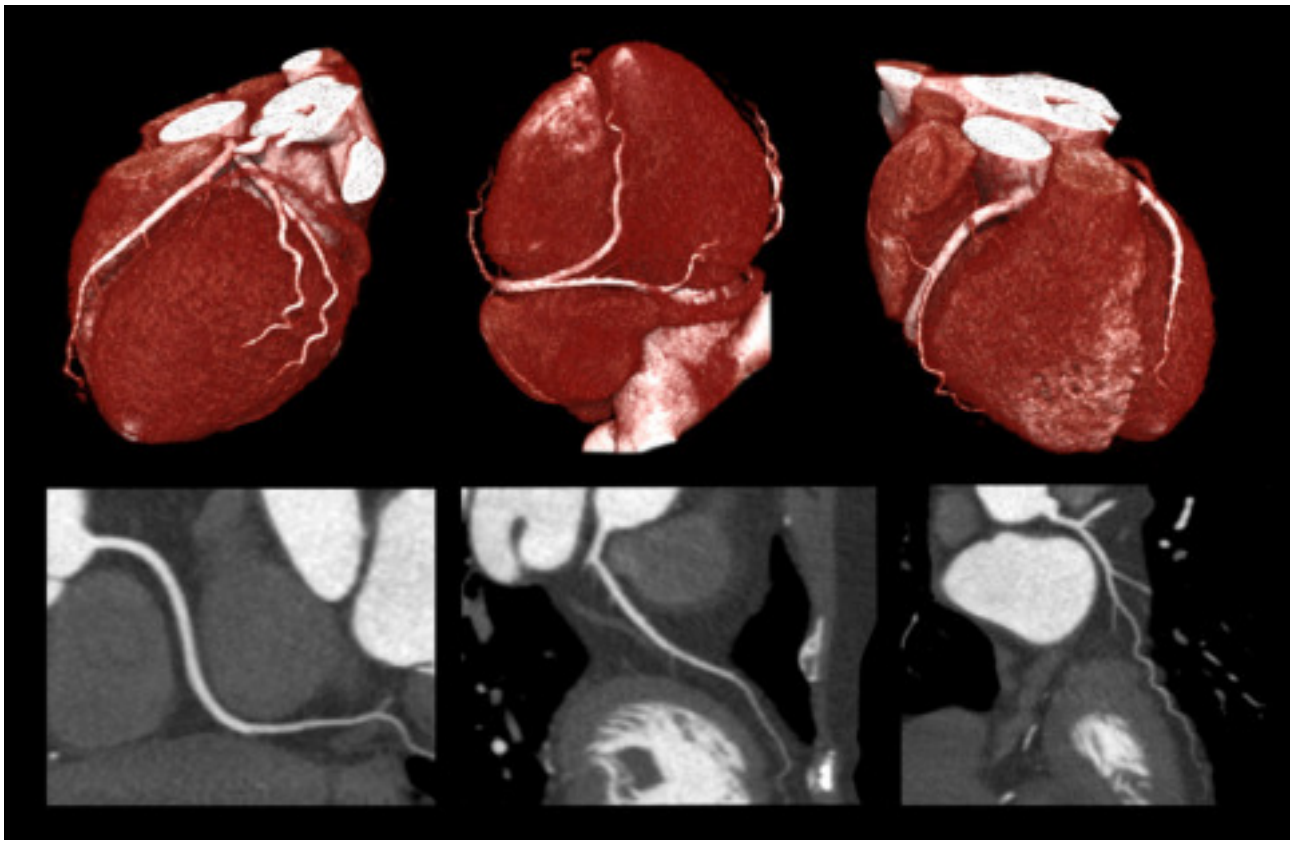
Both recruitment and the CT examination were carried out in an interdisciplinary collaboration between radiologists and cardiologists. The requirement was that representative physicians from both departments were involved. In our coordination center, the patients came partly via the outpatient center. Some were patients that received clinical treatment here. They were then randomized into one of two groups - CT or Cardiac catheterization. The patients then randomly received either a CT scan or a Cardiac catheterization.

CT is a safe alternative to cardiac catheterization for patients suspected of having CAD. The main clinical questions were specifically: "What are the long-term clinical outcomes after 3.5 years?" And "Are there differences in the CT group compared to the cardiac catheterization group?" So far, it has been unclear what the long-term clinical results are for patients with suspected CAD, if the initial diagnosis is made with CT instead of cardiac catheterization.

The results clearly show: Severe cardiovascular events (defined as heart attacks, strokes or deaths from cardiovascular diseases) occurred in 2.1% of the patients in the CT group and in 3.0% of the patients in the cardiac catheterization group during the study period. There were no statistically significant differences in the major cardiovascular endpoints between the two groups. Another important finding was that the frequency of serious procedure-related complications was lower in the initial treatment after the CT (0.5%) than in patients who underwent cardiac catheterization (1.9%).

How was the study coordinated between 26 European centers across 16 countries?

That was indeed a challenge. Just preparing the study and setting it up in the centers took years. With the help of a very structured procedure, we brought all the centers up to date. With the development of standardized, pragmatic guidelines for action, a common guideline was established in all centers and served as a universal quality standard. It wasn't easy, because, for example, we are still a long way from comprehensive CT care everywhere. In addition, the local standards based on the European guidelines for stable chest pain differ from country to country and, thus, the diagnostic procedures in the clinics. So, we defined clear requirements that all centers have fulfilled. For example, there had to be CT experts trained by us in every site. Among other things, at the beginning of the study, a cardiac CT workshop took place here in Berlin at the Charité Hospital, in which at least two colleagues from each center took part. We held regular cross-center discussions on the phone and via video. So, before the study started, we



Example of a Low dose 80 kV CT scan of the heart from a 68-year-old patient with recurrent angina pectoris under stress. Exclusion of obstructive CAD

were all on the same page in terms of recruitment, diagnostics, technique, and structure for collecting data. This is a very important prerequisite for the meaningfulness of the study results.

What international attention is the study attracting?

There are numerous diagnostic studies on CT. Notable previous randomized studies are the Scottish SCOT-HEART study (Scottish Computed Tomography of the HEART) and the US PROMISE study (Prospective Multicenter Imaging Study for Evaluation of Chest Pain). In principle, however, many national- and international experts have been waiting for these results, as this study is the most important randomized building block to demonstrate that there are no differences between CT and cardiac cathterization in the major cardiovascular endpoints over a long follow-up period in patients with stable chest pain and an intermediate pretest probability for the presence of CAD.

"The radiation exposure is comparably low with new CT systems as with diagnostic catheterization."

Viktoria Wieske, Radiologist, Charité University Hospital, Berlin, Germany.

How could the study results change clinical workflow?

If CT becomes recognized as an appropriate procedure [for diagnosis or exclusion of CAD], and is covered nationwide by health insurance, demand will increase significantly. A future challenge will be to provide sufficient infrastructure, so that all patients in Germany who benefit from a CT can also receive it from excellently trained staff. It is noteworthy that the German Radiological Society has already trained more than 1,000 certified cardiovascular radiologists.

Another aspect, which is also extremely important to us radiologists: There must be a corresponding indication. The goal should always be to select the patients accordingly. The primary aim of CT diagnostics is to filter out CAD patients, who do not need revascularization, but whose symptoms of chest pain can, for example, be treated well with medication.

The radiation exposure is comparably low with the new CT systems, as with diagnostic Cardiac catheterization. The argument from earlier times that a CT examination per se always involves more X-ray radiation definitely no longer applies to the new devices.

What do patients gain from the DISCHARGE study?

The findings of the study bring several advantages for the patients. If the results contribute to CT of the heart is being fully covered by health insurance, the ideal, gentle, non-invasive diagnostic method for excluding CAD would be available for everyone by use of CT. The examination is carried out on an outpatient basis. It only takes a short preparation for premedication and education. After the examination, people go home, just like after a normal doctor's appointment.

What CT systems do you use?

For the study, we worked here at the Berlin Coordination Center with the volume CT Aquilion ONE from Canon Medical. Of course, you can also do diagnostic heart CT angiographies on the 64-row system. With the 320-row, however, we have the best opportunity in terms of technical requirements to respond to all patients with the most diverse individual characteristics. With the Aquilion ONE we can perform all CTs well and get excellent diagnostic images, even with difficult heart rates under certain conditions. The coronary arteries, for example, can be visualized very well even in very obese patients. In addition, dense calcifications can also be assessed with the reconstruction possibilities of the Aquilion ONE.

Will this CT procedure be reimbursed by health insurance soon?

Under the new European guideline from 2019/20, it is already firmly anchored as a possible initial non-invasive imaging. In Germany, we still lack full approval for reimbursement in every case. In individual cases and individual case reviews, remuneration is possible with prior approval, but these are exceptions. The Joint Federal Committee is currently examining the inclusion of the procedure in standard care.

What is your vision for CT?

If CT is included in standard care, an increased examination volume is to be expected. A uniform indication for an adequate treatment is also decisive for this procedure, incorporation of the procedure into the diagnostic workflow of CAD in patients with stable chest pain, and a medium pre-test probability of the presence of CAD, as well as the use of radiological expertise for the quick and reliable evaluation of the examinations. //

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Urological Prevention in Professional Football

Together with the Charité Universitätsmedizin Berlin (Radiology and Urology Departments) in Germany, Canon Medical Systems supported the testicular cancer screening of 1. FC Union Berlin, with a high-end ultrasound device, directly at their Alte Försterei training grounds in Berlin Köpenick.

Prevention of testicular cancer
Within the last few months, the German premier league, the Bundesliga has been shaken awake by the number of testicular cancer diagnoses that have been reported in the media.

Cancer often affects young men. Between the ages of 20 and 44, a germ cell tumor of the testicles is the most common malignant tumor disease, accounting for around 25% (Bertz et al. 2017). Especially in industrialized countries, including Germany, the incidence has increased over the long-term and is currently 10/100,000 men. Although germ cell tumors of the testicles are considered to be a tumor disease with a high probability of survival.

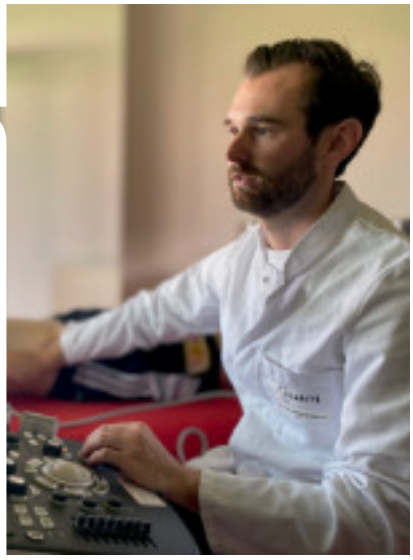
An early diagnosis is crucial for an adequate and early therapy and thus the prevention of distant metastases. The disease can be detected early with simple precautionary measures and can therefore be treated.

According to guidelines, 'self-examination', i.e. regular palpation at intervals of several months, is recommended for testicular cancer. A uroradiological consultation should take place immediately if something is palpated, or if the findings are generally uncertain. According to the current guideline, general screening for the presence of a germ cell tumor should not be carried out. This is justified by the fact that, in addition to the considerable effort, there are also possible disadvantages such as false positive results, the creation of fears and possible complications from diagnostic test procedures.[1]

Ultimately, discussions remain open, even outside of the guideline committees, because, as is so often the case, it is difficult to weigh up the advantages and disadvantages against each other.

"The assessment of detailed structures with high spatial resolution and the combined use of new applications from the Aplio i-series, especially SMI and Shear Wave Elastography, set new standards in testicular sonography."

Dr. Markus Lerchbaumer, Department of Radiology.



Urological prevention right at the stadium

The few studies describing a connection between high-intensity sporting activity (i.e. professional sports, such as football) and the occurrence of testicular cancer showed highly variable and sometimes contradictory results (e.g. Huang et al. 2018). However, the most recent cases in the German Bundesliga sharpened awareness of the necessity and importance of preventive medical check-ups in a generally younger population. For this reason, under the direction of the first team doctor, Dr. Clemens Gwinner (Senior Consultant, Centre for Musculoskeletal Surgery, Charité Campus Mitte), a preventive care day directly the Alte Försterei stadium was organized. Players, staff members (trainer, physiotherapists etc.) and individual officials/supervisors were initially interviewed for medical history and clinically examined by Dr. Robert Peters. (Senior Consultant; Department of Urology). This was followed by a focused ultrasound examination of the kidneys, bladder, prostate and both testicles by Dr. Markus Lerchbaumer (Consultant at the Department of Radiology, Charité University Medical Center, Campus Mitte in Berlin, Germany). All examinations were carried out in constant consultation between the colleagues from the two disciplines.

"We know from clinical routine that the clarification by means of sonography after abnormal palpation findings is unfortunately often a bit late."

Dr. Markus Lerchbaumer, Department of Radiology.

"The close cooperation between the two disciplines, which has existed for years, and the associated expertise in this field, is one of the great strengths of the Charité," said Dr. Lerchbaumer.

Testicular sonography: The imaging of choice

Sonography allows rapid and non-invasive diagnosis of inflammatory, tumorous or traumatic diseases of the testicles. The frequency spectrum of modern, broadband linear probes is now between 7 and 24 (up to 33) MHz. Testicular sonography is the imaging method of choice when abnormal palpation or (asymmetric) swelling is discovered. The high spatial resolution of new linear probes significantly improves both the detection and characterization of testicular tumors. The depiction of blood flow is considered the most important parameter in the clarification of testicular tumors, which are usually associated with increased vascularization. In recent years, multiparametric ultrasound (mpUS) has become established. This describes the combination of parameters from B-mode imaging with applications such as color-coded Doppler sonography (CCDS) and shear wave or strain elastography.

Conventional B-mode imaging and CCDS cannot confidently assess vascularization and vessel structure of smaller focal lesions. However, both parameters are groundbreaking in the diagnosis of testicular tumors.

Multiparametric Ultrasound: More than just colorful images

A high-end device Aplio i800 with 18 and 24 MHz intelligent Dynamic Micro Slice (iDMS) matrix transducers was installed for the on-site sonographic examination.

1. FC Union Berlin football stadium "Alte Försterei"

The use of new high-frequency linear probes allows the safe detection of the smallest lesions. Important new applications in testicular sonography are Superb Micro-vascular Imaging (SMI) and shear wave elastography. SMI, as a highly sensitive Doppler method, allows the exact assessment of the vascularity of smaller testicular lesions, where classic CCDS reaches its physical limits. Also in the case of larger lesions, the combined evaluation of the vascular load (hyper- or hypovascularization) and the vascular pattern (chaotic vs. structured) can be used to adequately differentiate between primary and secondary testicular malignancies.

Small, intra-testicular masses in particular often pose a challenge. So-called "minor incidental findings" can now be evaluated with a high level of diagnostic accuracy, which minimizes false-positive findings and avoids unnecessary surgery. The use of SMI in particular has reduced the need for contrast-enhanced ultrasound (CEUS) in recent years.

At Charité, this method is mainly used in unclear cases, findings in Doppler sonography/SMI (e.g. in cases of so-called 'burnout tumors'), or to assess complications of inflammation (assessment of non-vital parts and abscesses).

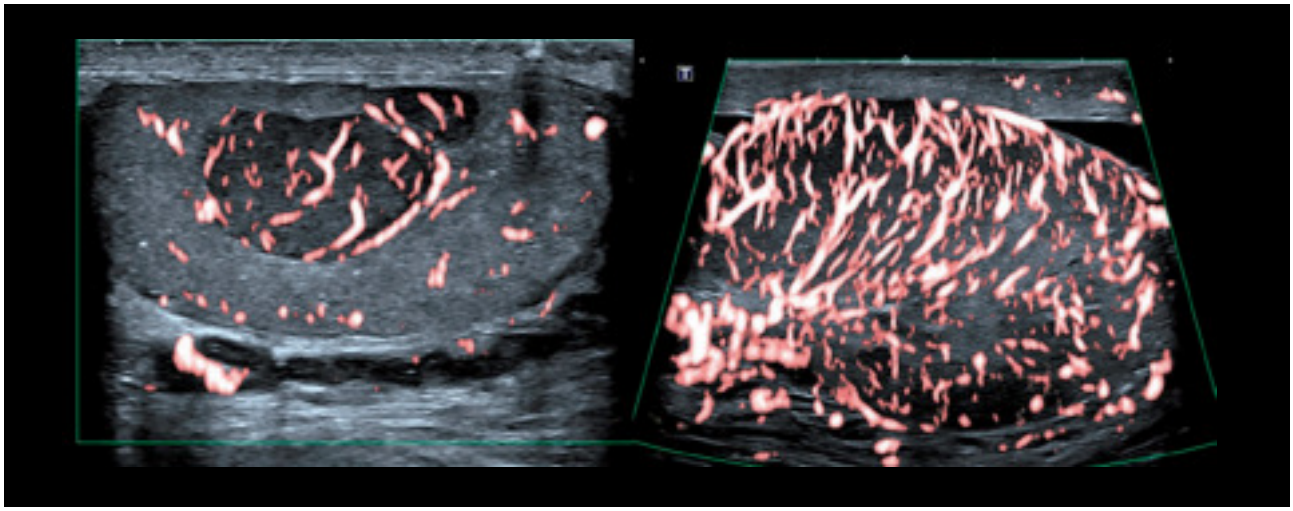


Figure 1: Superb Micro-vascular Imaging (SMI). Intratesticular seminoma (left) with hypervascularization and partly chaotic vessel pattern as well as different vessel calibers. Primary testicular lymphoma (right) with massive hypervascularization and a very orderly vascular pattern without nonvital tumor tissue.

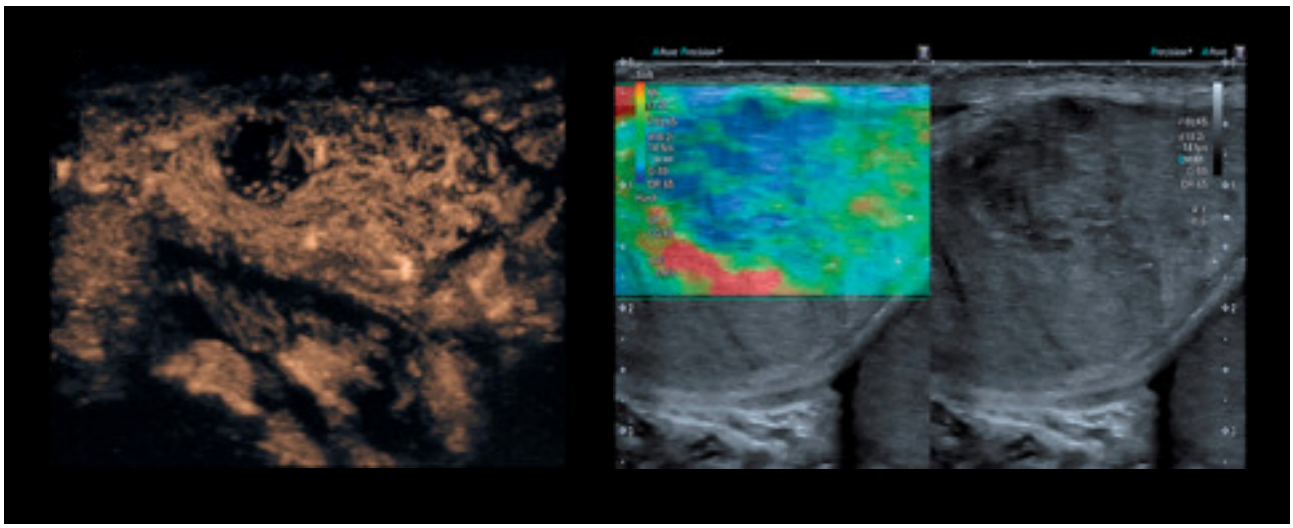


Figure 2: Contrast-Enhanced Utrasound (CEUS) and strain elastography. Burnout tumor with lack of perfusion and thus lack of contrast in the CEUS (left) and ill-defined germ cell tumor with clear hardening (color-coded as blue) compared to the testicular parenchyma in the strain elastography under dynamic compression (right).

Team doctor Clemens Gwinner was pleased with the willingness of the players to participate in the check:

"For several years, Charité has been providing medical care to 1. FC Union Berlin, not only on, but also off the field," he said. "I am pleased that we were able to carry out the urological check-up so intensively by my colleagues in cooperation with Canon Medical Systems and that it was accepted by the entire team." //

"So far there is no 'official' recommendation for preventive health care for young men (except for skin cancer screening from the age of 35). Rapid clarification of an abnormal palpation finding is important."

Dr. Robert Peters, Senior Consultant; Department of Urology.

Dr. Markus Lerchbaumer (MD)

Dr. Lerchbaumer is a Consultant Radiologist at the Department of Radiology, Charité - Universitätsmedizin Campus Mitte in Berlin, Germany. He is the Research and Teaching Coordinator of the Interdisciplinary Ultrasound Center at Charité. Dr. Lerchbaumer specializes in diagnostic and interventional ultrasound, as well as urogenital and and musculoskeletal imaging.

The medical team involved in urological care at Union Berlin: Dr. Clemens Gwinner, Dr. Markus Lerchbaumer and Dr. Robert Peters (left to right).

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Cardiac CT with Precise IQ Engine (PIQE) 1024 Matrix in Clinical Practice

Dr. Marcus Chen, Prof. Mickaël Ohana, Dr. Fuminari Tatsugami

Cardiovascular disease is the leading cause of death worldwide[1]. Early diagnosis of cardiovascular disease is important for improved life expectancy and effective treatment planning. Cardiac CT Angiography (CCTA) is a non-invasive test to diagnose coronary artery disease (CAD). A multi-center international study has shown that cardiac CTA accurately identifies the presence and severity of obstructive coronary artery disease and subsequent revascularization in symptomatic patients[2].

Recently both the US and European guidelines for the diagnosis of patients with chest pain have been updated. In the European guidelines cardiac CTA is recommended to exclude acute coronary syndrome in patients with low to intermediate likelihood of CAD[3].

CAD-RADS categories

Score	Stenosis	Interpretation	Further investigation
0	0%	Absence of CAD	None
1	1-24%	Minimal non-obstructive CAD	None
2	25-49%	Mild non-obstructive CAD	None
3	50-69%	Moderate stenosis	Consider functional assessment
4A	70-99% single or 2-vessel	Severe stenosis	Consider ICA or functional assessment
4B	Left main >50% or 3-vessel ≥70%		ICA
5	100%	Total coronary occlusion	Consider ICA and viability assessment
CadRads N	Non-diagnostic study	Obstructive CAD cannot be excluded	Additional evaluation needed

Figure 1: CAD-RADS Scoring system for coronary CTA. From https://radiologyassistant.nl/cardiovascular/cad-rads/coronaryartery-disease-reporting-and-data-system

In the US guidelines cardiac CTA is recommended as a front-line test for the evaluation of patients with stable and acute chest pain who have no history of CAD[4]. In both guidelines cardiac CTA has a Class 1 Level A designation which is the strongest recommendation indicating high quality evidence from clinical trials that CTA is beneficial, useful and safe[3,4].

The Coronary Artery Disease Reporting and Data System (CAD-RADS) provides a standardized reporting framework for coronary CT angiography and was updated in 2022. The classification system provides an assessment of stenosis and plaque burden and a guide to possible next steps in patient management[5] (Figure 1).

Precise IQ Engine (PIQE) is a Super Resolution Deep Learning Reconstruction* that brings together extraordinary spatial resolution and reduced noise, within a single-rotation scan for confident diagnosis of small coronary vessels, plaques, stents and fine cardiac structures.

The PIQE Deep Learning Reconstruction algorithm is trained using Ultra-High Resolution data with twice the resolution of conventional CT acquired on the commercially available Aquilion Precision CT system, which features UHR 0.25 mm detectors in routine clinical practice. Datasets reconstructed with PIQE empower the clinician with twice the high contrast signal definition, as well as reduced noise, in all three

** In clinical practice, the use of PIQE may increase spatial resolution (super resolution), depending on the clinical task, patient size, anatomical location, and clinical practice.*

"PIQE's visual clarity with reduced image noise and definition of fine cardiac anatomic structures improves the time spent evaluating especially challenging CTA examinations."

Dr. Marcus Chen, National Heart, Lung & Blood Institute National Institutes of Health, USA.

dimensions, relative to conventional hybrid iterative reconstruction. These benefits maintain low contrast detectability, without additional radiation dose to the patient[6].

The extraordinary spatial resolution of PIQE images reconstructed with 1024 matrix is also beneficial in other cardiac applications including Transaortic Valve replacement (TAVR) planning and follow up examinations where the valve leaflets are seen in excellent detail. In cases with mechanical valves, PIQE provides superior detail of the valve compared to other reconstructions.

PIQE 1024 Matrix training principles

The PIQE reconstruction algorithm features a next generation, three-dimensional neural network trained to identify and preserve signal features, both in-plane and longitudinally, throughout the cardiac volume dataset. Trained on high quality cardiac cases acquired on clinically operating Aquilion Precision systems, PIQE optimizes spatial resolution for clinically relevant tasks and realistic field-of-views. PIQE's three-dimensional learning also helps ensure continuity of small, longitudinally running vessels, which are often obscured by conventional reconstruction algorithms[6].

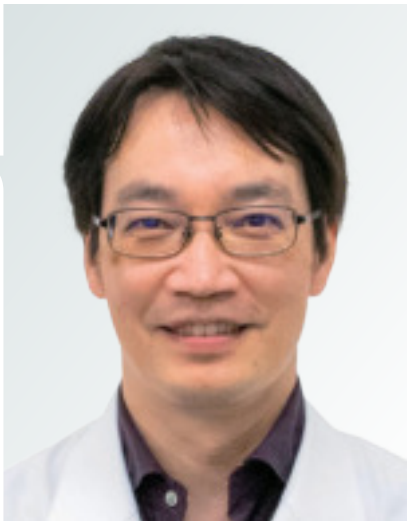
The training cases are acquired with the Aquilion Precision's Super High Resolution (SHR) mode that yields 0.15 mm anatomical detail. The SHR data is reconstructed with AiCE DLR which implicitly contains all the advanced models of MBIR. In addition to UHR mode, the Aquilion Precision also has Normal Resolution (NR) mode that combines detector channels to generate conventional resolution images in-plane and 0.5 mm nominal slice width equivalent to Aquilion ONE / PRISM Edition and Aquilion ONE / INSIGHT Edition. Raw data acquired in UHR mode can be reconstructed through a down-sampling algorithm to yield simulated Normal Resolution images, that have been demonstrated to be equivalent to true Normal Resolution images[1].

"Having the ability to achieve Ultra-High Resolution CT images from our routine cardiac CTA examinations is really where AI delivers."

Prof. Mickaël Ohana, Nouvel Hopital Civil, Strasbourg University Hospital, France.

"PIQE is considered a groundbreaking technology that should be widely implemented across various areas of the body."

Dr. Fuminari Tatsugami, Hiroshima University, Japan.



With this approach, both UHR and NR images can be produced from a single acquisition. As a result, pairs of UHR and simulated NR images have perfect spatial alignment, ideal for training a neural network. Simulated NR images are input to the neutral network and the corresponding UHR images are used as the gold standard target images. The neural network learns to maximize the inherent resolution possible with NR images and even enhance resolution further, while decreasing noise[6] (Figure 2).

The neural network behind PIQE does not learn features solely in the axial plane but rather in three dimensions, meaning signal features are identified and preserved in all three planes. This makes PIQE well-suited for cardiac exams, which are usually reviewed in MPR and curved planes[6].

PIQE reconstructions are available in both 512 and 1024 matrix, with 1024 matrix providing superior resolution with no loss of reconstruction speed.

The authors were all involved in the initial evaluation and optimization of PIQE 1024 in close collaboration with the engineers at Canon Medical and they have shared a selection of cases that highlight the clinical benefits of PIQE 1024 in cardiac CT.

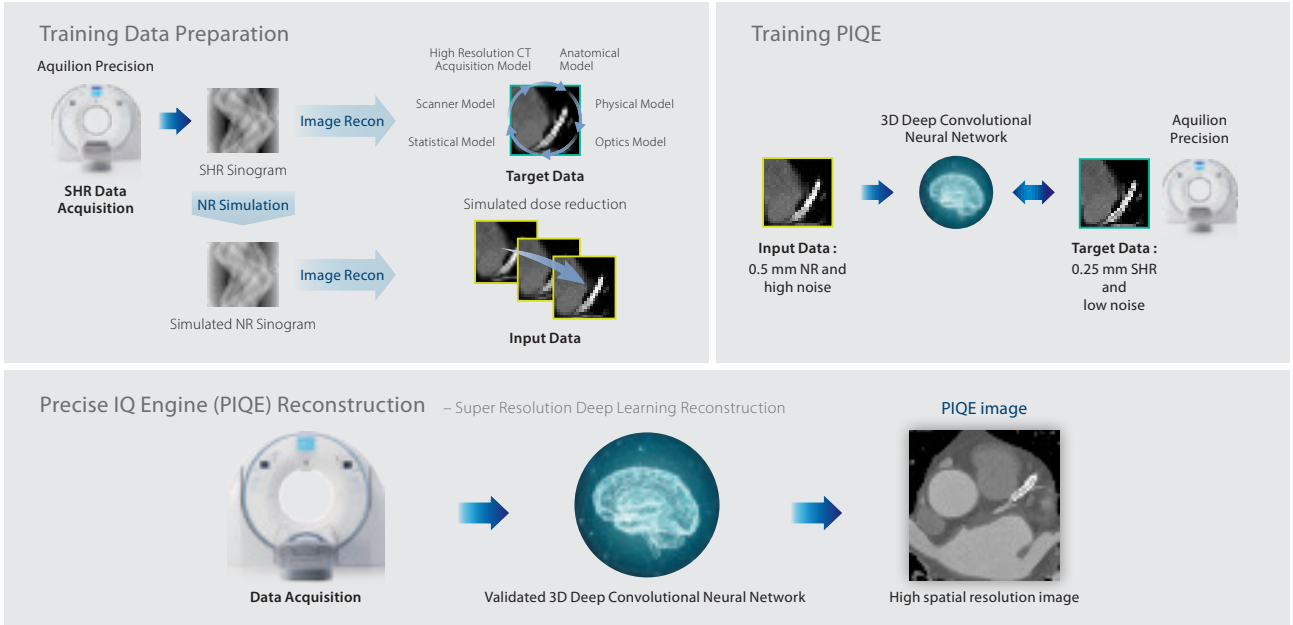


Figure 2: Training of PIQE network. Training data is prepared by down-sampling Precision UHR data. The network is trained using UHR data paired with down sampled, simulated NR data and actual UHR data. Once trained the network is validated and applied to the image reconstruction where it does not continue to learn.

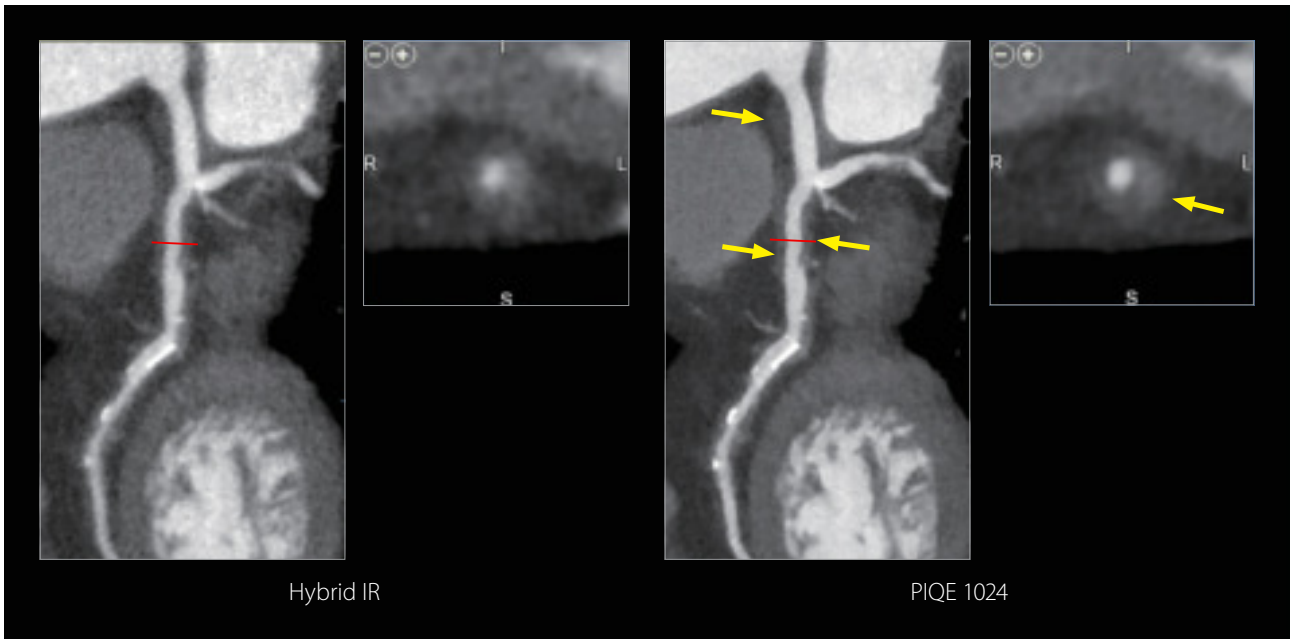
Case 1: Large Positive Remodeling of Plaque in LAD

Dr. Chen, National Institutes of Health, USA

Patient History

This 60-year-old man with BMI 31.3 was asymptomatic. A cardiac CTA was requested for screening for coronary artery disease.

Results



In the LAD, non-calcified plaque is seen concentrically around the vessel with significant positive remodeling resulting in minimal luminal narrowing. The plaque has an overall length of approximately 27 mm. The mid LAD has a calcified plaque causing mild (25-49%) stenosis followed by a second predominately non-calcified plaque region with positive remodeling resulting in minimal (<25%) luminal narrowing.

Clinical Benefit

The positive remodeling is an important plaque feature for the identification of vulnerable plaque. In this case, PIQE 1024 is a reliable technique to assess the extent of the positive remodeling.

Acquisition

Scan Parameters:	*One beat volume scan, exposure window 70-80%, 120 kV, SURE Exposure*
CTDI vol:	*14.5 mGy*
DLP:	*173.8 mGy·cm*
Effective Dose:	*2.43 mSv*

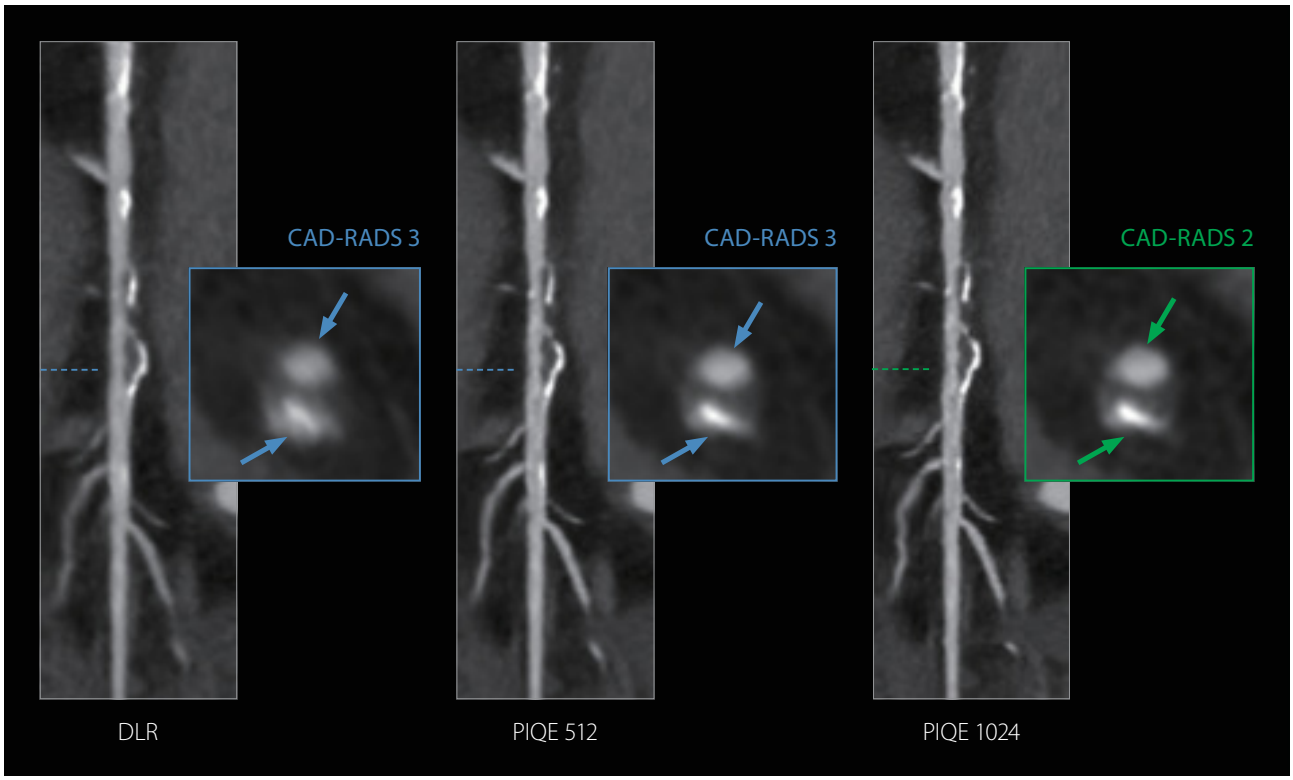
Case 2: Mixed plaque in the RCA

Dr. Tatsugami, Hiroshima University, Japan

Patient History

This 73-year-old woman presented with a history of myocardial infarction and a heart rate of 59 bpm. This patient had a chest lead V2-6 negative T wave appearance. The Calcium Score scan showed severe coronary artery calcification with an Agatston score of 954. A cardiac CTA was requested to evaluate the coronary arteries.

Results



With the normal resolution DLR and PIQE 512 images, this stenosis was graded as moderate with a CAD-RADs 3 score (50-69% stenosis). The visualization of the contours of the non-calcified plaque and the residual lumen were clearly improved with the PIQE 1024 image. In addition, the calcified component of this mixed plaque has sharper boundaries and better delineation in the PIQE 1024 cross-sectional images compared to other reconstructions. This stenosis grading was reduced in the PIQE 1024 reconstruction to a mild stenosis with a CAD-RADs 2 score (25-49% stenosis).

Clinical Benefit

In this case, the increased resolution of PIQE 1024 improves the accuracy of CAD-RADs scorings.

Acquisition

Scan Parameters:	*Full beat volume scan, 120 kV, SURE Exposure*
CTDI vol:	*12.2 mGy*
DLP:	*195.5 mGy·cm*
Effective Dose:	*2.7 mSv*

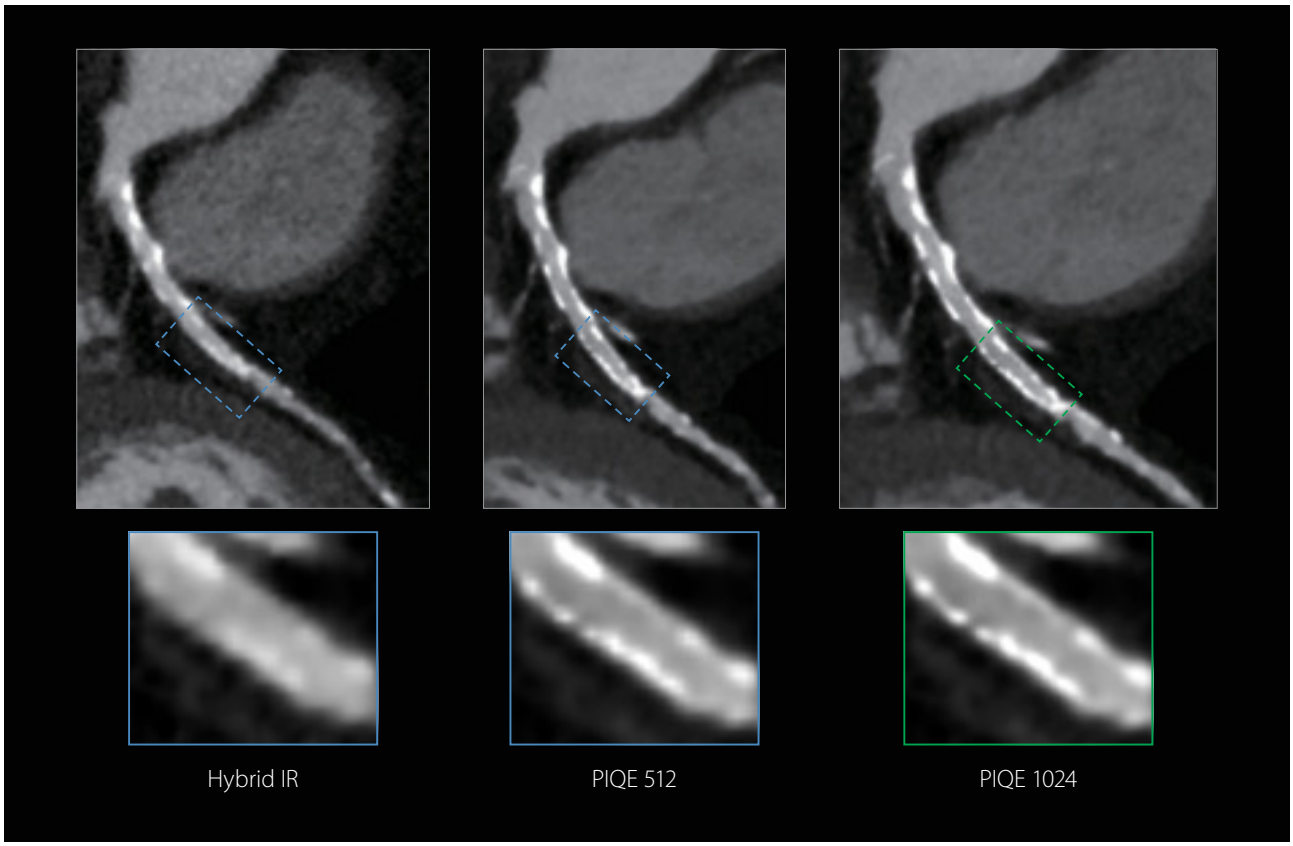
Case 3: LAD calcified plaque with high calcium score

Prof. Ohana, Strasbourg University Hospital, France

Patient History

This 82-year-old patient with a prior diagnosis of COVID-19 underwent a chest CT scan which demonstrated severe coronary calcifications. The patient was referred to the cardiologist who requested a calcium score and a coronary CTA scan due to non-specific ECG changes. The patient's heart rate was 70 bpm at the time of scan.

Results



The calcium score scan showed extensive coronary artery disease (CAD) with an Agatston score of 2118. In the CCTA scan, the Left Main coronary artery (LM) and the proximal and mid-segments of the Left Anterior Descending artery (LAD) show significant wall calcifications with 25-49% stenosis in all these segments.

Clinical Benefit

PIQE 1024 provides better depiction of the vessel lumen which is sharper and less noisy compared to other reconstructions. In this patient, the increased spatial resolution resulted in less blooming artifacts, allowing a more confident assessment of the lumen patency even in the presence of circumferential calcified plaques.

Acquisition

Scan Parameters:	*One beat volume scan, exposure window 30-80%, 100 kV, SURE Exposure*
CTDI vol:	*11.1 mGy*
DLP:	*177.2 mGy·cm*
Effective Dose:	*2.48 mSv*

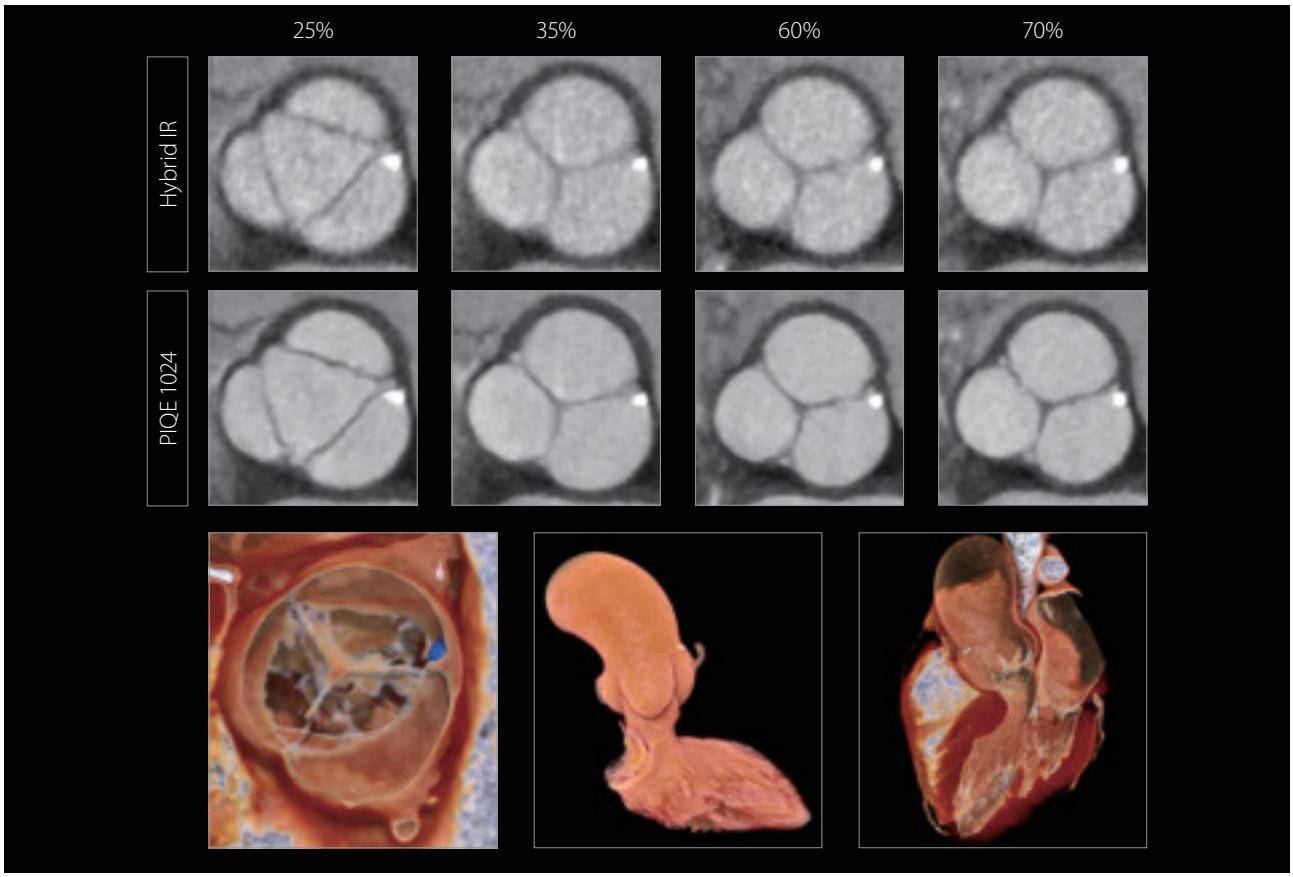
Case 4: High resolution 4D aortic valve evaluation

Prof. Ohana, Strasbourg University Hospital , France

Patient History

This 64-year-old man with a heart rate of 51 bpm and a history of cardiac disease, smoking, family history and an ascending aortic aneurysm, underwent screening for ischemic heart disease. A cardiac CTA was requested to evaluate coronary arteries and for the assessment of the ascending aortic aneurysm. The aortic valve was also evaluated.

Results



The clear delineation and sharpness of the aortic valve leaflets with PIQE 1024 outperforms the hybrid IR reconstruction. The opening and closing of the aortic valve leaflets can be clearly confirmed with the PIQE 1024 multiphase images. This tricuspid aortic valve shows calcification on the left cusp but without severe aortic stenosis.

Clinical Benefit

With its high spatial resolution, PIQE 1024 provides excellent delineation of the aortic valve leaflets. This can help to improve diagnostic accuracy for the aortic valve evaluation, which can be very beneficial in the planning of transcatheter aortic valve replacement (TAVR).

Acquisition

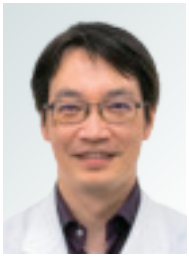
Scan Parameters:	*Full beat volume scan, 100 kV, SURE Exposure*
CTDI vol:	*22 mGy*
DLP:	*351.7 mGy·cm*
Effective Dose:	*4.9 mSv*

Conclusion

PIQE brings excellent spatial resolution and reduced noise within a single rotation cardiac scan while maintaining low contrast detectability and with no additional radiation dose to the patient. PIQE enables more accurate CADRADs scoring, improved visualization of non-calcified plaque, reduced blooming artifact from calcium and stents, improved evaluation of stent patency, excellent valve leaflet definition and accurate TAVR planning. //

Dr. Marcus Chen
National Heart, Lung & Blood Institute National Institutes of Health, USA.

Prof. Mickaël Ohana
Nouvel Hopital Civil, Strasbourg University Hospital, France.



Dr. Fuminari Tatsugami
Hiroshima University, Japan.

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VISIONS spoke with the University Institute of Radiology at the University Hospital of Salzburg (SALK), in Austria.

Diagnostic Comfort for Employees and Patients

Radiology technologists spend much of their work routine in an awkward posture and at the same time, are frequently required to move heavy weights. In order to reduce one-sided strain when lifting and repositioning, the University Institute of Radiology at the University Hospital of Salzburg (SALK), in Austria, purchased an X-ray solution that offers advantages for both employees and patients.

The Trauma DR Plus, a special digital X-ray solution for trauma and emergency rooms, has been in operation at the University Institute of Radiology at the University Hospital of Salzburg for almost a year. Prim (Priv-Doz) University Professor, Dr. Klaus Hergan, Head of the University Institute of Radiology at the University Hospital of Salzburg, and his team sum up the advantages: Patients can be maneuvered easily and quickly without having to be moved. A capability that is particularly important in critical trauma situations or cases of spinal injuries.

Making a free exposure with the Trauma DR Plus.

"The University Institute is equipped with all the modalities that are needed in the clinical environment. We have a particular focus on the areas of oncology, cardiology, orthopedics and traumatology," said Prof. Hergan. "In traumatology, the specialist clinic is the first point of contact for the care of newly- or repeatedly injured patients for the entire region. In the ortho-trauma area alone, around 54,000 patients are examined radiologically every year. This figure gives an indication of the range of additional tasks associated with the full department."

A particular challenge for Prof. Hergan currently is a lack of young talent, although SALK and the associated Paracelsus Medical Private University offer an exemplary training concept.

"We have a rotation system so that all doctors in training can also get to know radiology," explained Prof. Hergan.

With over 100 employees, including around 30 doctors, the Paracelsus Medical Private University also supplies training to other hospitals nearby Salzburg in Hallein, Tamsweg and St. Veit.

Ergonomics in focus

In view of the high physical strain on radiology employees, it is particularly important to the Head of Department that medical technology that meets their ergonomic requirements as closely as possible is purchased. The X-ray solution, Trauma DR Plus, meets these requirements and at the same time creates a high level of patient comfort. The system includes a U-arm, which enables the X-ray beam to be centered at all times on the image receptor, so that there is no misalignment. Equipped with a wireless portable Canon detector and built-in automatic exposure control, the device offers the highest possible image quality and provides accurate and repeatable images with the lowest X-ray dose.

The Trauma DR Plus is particularly suitable for the X-ray examination of trauma patients: they remain safely and stably positioned, while the only movement is from the X-ray tube holder above the head and the detector underneath, or to the side in lateral projections.

Operation is via a touch button. The screen display on the tube head provides direct access to examination information and exposure controls. While the Trauma DR Plus is manually operated, it also has an electric motor that supports vertical movement.

"The features of Trauma DR Plus were quick to learn and the support from Canon was impressive."

Prim. Univ. Prof. Dr. Klaus Hergan, head of the University Institute of Radiology at the University Hospital of Salzburg, Austria.

Ease of use with capacitive handle and tube touch screen.

"The image quality is excellent and the examinations are performed particularly quick," said Prof. Hergan. He described the advantages in everyday clinical practice, but was also convinced of the service and training provided by Canon Medical, as well as the company philosophy behind development.

"No technology works without people. Our radiology technologists had been used to a different device for many years, so it was important to me that the changeover caused as little stress as possible, which is already high in everyday working life. The features of Trauma DR Plus were quick to learn and the support from Canon was impressive," he said. "It makes diagnosis easier and reduces incorrect images, which is particularly helpful for trauma patients, but also for older patients who come in for a prosthetic check, for example."

"We prepared the installation of the device very well internally and the schedule was well adhered to on both sides. This is important so that the daily routine can continue," he emphasized. //

Feedback from the team
Herbert Hirscher and Lukas Nedwed, are Radiology Technologists at SALK, we asked them about their experiences:

What do you find most important?
Herbert Hirscher: Flexibility is our top priority. Things are often crowded in the trauma room because many specialist disciplines and nursing staff are working on the injured patient at the same time. There is often little space and no time to move things around, but at the same time you need usable images quickly. We also work alone on night shifts, so the U-bracket system that we were used to worked very well, so we didn't want to do without it.

Lukas Nedwed: The quick and easy handling of the devices is very important to us, especially that you can quickly switch to a lateral view when patients are lying down. Rapid image acquisition is also required.

How is Trauma DR Plus suited to the trauma department?
Herbert Hirscher: It is the only system on the market equipped with a measuring chamber, because of this feature it achieves optimal image quality. It also has an electric motor that supports vertical movement.

How does the Trauma DR Plus work in clinical routine?
Lukas Nedwed: We have both been working with this type of system for many years and there is no need to relearn the basics. Nevertheless, in just a few weeks we managed to become used to all the new controls. It certainly helped that we were entirely involved in the selection of the new X-ray solution and also considered together how we would place it when setting it up.

Are there any changes in the workflow?
Herbert Hirscher: The up and down movements were previously automated and are now purely electronic. This makes the process a little slower. However, this is made up by the software for selecting the examination and image post-processing.

Lukas Nedwed: There are more detectors available, which makes the imaging easier, for example when it comes to the upper arms or the pelvis. Switching between detectors is very quick. The new software can quickly perform background tasks.

How was your experience with installation and training?
Herbert Hirscher: Thanks to the excellent training, we can use the acquisition software to make and save a lot of settings ourselves, so we rarely need technical support.

Lukas Nedwed: The schedule for installation was met exactly.

Real-World Applications of AI

Early Clinical Experience in Acute Chest Pain CT, Cardiac CTA, and MR Body Imaging

Prof. Stefan M. Niehues, MD, MHBA, Prof. Mickaël Ohana, MD, PhD, Dr. Benoît Sauer, MD

Specialists across the world have welcomed Canon Medical's growing portfolio of Deep Learning Reconstruction (DLR) technologies into their daily practice. Three leading radiologists share their experiences on the performance of real-world applications already available via Canon Medical's Altivity.

Radiology is a key area for AI innovation. AI applications that are already available and in clinical use include image optimization through e.g. smart workflow automation, image reconstruction, automatic stroke detection, the detection of pulmonary embolism, aortic dissection in emergency situations, and more.

Canon Medical is at the forefront of developing AI-based healthcare solutions that deliver quicker and deeper clinical insights and support clinical decision-making. Launched in 2021, Altivity, Canon Medical's suite of cutting-edge AI technologies, supports more informed healthcare workflows and fast and tailored patient care. Our advanced AI-based systems have been developed together with some of the world's leading experts.

A fast response to emergencies

Professor Stefan Niehues, Radiologist, Deputy Director, and Senior Physician at the Campus Benjamin Franklin of Charité University Hospital, in Berlin, Germany, explained how Canon's AI applications perform in emergency CT settings.

"AI has merged into our routine clinical workflow. The typical application areas include stroke, pulmonary embolism, and aortic dissection - everything which is important to recognize very fast and to react on those findings," he remarked. "We started using Canon's Automation Platform for stroke and have extended it. It provides immediate assistance. You can use it to take a 'second look' or to improve confidence."

"In the conventional process of compiling a report, you start with the image acquisition and transfer it to some kind of IT technology. In post-processing, you may need to select or load further images, analyze them, save example images or screenshots, prepare them for a result, and then have the final result written and transferred to your other disciplines. It's quite a long process." he explained. "The Automation Platform really shortens this because the categorization, and prioritization of acquired images for post-processing are all performed automatically with a zero-click solution. After the scan and image transfer to the AI, you will get the final results for further interpretation without further ado, which will then reduce the burden of work, increase productivity and save time. Not only your time, but also the time for your patients until they get the final results."

The applications for the Automation Platform have broadened since its introduction.

"It started with a stroke solution with hemorrhage detection, the ASPECTS score, a fully automatic perfusion calculation and visualization, and large vessel occlusion detection, and now applications to detect pulmonary embolism (PE) and aortic dissection (AD) have been released," said Professor Niehues.

Automation Platform Pulmonary Embolism (CINA® PE)

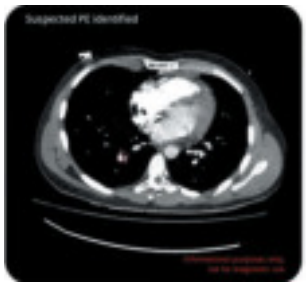
PE in particular is a common but sometimes fatal disease that can present with a wide range of symptoms from none at all up to sudden death. Many patients can have mild or no symptoms, but still need to be diagnosed and treated.

"A CT Angiogram with contrast is the modality of choice to detect PE, but automatic detection could provide the possibility of a triage, also flagging and communicating suspected or even absent findings in your PACS," said Professor Niehues. "The algorithm takes an average of 60 seconds to do this with a reported sensitivity and specificity of more than 91%."

a

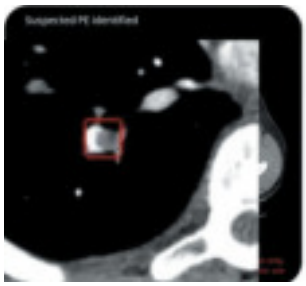
a. No findings suggestive of PE identified.

b



b. Suspected PE identified.

c



c. Zoomed image with red box around the finding*

**Red boxes are not displayed in the US version.*

Figure 1. Automation Platform Pulmonary Embolism (CINA® PE):
The Automation Platform Pulmonary Embolism has the possibility of a triage and notification of PE scans and flagging and communicating suspected or even absent findings in a PACS. In case of a suspected finding it will and show the key images of the findings. Marked in order for the radiologist to determine if immediate action is required.

Automation Platform Aortic Dissection (CINA® AD)

Aortic dissection is not common, and mostly presents as an acute condition in patients with catastrophic illness. However, early and accurate diagnosis and treatment is crucial for patient survival. CT is the most common modality of choice because of its widespread availability in emergency departments.

"The Automation Platform flags no findings of aortic dissection, or in the case of positive findings, it will indicate the presence and its location of the dissection. In the case of multiple dissections, it provides multiple key images so you can see the whole extent," said Prof. Niehues. "Again, here, the median processing time is a little over 34 seconds, so it's very, very fast. And there is an even greater sensitivity of 96% and a specificity of 97%. You can really rely on the results being presented by the Automation Platform."

Detecting these conditions is one thing, but presentations must be visible and understandable for physicians. "The Automation Platform has a web interface that highlights cases with positive findings. You have the opportunity to triage those patients, so you don't lose time to report on these. Some findings come with insights and results which will be or can be sent via email. And if you use push notification,even if you are not right in the emergency department, you get an email notification with the key images provided. So you do not lose any time for those patients with positive findings," explained Professor Niehues.

"It's a zero-click solution, so it just works on its own. The results will be within your PACS in a median of 60 seconds."

a

a. No findings suggestive of AD identified.

b

b. Suspected Type B AD identified

Figure 2. Automation Platform Aortic Dissection (CINA® AD):
The Automation Platform Aortic Dissection (CINA® AD) shows thumbnails in PACS which mention no findings of aortic dissection, or in case of positive findings it will show the key image with a red box to show the dissection. It will also classify the finding e.g. Type B aortic dissection.*

Combining the best of both worlds in Coronary CTA

Patients with coronary artery disease can benefit from use of Canon's Super-Resolution Deep Learning Reconstruction (SL-DLR) technique, PIQE. Professor Mickaël Ohana, Consultant Radiologist at the Strasbourg University Hospital in France, explained how it provides clinicians with the possibility for higher diagnostic confidence and clarity as compared to conventional image reconstruction approaches in visualizing small arteries, plaques, and fine cardiac structures, and has the potential to assist clinicians in coronary atherosclerosis patients' cardiovascular risk stratification.

"PIQE directly brings the potential advantages of Ultra High Resolution CT (UHR-CT) to conventional CT. It is about merging the best of both worlds," said Professor Ohana.

"Current research is focused on the advantages induced by very thin slice-thickness and increased matrix size. Mostly a sharper image quality, reduced artifacts, partial volume and blooming, and also an improved detection and characterization of small anatomical structures," he continued.

"Through this, Super Resolution CT has shown promise in correctly identifying non-obstructive diseases that were labeled as obstructive with conventional CT."

"We have noticed significant noise reduction, and increased sharpness of all the vascular and anatomical structures with PIQE compared to deep learning or hybrid IR reconstructions. The conspicuity of the structures and the contour can be more easily seen. Even in lesions with very subtle arterial calcification, PIQE provides a better view. This is the same with curved MPR - the sharpness of the vessels is better with PIQE. You can also achieve better delineation of smaller arterial branches. And you get an increased conspicuity of calcifications, mostly on faint or subtle low-density calcifications," remarked Prof. Ohana. "All these points - the noise reduction, the increased sharpness, better delineation of small structures, and the increased conspicuity of calcifications - lead to a higher image quality with PIQE".

"In the end, in routine clinical work, you can expect to get the advantages of the Super Resolution CT images, but without the drawbacks," he added. "And at a lower cost with, of course, a higher number of machines to be able to do that. The availability of a wide area detector, which is something that once you get it, you cannot go back, when you do cardiac imaging. The faster rotation time, the ability to use systematically for all patients on 100kV and all that at the lowest radiation dose. This is really like combining best of both worlds."

"What is important is that you can use it without any impact on the workflow or the dosimetry. You have an increased perceived image quality of coronary CTA, and in the end, it could carry a potential diagnostic impact as we have seen, probably a better assessment of highly calcified vessels, possibly also a better delineation of minimal atherosclerotic lesion, and also maybe a possible better plaque quantification," he concluded. "It is very promising, and I think it's only the beginning of the technology. We hope that we will see more in the future."

Better body imaging with MRI

Patient comfort, optimization of sequences, and improvement of image quality using new artificial intelligence technologies are key, especially in certain patient groups. They can lead to a better diagnosis and facilitate appropriate personalized treatment. Dr. Benoît Sauer, Radiologist at the Groupe d'imagerie médicale - MIM, Clinique Sainte Anne Strasbourg, in France, outlined the practical implications for improving body imaging of super-high resolution PIQE for MRI.

"Deep Learning Reconstruction is a major additional layer for improvement of image quality and also time in MRI, which is very important for patients," said Dr. Sauer. "In addition, radiologists have more choice and more capacity to adapt to make better images for each patient characteristic."

In abdominal imaging, quality is essential to make an accurate diagnosis. For upper abdomen scanning, the length of the patient's breath-hold is a limit. For whole body diffusion scanning, the duration of the examination can be problematic for some patients. For whole-body DWI diffusion, for myeloma, comfort is very important. For musculoskeletal imaging, especially trauma-related scanning, total scanning time needs to be fast.

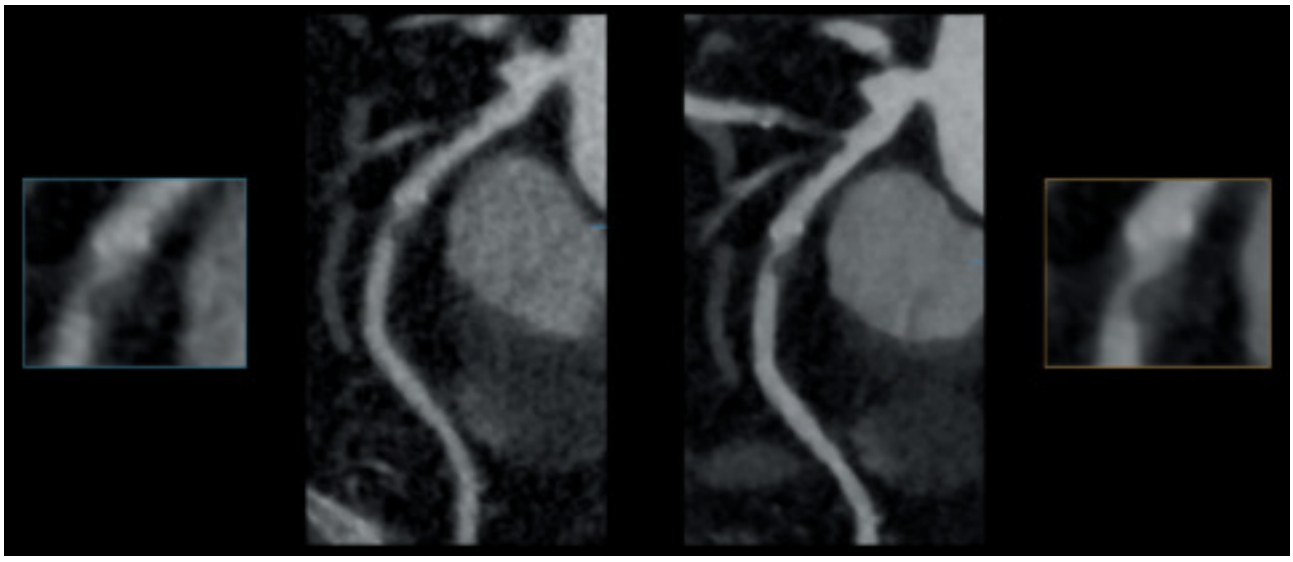


Figure 3. PIQE – CT Super Resolution-Deep Learning Reconstruction:
The coronary artery CT image on the left (a) is reconstructed with Iterative Reconstruction and on the right (b) with Super Resolution-Deep Learning Reconstruction. The contour of the plaque can be better seen on the PIQE image and also a much better differentiation of the residual lumen inside can be seen compared to iterative reconstruction.

"With Canon's Deep Learning Reconstruction techniques, AiCE and PIQE, we now have an MRI liver protocol of less than ten minutes, complete with a low dose CT scan of the whole thorax-abdomen. For unwell patients experiencing difficulties with breath-hold, we make shorter sequences of 13 seconds in dynamics, so we have high quality. For prostate, we can perform an examination in ten minutes," said Dr. Sauer. "It works also for other things.

For example, musculoskeletal imaging and knee trauma with a rupture of LCA, and bone marrow oedema. The total examination is less than six minutes. The advantage is quicker results with fewer movement artifacts, so it's very important. We can obtain good quality images as well as a good diagnosis, fast."

"In conclusion, quality and comfort in MRI are essential for the patient. With Deep Learning Reconstruction, our standard protocols now take less than 10 minutes in total to perform, except full body. AI allows for shorter examination times. It's more comfortable for the patient and improves the image quality. It also allows a personalized evaluation, rapid sequences to avoid movement artifacts and meets the needs of fragile patients," he added. "These are major gains, especially in time and quality in MRI for the comfort of the patient."

Meaningful innovation. Made possible.

Canon Medical is developing intelligent technologies to make a whole new level of quality, insight, and value across the entire care pathway possible. With these insights, it is becoming apparent that AI-based healthcare support can be successfully embedded into clinical practice for the benefit of patients and clinicians. //

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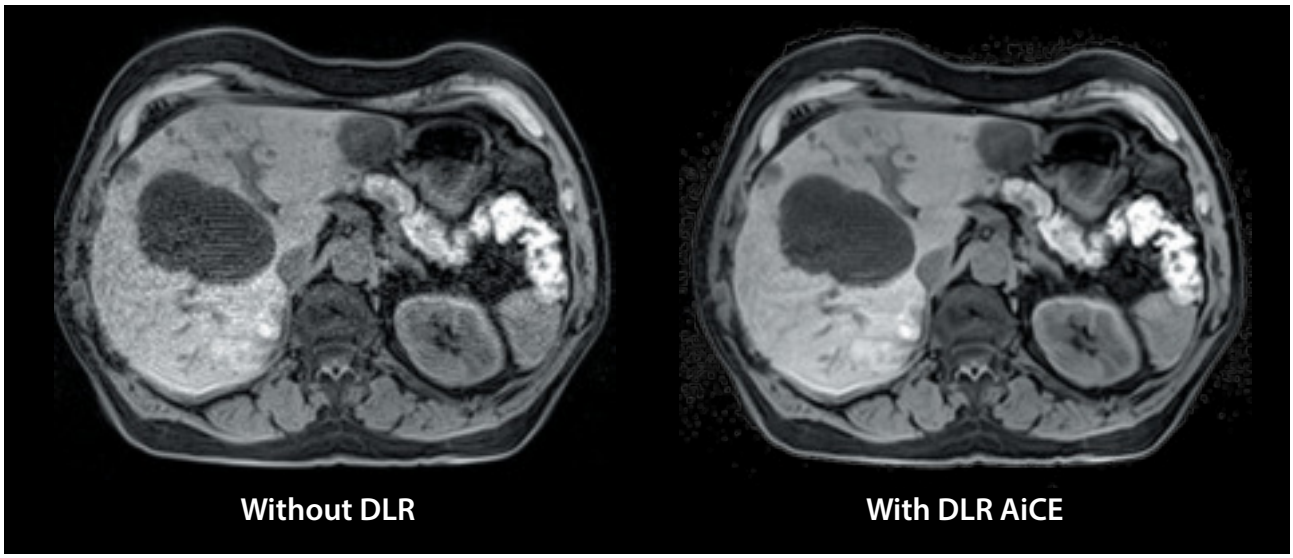

Figure 4. MRI Deep Learning Reconstruction:
For whole body MRI diffusion the duration of the examination could be problematic. An MRI diffusion image of the abdomen of 15 sec is reconstructed without DLR on the left (a) and with DLR (AiCE) (b) on the right. There is a great increase of image quality in the DLR image. In MRI, shorter scan time equals to quality and comfort for the patient.

INSTINX Workflow: A Highly Intuitive AI-Assisted CT Experience

Kirsten Boedeker, PhD, DABR

Canon Medical's new INSTINX workflow for CT combines a human-centered, intuitive design with artificial intelligence to drive a fast, simple, and accurate workflow experience. INSTINX is designed to alleviate some of the challenges of staff shortages and patient backlog in today's overburdened clinical environment by being instinctively easy to use. Featuring a user interface (UX) honed by experts in user-centered design, INSTINX eliminates complex, language-based scan set-up in favor of intuitive icons, reducing clicks and the number of interactive steps by 40%. INSTINX reinvents scan planning by replacing the traditional two-dimensional scanogram acquisitions with a dose-neutral, helical 3D Landmark Scan. Powered by artificial intelligence, Anatomical Landmark Detection (ALD) uses the 3D Landmark Scan to automatically generate scan range start and end positions as well as tailor the field of view to the individual patient. The 3D Landmark Scan with ALD results in accurate and consistent scan planning across shifts, systems, and facilities.

From easier patient positioning supported by gantry-mounted Canon cameras to a clear, intuitive UX with automatic scan planning, the INSTINX workflow was developed to make scanning instinctively simple and help the operator keep their attention where it belongs, on the patient.

A whole new user experience

The INSTINX user interface was built with one guiding principle: to be intuitively easy to learn and use. The increasing complexity of CT systems and reality of today's busy clinical environment demands a user interface that not only improves usability and clinical workflow but also helps the operator keep their focus on the patient. The INSTINX user interface is the result of a five-year iterative design process employing a multidisciplinary worldwide team of experts, including UX designers, graphic designers, software engineers, and CT technologists, to create a novel user interface that appeals to user intuition on a whole new level.

The design philosophy behind INSTINX was guided by extensive user feedback on their biggest challenges with CT user-interface design. Based on this research, the INSTINX UX was designed to eliminate unnecessary redundancies and superfluous information that can overwhelm an operator. Instead, INSTINX features what users need most: recognizable icons placed in intuitive locations on the screen, consistent terminology, a clear visual flow from patient registration to the end of the exam, as well as useful feedback available to the operator at any point during scan set up.

Figure 1 shows the protocol navigator for an example protocol on INSTINX. The layout employs a simple left-to-right

Figure 1: Four Phase liver scan protocol with intuitive left-to-right scan progression.

Figure 2: Dual gantry mounted cameras.

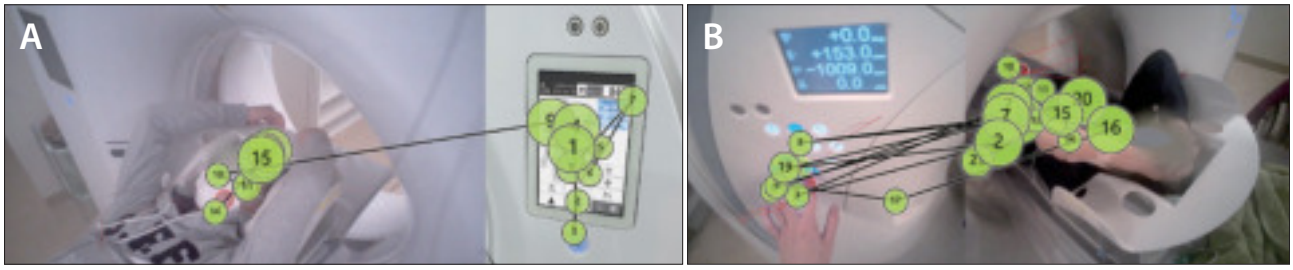

Figure 3: Eye tracking case study results. In A, with INSTINX, the operator looks at the touch panel and then moves to view the patient without looking back at the touch panel. In B, the user repeatedly looks between the gantry buttons and the patient during positioning as indicated by the multiple lines.

flow of scan progression that appeals to user intuition with clearly labelled badges to represent each scan and in situ waiting times between each scan.

The result of this initiative is a new interface that significantly reduces the learning curve for healthcare professionals, with most users requiring less than half a day of training to feel confident operating the system. Additionally, the intuitive design reduces workflow steps by 40%*, helping to reduce operator stress.

INSTINX UX design process

INSTINX began as a literal blank screen and was created from scratch over five years of development. That blank screen evolved into the highly efficient, intuitive INSTINX UX via an intensive iterative design process. Working with technologists both familiar and new to Canon CT as well as with radiologists, the user interface went through repeated stages of vetting. Evaluators were provided working UX mockups and asked to conduct a variety of clinical tasks, such as to perform a mock CT Pulmonary Angiogram scan on a 55-year-old female patient from patient registration to the close of the exam. Any elements that failed to provide a straightforward, easy-to-use experience were replaced and evaluated fresh in the next round of testing. By incorporating users of all skill levels and from different geographical regions, the design and development process accounted for regional variations in workflow ensuring the user experience would be universally simple and intuitive.

INSTINX gantry mounted camera

Prior to scanning, INSTINX takes advantage of dual gantry-mounted cameras to help automatically position the patient relative to the isocenter (Figure 2). After the patient lies on the couch, the cameras detect patient features and spatial orientation; INSTINX automatically adjusts the couch height, as well as lateral and longitudinal position, in preparation for the acquisition of a 3D Landmark Scan.

Eye tracking case studies have shown camera-assisted patient positioning keeps the operator's focus on the patient and the patient's comfort. In the example below (Figure 3), the operator can keep their attention on the patient, rather than alternating focus between the gantry panel and patient. The circle size indicates time spent looking at the point. In A with INSTINX, the operator looks at the touch panel and then moves to view the patient without moving back to the touch panel. In B, the user repeatedly looks between the buttons and the patient during positioning.

3D Landmark Scan and Anatomical Landmark Detection (ALD)

Traditionally, dual planar radiographs are used to establish the scan range for a given protocol. These scanograms, however, are inherently two-dimensional and are unable to provide a precise guide to internal anatomy. As a result, a non-optimized scan region is projected onto the AP and Lateral views and the operator must adjust the planned scan regions for every patient.

**Based on conversion of manual steps requiring interaction to automated steps, due to the camera, 3D Landmark Scan/ALD, and hanging layout.*

With INSTINX, the traditional dual planar acquisition is replaced with an ultra-low dose, three-dimensional helical scan called a 3D Landmark Scan. Canon's SilverBeam energy-shaping filter, used to remove low energy photons from X-ray beam, ensures the 3D Landmark Scan is acquired at a radiation dose equivalent to a traditional dual 2D planar acquisition. The resulting 3D Landmark Scan images are 1 mm in slice width and offer a wealth of anatomical detail that can be used by artificial intelligence to drive Anatomical Landmark Detection (ALD) for quick, accurate, and consistent scan planning. 3D Landmark Scan vs. 2D scanograms allow for highly accurate detection of internal landmarks to determine scan start and end positions and FOV.

When building a protocol, the user can take advantage of an interactive anatomical avatar to indicate the desired start and end locations. For example, as shown in Figure 4, this abdominal protocol will plan patient scans to begin 1 cm above the dome of the diaphragm and end at the iliac crest. Based on these user-determined "snap points," the ALD takes advantage of the three-dimensional anatomical information in the 3D Landmark Scan images to automatically generate start and end positions, as well as field of view, for the individual patient being scanned, with 97% accuracy. For operator convenience, these scan range regions are projected on an Anterior Posterior projection and a Sagittal projection if manual adjustments are desired for any reason.

The Anatomical Landmark Detection algorithm was trained on 3D Landmark Scans for all relevant anatomy, including common clinical variations, such as arms down versus arms up. ALD works by first segmenting anatomical regions and then applying a random forest algorithm, which combines the results of a large number of classifiers trained on a variety of features, to identify the six planes which define start, stop, and field of view.

Anatomical Landmark Detection not only helps save operator time by 24% but also helps promote more consistent scan planning. With traditional dual planar radiographs, the literature has shown over-scanning beyond optimal limits can add extra, unnecessary centimeters to the scan range and unnecessary radiation dose to the patient[1].

The amount of over-scanning can vary significantly with the institution or experience level of the individual operator[1]. In addition, under-scanning can lead to missing anatomy and repeat examinations. INSTINX uses ALD to help enable the operator to focus on the patient and promote consistent scan planning.

In addition to scan range planning, 3D Landmark Scan lets the operator set a region of interest for bolus tracking without any additional scan or radiation dose. Similarly, selecting the slice location and needle planning for CT fluoroscopy requires no additional planning scan acquisition.

Conclusion

INSTINX workflow combines intuitive, user-centered design and artificial intelligence to drive fast, easy, and accurate workflow. The INSTINX UX is intuitively simple to learn and use, helping to ease operator stress and decrease training times. The 3D Landmark Scan and AI-driven Anatomical Landmark Detection offer an innovative solution to ensure quick, accurate, and consistent CT exams. //

Kirsten Boedeker, PhD, DABR
Senior Manager, Medical Physics Canon Medical Systems Corporation.

Click HERE for more information about Canon's INSTINX

Reference

[1] *Schwartz F, Stieltjes B, Szucs-Farkas Z, Euler A. Over-scanning in chest CT: Comparison of practice among six hospitals and its impact on radiation dose. Eur J Radiol. 2018 May;102:49-54.*

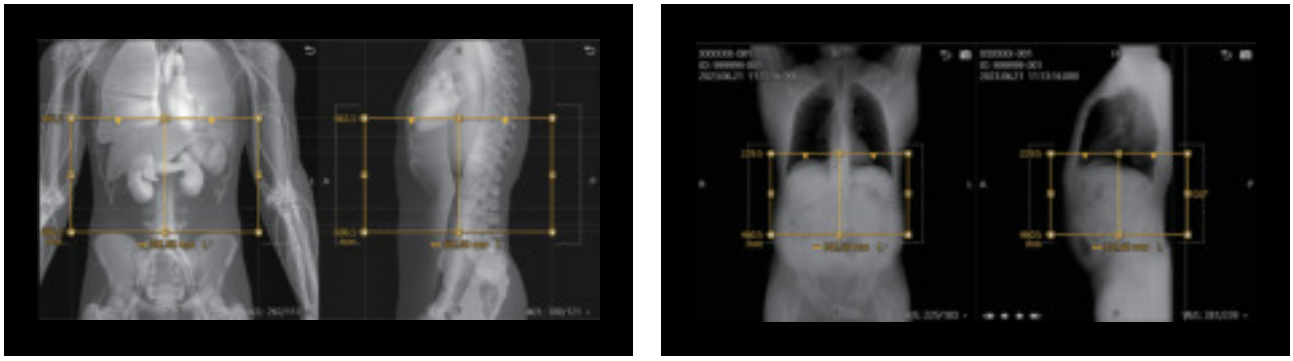

Figure 4: Abdomen protocol showing the scan range set in the scan protocol and then in the actual patient scan.

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Pre Scan

Scan

Post Scan

Canon Medical's new INSTINX workflow for CT combines a human-centered intuitive design with artificial intelligence to drive a fast, simple, and accurate workflow experience. Based on extensive research and evaluation with a team of experts, Canon Medical developed intuitive features that result in high-quality and consistent results, independent of the level of user experience.

INSTINX supports full automatic use of all diagnostic imaging procedures, from patient positioning to user defined reporting pages. The INSTINX workflow makes scanning simple and helps you to keep your attention where it belongs, on the patient.

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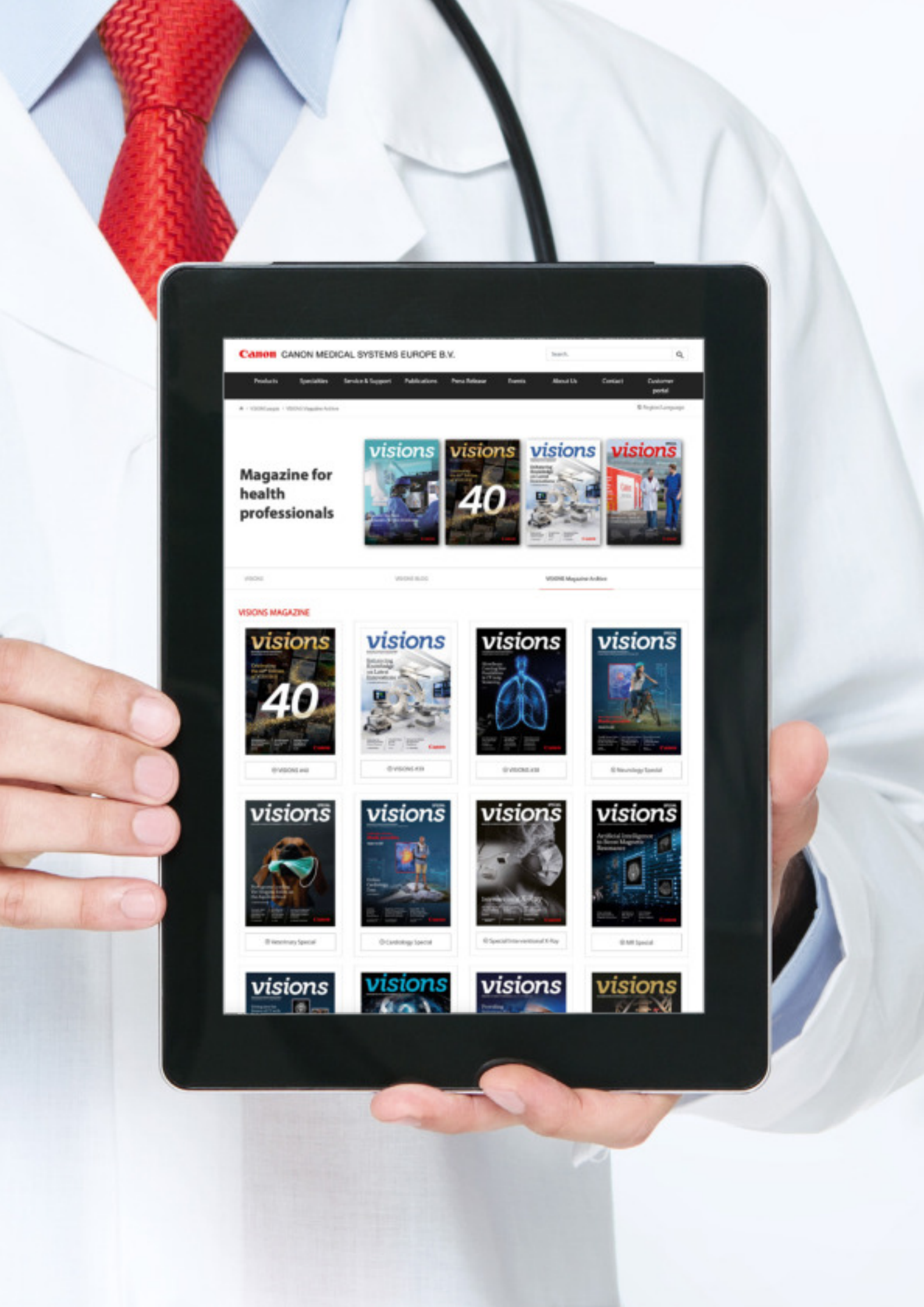
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Welcome to the age of AI-assisted CT

Advanced intelligent Clear-IQ Engine (AiCE) is an innovative Deep Learning Reconstruction that enables radiologists to obtain lower dose scans with improved image quality.
We are happy to announce that this great technology has now been migrated across all segments of its CT business in order to support high-quality imaging at low doses for all patients, in keeping with its Made for Life philosophy. Even on the 16-row CT systems.

AiCE images have:

- Low Noise
- Natural Image Texture
- Sharp High Contrast Resolution
- Clear Low Contrast Detectability

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