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MAGAZINE FOR HEALTH PROFESSIONALS
European Edition // No 40 // March 2023

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We are celebrating the 40th edition of our European VISIONS magazine. On the cover image you can see in the background, a few of the covers of previously released European VISIONS editions.

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

The magazine is published twice a year. To register for new VISIONS editions (free of charge) or to download/read the latest VISIONS editions or separate articles, previously published full editions or separate articles, please scan the QR code or visit our website: https://eu.medical.canon/visions-magazine. Canon Medical stores and uses personal data of the registration to send out the magazine and inform members about new developments. Members can customize preferences or opt-out, after registration.

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Publisher
Canon Medical Systems Europe B.V.
Zilverstraat 1, 2718 RP Zoetermeer
The Netherlands
+31 79 368 92 22
W: https://eu.medical.canon/
E: visions.eu@eu.medical.canon

Editor-in-chief
Jacqueline de Graaf
jacqueline.degraaf@eu.medical.canon

Design & Layout
Boerma Reclame
boermareclame.com

Printmanagement
Printweb Media B.V.
printweb.nl

Photography
Cojan van Toor
cojanvantoor.nl

Text contributions and editing
Sara Sharp - The Creative Practice
Mélisande Rouger - Independent Journalist

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// EDITORIAL

Dear Reader,

2022 has been yet another year of uncertainty. The COVID-19 pandemic continued to create challenges in our personal lives and business environment. However, there was a slow return to many everyday activities, and importantly, opportunities to catch up with other people in person through resumed social activities.

The healthcare environment faces not only existing challenges, but many new ones. It is under more pressure than it ever has been.

Workloads have increased, but staff and resources have become even more limited. Staff shortages, equipment availability and time, are daily challenges that most healthcare facilities have to negotiate. Some face dealing with sustained disruptions to regular services. In addition, there are ongoing consolidations and changes in decision-making units in many healthcare settings. Along with a residual backlog created at the height of the pandemic, patient waiting lists have lengthened further with recent developments.

As has been said many times before, Canon Medical's 'Made for Life' management philosophy has never been more important or more valuable to us as we strive to help our customers' meet these challenges and assist in improving care for patients. The relevance of "Made for Life" only intensifies.

Through continuous innovation, we are responding to as many new challenges as possible to support healthcare professionals as much as possible. And cutting-edge developments that we have been working on for many years are proving their worth in this context.

AI plays a major role. Altivity is Canon Medical's bold new approach to AI innovation. It is our brand new development suite of intelligent imaging solutions based on deep learning that delivers uncompromised quality and value across the entire care pathway. AItivity will enable healthcare professionals to leverage data in a new way and transform it into essential insights that improve patient outcomes and streamline workflow across the board. And it is already implemented is already implemented in almost our entire portfolio.

This year, we will be bringing several new solutions to you. With the current need for greater efficiency to cope with extra demands, our new innovations and products are strongly focused on improving workflow and automation. Cameras, portable tablets and automation platforms have been designed to help support clinical staff daily in solving their high workload challenges. We will also contribute towards assisting hospitals and clinicians through streamlined educational support.

In this 40th edition of VISIONS – in itself, a milestone publication that is testimony to the longevity of Canon Medical's commitment to the healthcare community - you can read how so many of our cutting-edge innovations are already making a difference in many hospitals across the world. Our approach is to rise to the challenges and innovate even more, based on our "Made for Life" philosophy, to improve patient outcomes.

Best regards,

RENÉ DEGROS
Vice President
Canon Medical Systems Europe

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Made For life



Introducing our new approach to AI in healthcare

Imagine a world where advanced machine learning and deep learning technologies can help you deliver uncompromised quality, insight, and value across the entire care pathway. Where every patient gets the fast, accurate diagnosis they need for a more personalized treatment approach. And where businesses are equipped with intelligent tools that foster growth, success, and unlimited potential. This is the world that's available now, made possible by Altivity.

CANON MEDICAL SYSTEMS EUROPE B.V.
https://eu.medical.canon/specialties/ai



Celebrating the 40th Edition of VISIONS Magazine

This particular VISIONS magazine marks a milestone in Canon Medical's history. Precisely twenty years and 40 editions ago, the first European VISIONS was published.

The idea to produce a high-quality customer magazine originated in Europe. Aware of how remarkable the real-life applications of Canon Medical's systems in research and development really are, as well as what a difference the systems make in clinical practice, our European Marketing Director, Jack Hoogendoorn, recognized the immense value of sharing accounts of these applications with our customers in a convenient format. VISIONS is exemplary of our Made for Life philosophy and exemplifies our commitment to improving quality of life through innovation and lifetime partnerships - no matter what the challenges are.

VISIONS provides the latest news on clinical solutions from Canon Medical across the entire range of our modalities, ground-breaking studies, and clinical application stories. Many of the contributors are world-leading specialists in various fields. And they are not only our customers, but are considered our valued partners.

When it was first published in 2002, VISIONS was a modest printed magazine. Now, the European VISIONS publication is distributed to approximately 7,000 readers. And there is a global version, as well as national issues in Germany, Austria, the Netherlands, and the UK. There are also a number of VISIONS online resources, such as a blog and LinkedIn VISIONS page that attract more than 1,250 followers.

I started to work on VISIONS as an Editor approximately 10 years ago and became Editor-in-Chief in 2020 (Edition 34). Over the years, the publication has evolved in content and style to become a significant title in the essential reading list of so many specialists worldwide.

It is always a pleasure to work on VISIONS, knowing that it delivers such valuable and meaningful content across the healthcare industry. And I look forward to continuing to work on future VISIONS editions.

Kind regards,



Jacqueline de Graaf- Degros

Editor-in-Chief of VISIONS Magazine,
Senior Project Manager Marketing
Canon Medical Systems Europe B.V.

Your Feedback Drives Our Business

European Customer Survey Results

For decades Canon Medical has placed the Voice of the Customer (VOC) at the heart of its business. In 2015, we made steps to ensure faster and better response to customer feedback. Customer satisfaction research was increased from a once-a-year survey to continual monitoring in 'real-time', with the results of this used to implement actions to improve our services immediately. Since then we have been inviting our customers to evaluate their experience of our post-installation Training. In more recent years, we have also introduced customer satisfaction surveys on the Procurement, the Delivery & Installation and SOS Service.

The survey results enable us to gain better insight into customers' needs and the responses provide us with input for possible improvements. Thanks to your feedback, we were able to learn and grow as a company, resulting in very high satisfaction scores once again.

Although your satisfaction score is already at an extremely high level, you can rest assured that we will not sit still. We will continue to work on improvements in order to meet your changing needs and requirements as well as the general healthcare market conditions.

As we work towards further improvement of our services, your opinion is invaluable and we hope you will continue in providing us your feedback!

In addition to the surveys mentioned above, we also launched a Generic Survey, which was sent to more than 21,000 Canon Medical customers in Europe in November 2022.

This generic survey is conducted every two years to measure the satisfaction of our customers who have not received any of the other surveys mentioned above in the past two years. We will share these results in our next VISIONS edition.

This time next year, we will feature our 2023 Customer Survey results, including the results of our new Generic survey conducted in November 2022. - Here's to another year of fantastic responses. //



Procurement

Average Satisfaction

9,3

RECOMMENDATION
70% rates a 9 or 10 when asked to what extent they would recommend Canon Medical (from 0-10) to others based upon their experience with **Procurement**



Delivery & Installation

Average Satisfaction

9,4

RECOMMENDATION
83% rates a 9 or 10 when asked to what extent they would recommend Canon Medical (from 0-10) to others based upon their experience with **Delivery & Installation**

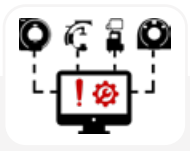


Training

Average Satisfaction

9,5

RECOMMENDATION
86% rates a 9 or 10 when asked to what extent they would recommend Canon Medical (from 0-10) to others based upon their experience with **Training**



SOS Service

Average Satisfaction

8,7

RECOMMENDATION
75% rates a 9 or 10 when asked to what extent they would recommend Canon Medical (from 0-10) to others based upon their experience with **SOS Service**

Why do our customers recommend us?

Procurement

UK

"Excellent experience with the demo team. Very professional, every question followed up comprehensively very quickly."

SPAIN

"Honesty of the sales staff. Excellent experience with previous team and maintenance service."

AUSTRIA

"Technical knowledge, understanding of needs, polite, not pushy."

Delivery & Installation

SPAIN

"The equipment quality and delivery time."

ITALY

"Precision, Competence, Education, Respect for the activity that was in progress."

SWITZERLAND

"Punctual, competent, friendly, responsive to my questions, and seem to be able to put themselves in my shoes."

Training

PORTUGAL

"The image quality and the friendliness of technicians."

SWEDEN

"Clear information, easy-to-understand presentation."

FRANCE

"The professionalism and competence of the trainer."

SOS Service

GERMANY

"Always competent contact persons, especially the service technicians."

THE NETHERLANDS

"Canon Medical is very customer-oriented."

BELGIUM

"Availability, efficiency, monitoring. Very good after sales service."

Three main reasons for choosing Canon Medical:

1 **Quality of Services**

2 **Product Performance**

3 **Stable Partner**

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Redefine CT Workflow with Key Addition to Portfolio

2023 will bring a new way of scanning and strategies to boost workflow will continue to guide innovation for the years to come, Roy Verlaan, European Director for CT at Canon Medical Systems Europe, told VISIONS earlier this year.

The European CT market has expanded and the demand for midrange scanners has increased during recent years, pushed by the COVID-19 pandemic and the need to attend to larger cohorts of patients.

Roy Verlaan, 35, has worked for Canon Medical Systems Europe for the past eleven years. He started as an Application Specialist for CT and, in 2018, was appointed European Director of the CT business unit, his current role. Prior to that, he worked as a radiographer at Leiden University in the Netherlands for almost five years. A part time athlete, Roy enjoys running, cycling and handball, a discipline where he met his wife Britt.

Canon Medical has responded to the challenge by delivering mobile CT scanners to hospitals and groundbreaking technology, such as Advanced intelligent Clear-IQ Engine (AiCE), a deep learning reconstruction that enables radiologists to obtain lower dose scans with improved image quality.

Recently, Canon Medical introduced PIQE, a deep learning reconstruction method designed to enhance spatial resolution and reduce image noise. The tool has been trained for cardiac imaging, but it has the potential to be expanded to other parts of the body, according to Roy.

'We've taken yet another step into deep learning technology with PIQE,' he said. 'By incorporating ultra-high-resolution images into the deep convolutional neural network, we can achieve both spatial resolution improvement and noise reduction for cardiac applications. This allows users to better understand disease in cardiovascular patients, in whom CT is becoming the first line test.'

2022 also saw the introduction of SilverBeam, a new technology that allows lowering dose in lung scans. Used in combination with AiCE, SilverBeam can help to reduce dose without compromising image quality.

'Our main areas of development will continue to match the growing trend for preventive healthcare,' he said.

More than ever, imaging equipment manufacturers must help alleviate physicians' burden, by offering them cutting edge solutions to boost workflow, Roy explained.

'Radiology teams have to deal with shortage of staff, while the number of patients,



"We will continue to support our users following our Made for Life philosophy."

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



Canon Medical's CT scanner portfolio.

elderly patients, and, thanks to treatment advances, follow-up scans continues to rise steadily. We still have a lot of patients to image in the backlog who had to interrupt their care journey during the pandemic,' he said. 'Our commitment is to help teams integrate all the imaging data that's being acquired during an examination and make complex scanning procedures easier to perform, regardless of the user's experience.'

Aquilion Serve and INSTINX: a new way of scanning

In 2023, Canon Medical will continue to provide meaningful innovations. A major step forward will be the introduction of a new midrange scanner, the new Aquilion Serve and the INSTINX platform at ECR 2023.

'The system offers groundbreaking workflows from the patient setup to scanning and image reviewing,' he said. 'The Aquilion Serve is a new way of scanning that will expedite workflow in unprecedented ways.'

The Aquilion Serve is an 80-row scanner with two built-in gantry cameras for accurate patient positioning. It includes the new INSTINX platform, which is Canon Medical's way of redefining workflow, and features AiCE and SilverBeam.

'On the Aquilion Serve, we standardized and harmonized the scanning procedures, meaning more automation and less need for rescanning and more accurate scan planning,' Roy said. 'This advance enables the system to lower the dose and increase automation and output of hospitals.'

Future trends

In 20 years' time, transitions that have already started are likely to be complete. AI, for example, will have a bigger impact in various aspects of the imaging workflow. Imaging and non-imaging data will be better integrated, while techniques like photon counting CT will enable tissue characterization and functional imaging, Roy predicted.

'Screening programs are likely to continue and to be expanded, and so will the use of big data and the quest to make complex scanning procedures easier and faster,' he added.

The trend in both the mid and long term is for more automation, as radiology departments must cope with an increasing number of patients who require medical imaging.

New technologies will support, not replace, radiologists and radiographers in their day-to-day activity, Roy insisted. 'Someone will always need to be with the patient during the examination. Healthcare will always need a human touch, and working with patients will always require human interaction.'

Canon Medical has a significant role to play in this scenario and active listening is a must-have quality to develop pertinent solutions together with the clinicians and technicians.

'We will need to carefully listen and analyze these trends, understand what problems our users face and continue to ask questions to our users. What problem do we solve with our solutions and how can we provide meaningful innovations that actually change and improve patient management? By answering such questions through innovation, we will continue to support our users following our Made for Life philosophy,' he concluded. //

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*Improved **patient care***

*Improved **patient experience***

*Improved **workflow***

*Improved **cost-efficiency***

Welcoming the New Multi-Purpose X-Ray System

Canon Medical announced its new, versatile, multi-purpose X-Ray system - the Celex - at ECR 2023 (March 1-5, 2023, Vienna, Austria). The Celex offers an extensive range of advanced DR imaging capabilities. It combines state-of-the-art imaging with unique positioning flexibility and represents a true multi-purpose solution that delivers optimum capacity utilization.

The Celex offers an extensive range of DR imaging capabilities. It combines state-of-the-art imaging with unique positioning flexibility and represents a true multi-purpose solution that delivers optimum capacity utilization.

Designed with a small footprint, a minimum installation space is required and the work area around the patient table is maximized. The Celex is available in two versions, with either a left-side or a right-side suspended patient couch, to provide options that can meet different clinical needs, such as the requirement to perform ERCP examinations, or to counteract any examination room constraints.

Supreme agility

The Celex takes multi-purpose to a new level with wide projection flexibility and innovative features that enhance user ergonomics and patient comfort. With its extensive movement ranges, including an SID (Source Image Distance) range up to 150 cm, Celex is capable of performing almost any position you can imagine.

To improve the workflow using the Celex, it is possible to save almost thousand different auto-positions and any position can be customized and saved for any clinical procedure. The built-in inMotion auto-positioning technology enables direct, automatic positioning of the detector and tube to any saved position with pre-set examination parameters. Save and restore any position – permanently or on-the-fly. Preferred positions can be saved and recalled at any time, for fast and fully automatic positioning.

The user interface enables intuitive control of the system movements and exposure parameters. Self-explanatory icons on the large touchscreen make the system operation efficient, yet easy to master. Depending on the user's preferences, customizable buttons can be selected to ensure smooth operation that is tailored to each department's needs.

The inControl Console has been designed with four touch-sensitive joysticks and features a clear touch-screen interface. The joysticks are not only color-coded, but also have a distinctive shape making them highly distinguishable from each other.

The detachable table option enables users to detach and to store the table top on a trolley in a few simple steps. This enhances the versatility and functionality of the system. This advanced feature provides optimal space for patients in e.g., wheelchairs or on stretchers. It also supports any procedure that requires free space inside the C-arm. This means that an already vast Celex exam portfolio can be expanded even further with examinations, such as iso-centric standing knee, standing/sitting thorax, standing or sitting esophagus, etc. Attaching the table top again is a quick process.

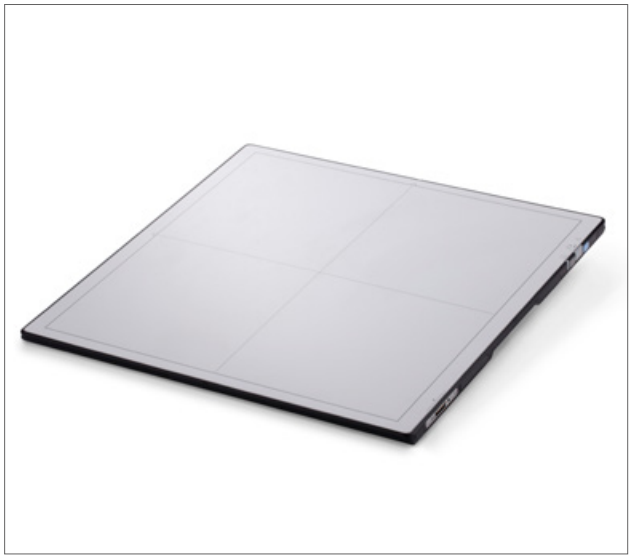
Safety first

Finally, the system has been designed with the patient- and user safety in mind. Particular attention was paid to dose reduction.

With a carbon fiber patient table, the Celex is made entirely of materials that allows minimal X-ray absorption for maximum dose reduction. The grid can be easily removed and the patient table can be moved out of the X-ray beam.

Furthermore, Canon Medical's advanced software with specialized algorithms and specific programs for pediatric patients contribute to dose minimization. The advanced algorithms include noise reduction, advanced edge enhancement and contrast boost. //

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*Improved **patient care***

- CXDI-B1 detector, which combines outstanding image capabilities with high sensitivity, and high-resolution dynamic capabilities.
- Intuitive software provides sophisticated image processing for premium diagnostic image quality.
- The system has been designed to keep dose as low as possible through its carbon fiber table top, an easily removable grid, specific programs for all patients, and virtual collimation.

*Improved **workflow***

- inControl: modern design with highly intuitive operation. The inControl Console is designed with four touch-sensitive joysticks and features a clear touchscreen interface.
- SmartPanel allows operation of the system while standing next to the patient. It ensures effortless operation.
- inMotion auto-positioning technology for direct and automatic positioning of the system.





*Improved **patient experience***

- Whether the patient is ambulant, in a wheelchair, or on a stretcher, optimal patient comfort can be achieved through the detachable examination table.
- Minimum space required maximizes the work area around the patient table.
- Patient-centered design: The system moves instead of the patient.
- Easy choice of multiple beam projections which reduces the need to reposition the patient.
- Patient safety is a given with Touch Guard anti-collision system and inTouch sensors.

*Improved **cost-efficiency***

- No extra technical room needed – requires only space for the generator outside the system.
- Versatile multi-purpose tilt-C X-Ray system to replace several dedicated systems.
- Fits into any working environment thanks to its small footprint.
- Examine more patients per day without increasing the workload thanks to innovative workflow solutions.

French Expert Highlights the Benefits of Working with the Alphenix 4D CT

Canon Medical's Alphenix 4D CT system enables to ease patient flow and perform liver and prostate procedures with millimetric isometric precision, a leading French interventional radiologist told VISIONS.

The interventional radiology section at Nîmes University Hospital in southern France is a leading center for the treatment of osteoarticular and soft tissue diseases. 'Oncology represents about 70% of our activity,' said Prof. Julien Frandon, Head of the interventional department.

The hospital installed the Alphenix 4D CT in November 2020 to anticipate to the growing need for hybrid procedures requiring a CT guided intervention combined with fluoroscopy imaging with a C-arm, for more precision and better visualization when injecting i.e embolic material and devices.

'We really needed an all-inclusive room,' said Prof. Frandon, who was 'seduced' by the equipment's 'all in one' aspect, and, in particular, the possibility to perform image fusion.

We really liked the instant fusion possibility of vascular CT data during fluorosocopy,' he said.



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Alphenix 4D CT

'We started performing prostate embolizations, our field of expertise, which was sub-optimal in the past due to the limitations of our conventional cone beam CT'.

With the Alphenix 4D CT, the team now works with 'millimetric isometric precision' in three planes. 'We can do perfusion thanks to the wide area detector of the CT scanner, which allows us to cover 16cm in a single rotation.'

Biography

Prof. Julien Frandon, an interventional radiologist, has been the head of the functional unit in the interventional section at Nîmes University Hospital, France, since November 2015.

Benefits of working with a multimodal guidance system with a wide area CT detector

The Alphenix 4D CT has tremendously improved the patient flow at the hospital, Prof. Frandon explained. 'For each patient, we used to ask ourselves: Do I need CT, X-ray or Ultrasound imaging for this procedure? Now, thanks to our multimodality interventional room, we no longer have to ask ourselves this question.'

The system enables to do virtually any type of intervention, he added. 'We can manage our patients under CT and/or angio guidance, which is perfect. We no longer have to reschedule patients and face programming difficulties on the other radiology examination rooms. For all the complicated procedures where I'm not sure which imaging technique to use, I use the Alphenix 4D CT room.'

The team can also combine multiple imaging modalities, a possibility that is particularly relevant when carrying out liver and prostate procedures.

'For example, when we do an arterial approach, we inject a contrast media agent directly into the superior mesenteric artery, and its venous return allows



"The Alphenix 4D CT has tremendously improved the patient flow at the hospital."

Prof. Julien Frandon, Nîmes University Hospital, France



Canon Medical's Alphenix 4D CT system at Nîmes University Hospital in France.

us to have a pure portal hepatic enhancement, which is called Porto-CT. This allows us to clear everything that is not hepatic parenchyma, and therefore to see even metastases that are not visible with classical contrast injections,' he said.

The system features the Aquilion ONE wide area detector CT scanner, which was a decisive factor for his team, Frandon explained. 'We wanted to perform liver interventions. The benefit is that, with the acquisition of 16 cm per rotation, the liver is directly visible after a single rotation, without having to make a helical CT acquisition. You have instantaneous volume acquisitions,' he said.

This 'One shot volume scan' can be repeated over time with an exceptional temporal resolution, enabling to obtain perfusion maps, which are also useful for prostate imaging. 'This allows us to have both perfusion imaging and 3D mapping of the vessels because, in a 16cm volume acquisition, we can visualize both the prostate and the prostatic arteries that arise from the hypogastric artery,' he said.

Innovative features

Canon Medical's SURESubtraction application, an acquisition mode similar to a DSA sequence in angiography, brings significant advantages in daily routine, according to Prof. Frandon.

'First, we make a mask acquisition with a very low dose, then an arterial acquisition that allows us to obtain a perfect vascular and bone CT subtraction volume automatically.'

This ability is particularly beneficial in the prostate, where traditional segmentation can be very time consuming. 'It used to take us a lot of time, because some vessels near the sacrum were deleted on the consoles and we had to perform manual segmentation,' he said.

'Today, we use SURESubtraction all the time, and also in the liver. For example, we can now see if there's new contrast enhancement of a previously treated nodule or if it's Lipiodol from an old procedure.

'The Auto-registration module was recently installed, allowing for automatic fusion of CT volumes with fluoroscopy without the need to perform frontal and lateral fluoroscopy to align the CT volume with the actual fluoroscopy image. 'It works very well and it's allowed us to optimize our workflow,' he said.

The newly designed hybrid CT touch-panel interface for CT guided interventions that enables one-handed operation was recently installed, at the team's request.

'We're really satisfied with this upgrade. Canon Medical designed the Hybrid Touch Panel so that a single operator could perform most tasks at the bedside and fewer interactions are required from the radiographers. These are real advantages for workflow during our interventions and the optimization of our staff management.' The Alphenix 4D CT is also equipped with Advanced intelligent Clear-IQ Engine (AiCE), a CT reconstruction algorithm based on artificial intelligence that enables to further reduce radiation dose.

'When we do interventional procedures, we can accept a noisy image because the goal is simply to be able to guide ourselves, even at low dose,' Prof. Frandon said. 'Nevertheless, some operators asked for an increase in dose in order to reduce the noise. We no longer have this problem with AiCE. The image noise is removed while the texture is maintained and without distortion, allowing us to work in Ultra Low Dose.'

Patients, too, are very happy with the Alphenix 4D CT. 'They know that the procedure will be much more precise. The fact that we have the multimodality interventional system with the wide-area CT scanner is clearly a benefit,' he concluded. //

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Improved patient care

Improved patient experience

Improved workflow

Improved cost-efficiency

Introducing the New Aquilion Serve CT System

Canon Medical will announce its new 80/160-slice CT scanner, the Aquilion Serve at ECR 2023 (March 1 – 5, 2023, in Vienna, Austria). Designed for busy medical imaging departments, it delivers consistent imaging results, better image quality, lower radiation dose and faster throughput, creating more time for patient care.

The Aquilion Serve is an efficient solution for all routine examinations, including trauma. Its newly designed 80-cm wide bore gantry features two, easy-to-use, touch panels and inbuilt cameras that support automated one-touch patient positioning. It also introduces the next-generation INSTINX workflow solution, which combines AI-enabled automation with innovative hardware and an intuitive user experience to support fast, easy, and safe CT examinations. The new workflow also dramatically reduces training time for operators.

Preview first

The new system introduces an industry-first, 3D Landmark Scan, which is acquired at the same dose as a traditional dual 2D scanogram. 3D Landmark Scan provides a preview of the full scan range cross-sectional dataset in addition to the traditional 2D view for scan planning. This, in conjunction with Anatomical Landmark Detection (ALD), can accurately identify the anatomical structures required to perform automatic scan planning for all routine examinations. In addition, scan range and field of view can be automatically set to a position that is predefined in the scan protocol to save time, while ensuring consistent results for all CT technologists.

Sharp imaging

For image quality, Advanced intelligent Clear-IQ Engine (AiCE) harnesses the power of deep learning to distinguish signal from noise and deliver extremely sharp, clear and distinct CT images. Fully integrated into the patient-centric workflow, it also reduces dose levels significantly.

New standards in workflow efficiency

As part of the new system, Canon Medical introduces INSTINX, 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.

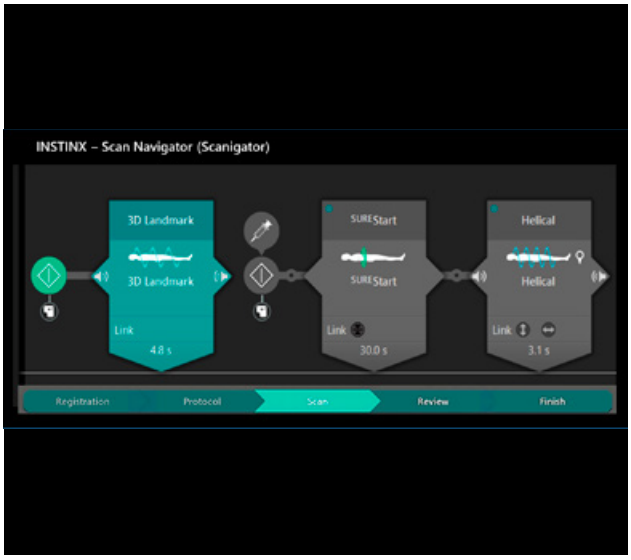
"The Aquilion Serve intelligently supports a patient's journey through a CT examination with technology that will change the way you perform a CT examination forever," remarked Naoki Sugihara, Vice President and General Manager of CT Systems Division at Canon Medical Systems Corporation. "With an optimized workflow experience that enables consistent results to be provided more quickly while maintaining low dose, Aquilion Serve 'simply delivers'."

Aquilion *Serve*



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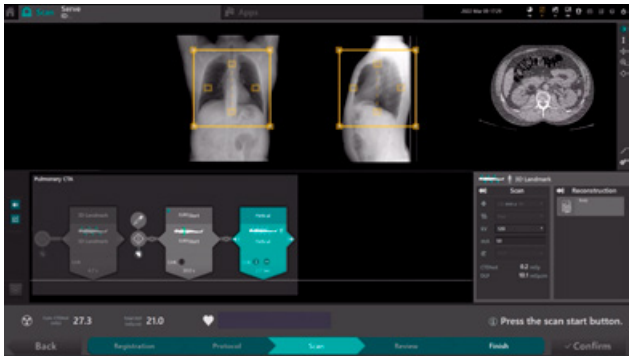


*Improved **patient care***

- Industry's first 3D Landmark Scan to accurately identify the anatomical structures.
- All-round, versatile capabilities for any type of patient or examination.
- Low dose, consistency in image quality and contrast reduction made possible through Deep Learning Reconstruction (Advanced Intelligent Clear IQ Engine).
- SilverBeam filter, a beam-shaping filter to selectively remove low energy photons from a polychromatic X-ray beam, leaving an energy spectrum optimized for high contrast CT applications.

*Improved **workflow***

- Integrated, built-in cameras to seamlessly set the patient in the iso-center.
- Consistency thanks to a new intuitive user interface and a robust scanning process.
- Simple scan planning and simple patient positioning.
- Easy-to-learn user experience for both CT experts and first-time users.
- AI-based anatomical landmark detection for patient positioning and scan range.





*Improved **patient experience***

- Unique flared gantry design with an opening of 80 cm providing a calming, wide-open space.
- Increased safety with Tech Assist Lateral Slide, a feature that mechanically moves the patient up, down, left, or right to the correct position at the touch of a button.
- In-gantry lighting and quiet gantry for optimal patient comfort.
- No compromise on patient safety by using AI guided scan set-up and simple operation buttons.
- Standardized workflow eliminating the risk of rescan.

*Improved **cost-efficiency***

- Designed to save space with an eco-conscious design.
- Enables high patient throughput with standardized workflow, eliminating inconsistencies.
- Intuitive user experience that results in shorter training requirements.

Click HERE to find out more about the new Aquilion Serve

Never Let a Good Crisis go to Waste

From Iodine Contrast Shortage to Environmental Sustainability

Joanne D. Schuijf, PhD

During the summer of 2022 many imaging centers in the USA and elsewhere faced a shortage of iodinated contrast, which is crucial for contrast-enhanced CT. Due to the COVID-19 lockdown, a key manufacturing facility was forced to temporarily shut down, causing an almost immediate global shortage of iodinated contrast. Hospitals responded rapidly with various mitigation strategies to maintain care as much as possible. Production has meanwhile resumed, but local shortages are expected to last for weeks to come. Moreover, the contrast agent shortage and rapid implementation of strategies to reduce the administration and waste of contrast materials highlight the need to critically review our approach to contrast utilization in radiology. We need to become less vulnerable to shortages in the short-term and strive for sustainability in the long run.

In this article, I'll discuss the benefits of contrast reduction from a patient, financial and environmental perspective. In addition, I'll list several ways how technological advancements can help you reduce the amount of contrast administered.

Contrast reduction: How can patients benefit?

For many imaging procedures, contrast agents - such as iodinated contrast for CT and gadolinium-based contrast agents for MRI - play a crucial role in improving the detection and characterization of abnormalities. Although the administration of contrast agents is generally safe, allergic responses can occur while also caution is required in case of renal impairment. Thus, for each patient the potential negative effects of using contrast are weighed against the benefits of the diagnostic or therapeutic procedure and, ideally, the administration of contrast agents is restricted as much as possible. As the population ages, the number of patients with relative contraindications to contrast is expected to increase since renal function declines with age.

Recently, concerns have also been raised due to the observation of gadolinium retention, particularly in the setting of repeated imaging. Thus, strategies to reduce patient exposure are warranted. Such considerations of patient safety are fueling the development of imaging approaches to either reduce the amount of contrast or even providing contrast-free alternatives to limit contrast related complications.

Contrast reduction: How can hospital finance benefit?

More efficient use of contrast materials also makes sense from a financial perspective. In general, the benefits of contrast administration through improved diagnostic performance offset the financial costs of contrast agent. However, in times of increasing financial restriction, strategies to improve operational efficiency and minimize costs are mandated. Several studies have investigated the potential cost-savings when changing from single-use vials to multi-patient injection systems. Routhier et al.[1] showed for 3 major CT indications (pulmonary embolism, head and neck, abdomen and pelvis) that such an approach could reduce the average amount of contrast agent used and translate to annual cost savings of $31,000 (corresponding to approx. € 24,200). Likewise, Struik et al.[2] pointed to increased operational efficiency and lower costs for MRI.

Contrast reduction: How can the environment benefit?

Reducing resource consumption is crucial to support the transition towards more environmentally sustainable healthcare[3]. In this context, the negative consequences of medical pharmaceuticals on the environment are a growing problem that calls for awareness and action worldwide. With rising levels of care, human pharmaceuticals are increasingly found in our waterways, posing a risk to the natural environment and our health. Contrast materials are no different. As contrast agents are excreted from the body via the urine, they also enter the aquatic environment

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through our sewage systems. Contrast media and their byproducts are now commonly detected in our rivers, lakes and drinking water supply systems[4-6]. Indeed, during the past decades, concentrations have been found to increase in direct relation to growth in imaging utilization and as such are expected to rise further[4-6]. It is important to realize that while contrast media themselves are relatively safe with low toxicity, their byproducts may not have the same risk profile. Moreover, contrast agents and their byproducts are difficult to completely remove from water during purification processes. Such observations provide another important argument to invest in strategies to reduce contrast media use and waste.

Contrast reduction: How can technical innovations contribute?

Multi-patient dosage systems and saline flush techniques can minimize the amount of wasted contrast material, while urine collection bags have been shown to reduce entry into the sewage system[6]. However, from a patient perspective, it is preferable to optimize the amount of contrast administered. In this regard, weight-based dosing is an important first step. The contrast shortage also created awareness that protocols for certain indications could safely be shifted to non-contrast CT protocols. Nonetheless, for those indications that do require enhancement with contrast agents, technological advancements may provide important opportunities to further reduce contrast dose.

During the past decades, engineers from Canon Medical Systems have been actively pursuing strategies to limit the need for contrast materials. More recently, developments in artificial intelligence have been added to technologies available for this purpose. As shown in the clinical examples below for CT, combining Deep Learning Reconstruction algorithms, such as with Advanced intelligent Clear-IQ Engine (AiCE), with low kVp (Figure 1) or spectral techniques (Figure 2) allows to maintain or increase arterial enhancement while using less contrast.

Other approaches to contrast media optimization are also available from Canon Medical. In CT, the virtual contrast boost technique uses a sophisticated 3D algorithm to boost the contrast-enhanced signal (figure 3). High technical efficiency with substantially lower contrast use was recently demonstrated in the interventional setting using a state-of-the-art Angio CT system for liver ablations[7]. In MRI, pioneering work is taking contrast reduction even further by eliminating its use entirely in angiographic applications[8,9]. Continuous improvement and further expansion to other indications remain areas of active research and development[8,10].

Key takeaways

Contrast agents remain crucial for imaging diagnostics and interventions. While reducing contrast may not always seem worth the effort or a priority, it is our responsibility as healthcare providers to reduce patient and environmental exposure to contrast agents as much as possible.

Reduction of contrast media use has important benefits:

- For patients by reducing complications
- For hospitals by reducing costs
- For the planet by reducing environmental pollution

Reduction can be achieved in several ways, including:

- Reduction of contrast waste
- Reduction of contrast volume per examination
- Development of contrast-free alternatives

Medical imaging companies play an important role in reducing contrast use through technological innovation and Canon Medical is committed to continuing its efforts in this area. //

Example 1

Usually 80 kVp is limited to smaller patients due to higher noise and reduced image quality. However, Advanced intelligent Clear -IQ Engine (AiCE) Deep learning Reconstruction makes it possible to use 80 kVp even for average-sized to moderately overweight patients by reducing noise and improving overall image quality.

In this clinical example, contrast saving is clearly demonstrated when combining lower kVp with AiCE DLR compared to higher kVp without DLR.

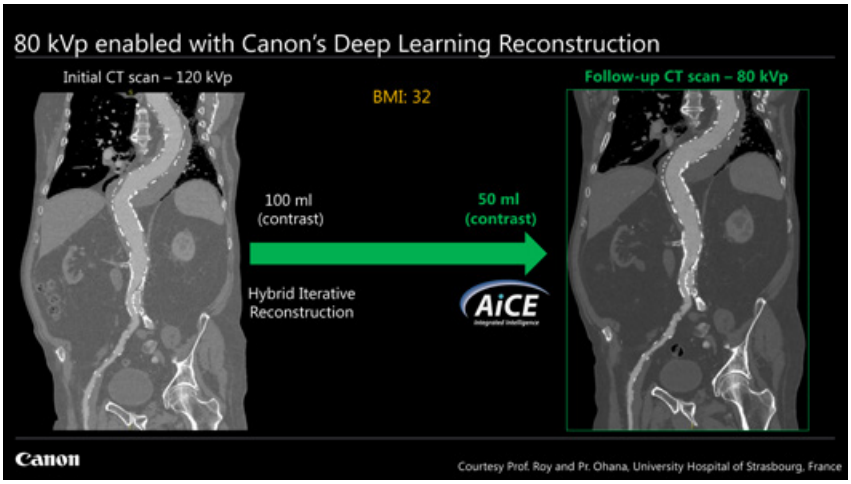


Figure 1.

Example 2

Deep Learning Spectral makes it possible to fully benefit from the iodine conspicuity at low keV range (35-60 keV) by providing excellent low noise virtual monochromatic images across the entire keV spectrum.

In this clinical example, iodine contrast load is reduced by 46% when using Deep Learning Spectral, compared to the standard site protocol.

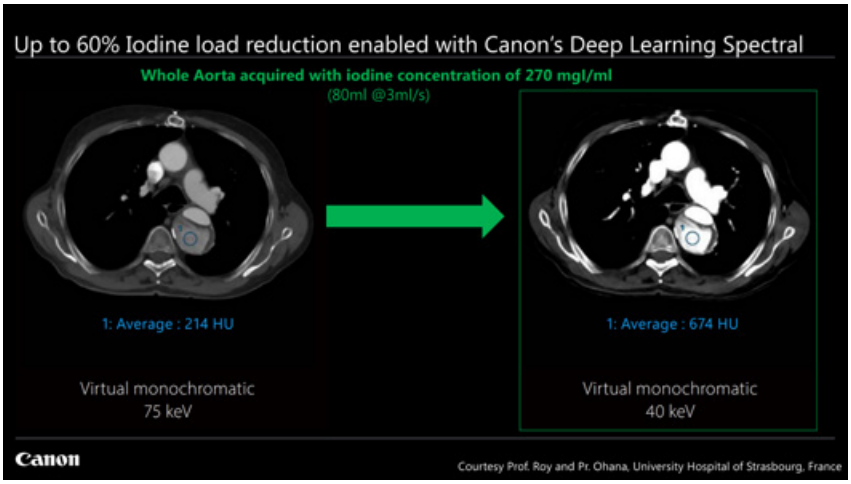


Figure 2.

Example 3

Subtraction CT (SCT) Virtual Contrast Boost is a sophisticated 3D deformable registration algorithm which ensures accurate extraction of the iodine signal. Recombining the extracted iodine signal into the CTA data set increases the HU density of iodine.

In this clinical example, iodine signal is increased by 45% and 112% respectively, using SCT Virtual Contrast Boost 1 and Contrast Boost 2. This SCT technology, unique to Canon Medical, makes it possible to fully benefit from this significant increase in iodine signal for contrast media optimization.

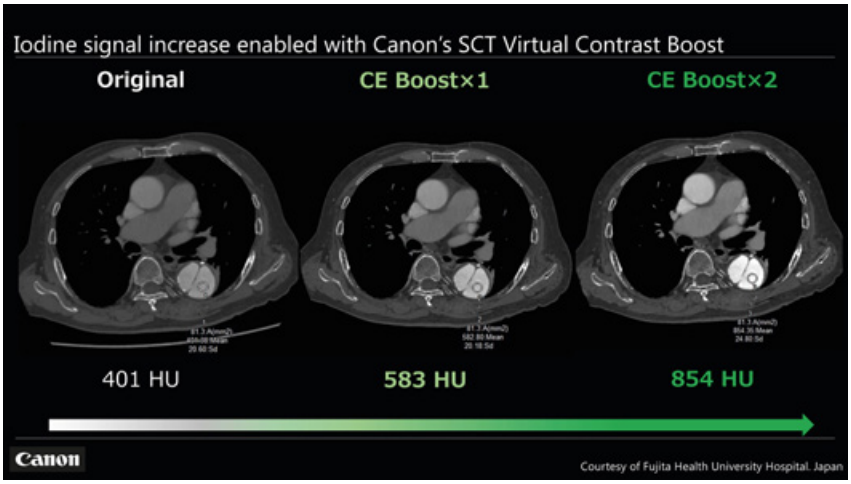


Figure 3.



Dr. Joanne Schuijf
Clinical Research Manager working as a member of the Global Research & Development Center in Canon Medical Systems Europe. She is an expert on cardiovascular imaging having over 15 years' experience in the field.

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More Time for Patient Care with INSTINX and Aquilion Serve

Canon Medical's new Aquilion Serve CT scanner was specially designed to support busy imaging departments that face challenges in time and staffing. With a host of brand-new features, the new system delivers better image quality, lower radiation dose and optimized workflow to enable healthcare professionals to focus more on patient care.

The Royal Bournemouth Hospital is a large and busy general healthcare facility in the South of the UK. Facing increased demands for consistent high quality scanning, the Hospital opted for an Aquilion Serve, which has already helped to improve efficiency and bring greater confidence to its 28 radiographers. Matthew Benbow, Superintendent Radiographer, manages the CT and MRI Departments. He explains to VISIONS how the new system has dramatically reduced training time and workflow.

The Royal Bournemouth Hospital is a general (723 beds) hospital in Bournemouth, Dorset, UK, managed by the University Hospitals Dorset NHS Foundation Trust. It already houses three Canon Medical CT scanners: Aquilion ONE ViSION Edition, Aquilion ONE GENESIS Edition, and now, an Aquilion Serve.

Challenging environment

Matthew has worked at the Hospital for over 23 years. During this time, he has experienced the growth in demand for CT imaging, as well as its technological evolution.

"When I first came to Bournemouth, we were scanning around 15 patients per day on one CT scanner, due to lower demand and much lower scanner capabilities," he said. "Now, we've got three CT scanners and we're imaging around 100 plus patients per day. So, each of those scanners is doing at least twice as much as the original one used to do."

Alongside increasing workloads, the available staff changed drastically at the hospital.

"The turnover of radiographers is now high and there is a shortage of radiographers. It's hard to get them. They come and go quicker than they used to years ago, when they used to stay around for 15-20 years," he remarked. "Now, sometimes, we train someone and they move on again really quickly. The key thing is that we want new people trained as quickly as possible, so that they can take part in the full rota, including the night work, the evening work, and the shift work.... as a full member of the team and in a position that doesn't require supervision by somebody else."

New standards in workflow efficiency

The Aquilion Serve features INSTINX - Canon Medical's new, holistic, ultra-efficient workflow solution. INSTINX was specially designed to enhance every aspect of imaging - from patient positioning, right to patient scanning and reporting. It features many advanced technologies and innovations from Canon Medical. Wherever possible, automation is employed to make operation easier, faster and provide a more consistent workflow experience.

Aquilion Serve Simply delivers

The Aquilion Serve is suitable for all routine examinations. It features a new 80-cm wide bore gantry with two easy-to-use touch panels and inbuilt cameras that enable automated, one-touch patient positioning. It also introduces Canon Medical's unique INSTINX workflow solution. which combines AI-enabled automation with innovative hardware and an intuitive user experience to support fast, easy, and safe CT exams. The new workflow also dramatically reduces training time for operators.

"The User interface of the Aquilion Serve is state of the art which makes building protocols much easier and much more straightforward, as well as in scanning. People are getting to grips with it a lot quicker," said Matthew. "It also includes some automation that didn't exist previously. Canon Medical have brought some innovative features and some clever automation into the software, which we are taking advantage of."

"There are two cameras built into the gantry for automated positioning during initial setup. They help ensure that the patient is in the iso-center of the gantry," added Matthew. "that's important, because you get a better scan quality and you get a better dose profile if the patient is in the middle. So, the cameras 'look for' the patient and moves them to the correct start position, the correct height and adjusts the left-right positioning when needed before you start acquiring any images. That was a manual process before, now the Aquilion Serve is doing that for you."

"The touch panels on the gantry are very straightforward and clear," he said. "You make a body part selection, then you press a single button and the scanner carries out the task that you just asked it to do. The touch panels are on both sides of the gantry - left and right. Obviously, different rooms will be designed in different ways. So you might want one side or the other, but it works on both sides which is very straightforward."

Enhanced safety

Many of the new features of the Aquilion Serve enhance the safety of all procedures for the patients, as well as staff.

"It's always better to have the patients in the middle of the gantry. They are less likely to knock their arms and their elbows because they are centrally positioned," said Matthew. "With the scanner's lateral table movement, it saves anyone having to pull the patient manually across on the mattress, or dragging them across on a slide sheet. Some patients are really heavy. So, manually pulling the patients into position is not only less comfortable for the patient, but is also risky for the radiographer that's performing that. A motorized tabletop offers some reduction in the risk of manual handling incidents or accidents, which is great."

Low dose scanning

Using SilverBeam technology, the Aquilion Serve's 3D Landmark Scan, provides an ultra-low dose 3D scanogram. The dose of the 3D scanogram is the same as frontal and lateral 2D scanograms.

"The advantages of 3D Landmark Scan are that it allows the scanner to perform automatic landmark detection of scan ranges and accurate fields of view," said Matthew. "So, you can use, not just the frontal and lateral image that's generated from the helical scanogram, but you can also use the axial slices to ensure your field of view is optimum. So, you effectively get it for free compared with what you did before, i.e. for the same dose you now get extra functionality."

Matthew Benbow

Matthew is the Superintendent Radiographer of CT and MRI at the Royal Bournemouth Hospital in Bournemouth. He joined the Hospital 23 years ago. Prior to this, he was a Senior Radiographer at Southampton General Hospital (UK) for five years. And before this, he has worked in Brighton (UK) and Treliske Hospital in Truro, Cornwall (UK) where he originally trained. When he is not working, Matthew plays bass in a hospital band called 'On the NASH'.



"As the Aquilion Serve is so intuitive and easy to operate, training time is significantly reduced."

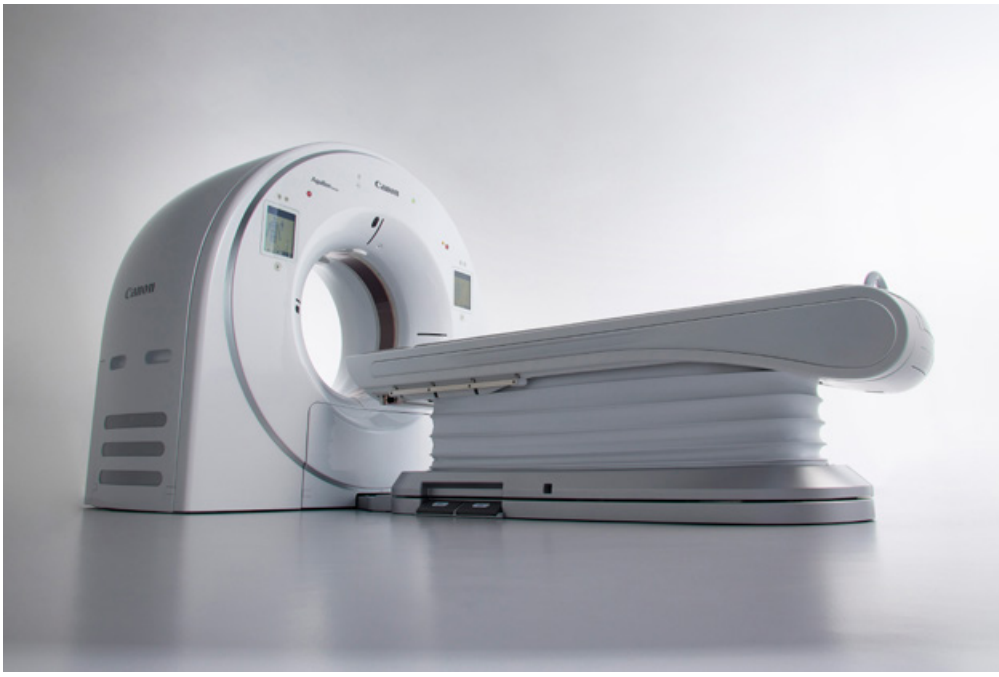
Matthew Benbow

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"Based on your scan protocol, Automatic Landmark Detection (ALD) automatically adjusts the scan range, Field of View, kV and mA for each individual patient." he continued. "It speeds up the operation that the radiographer has to do and gives them more time to focus on other important issues, like the patient. We are using ALD for all our examinations. "

Canon Medical's Advanced intelligent Clear-IQ Engine (AiCE) deep learning reconstruction algorithm provides high quality low noise images with low dose levels according to Matthew.

"AiCE is another successful example of where clever reconstruction techniques have come along. We use it on all reconstructions."



Aquilion Serve's 80-cm wide-bore gantry, inbuilt positioning cameras, smart touch screen controls and Tech assist lateral slide, allows efficient patient setup to be provided with the utmost care, resulting in reduced stress for both the operator and the patient.

Accelerated training

As the Aquilion Serve is so intuitive and easy to operate, training time is significantly reduced.

"After a fortnight of applications training, around 10 of our radiographers were happily performing scans with the system," said Matthew. "That's unusual for that number of people in that short time. Everybody just took to it so intuitively. It is great news if we can shorten training time. There are 28 radiographers here, who have all got to learn to use it. It makes that process simpler."

Matthew also recognizes that the more straightforward and intuitive equipment is, the less likely it is that errors are made.

"With the simplified and more intuitive software that we have on the Aquilion Serve, I believe that the probability of anyone making an error or requiring assistance is reduced because it's more obvious when the operator is doing the right thing," he said. "It gives them confidence that they are not looking at a cluttered screen with several different options, any of which could be the right one. They're working on a very clear screen, which is intuitive as to where they're going next. The software is structured such that they are guided in the right direction."

"The Serve is enjoyable for our operators to use, because they feel not only supported by training, but without even realizing it, they feel supported by the person who designed the software," added Matthew. "It enables them to feel comfortable and confident that they're doing the right thing."

Long-term partnership

For around 22 of the 23 years that Matthew has worked at the Royal Bournemouth Hospital, he has been collaborating with Canon Medical.

"Some of the Canon people are still there after all these years. I've got to know them really well. It's a great team to get on with and work with,' said Matthew. "They know what we need and are only too keen to try to support that, and make it happen, which is probably why the relationship has gone on so long and continues to go on."

"I look forward to where INSTINX is going. It is great to have one of the first Aquilion Serve CT scanners and to be at the forefront with INSTINX. It's a brand new software platform which undoubtedly will be developed further for many years. The developments that will come along with that will be quite exciting," he continued. "We're certainly keen to push it as hard as we can and see what we can do with it, but, so far, so good. And we are enjoying it very much."

"The Serve is very much a workhorse scanner. It's used for a mixture of inpatients and outpatients and works through big numbers of patients every day. It's capable of doing that," he said. "That's what we're going to expect of it. And I've got every confidence that that is what it's going to deliver." //

Click HERE to find out more about the new Aquilion Serve

Canon



Perform simple, safe, high-quality CT exams with consistent clinical outcomes

As radiology departments around the world find themselves increasingly pushed to their limits, they need a CT scanner that delivers low dose, consistent results and fast throughput that leaves more time for patient care. With workflow features that deliver simplified patient positioning, automatic scan planning and AI-enabled solutions, Aquilion Serve meets these needs.



Aquilion Serve

Simply delivers.

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Vantage Fortian
Canon



VISIONS spoke with Thierry Munier, European Director of MRI at Canon Medical Systems Europe, about what customers can expect in terms of novelty at the dawn of a new year.

More Automation and Real-Time Analysis Gain Momentum in 2023

Activity has resumed in 2022 and automation is becoming the standard, according to Thierry Munier, European Director of MRI at Canon Medical Systems Europe, who told VISIONS what customers can expect in terms of novelty at the dawn of a new year.

'We're back to an almost traditional operation level inside the organization and with users or future customers, whom we've been able to meet again in product presentations or conferences such as the ECR, JFR or SIRM,' he said. 'We were able to restart site visits and take potential customers on tour.'

The COVID-19 pandemic put MRI sales on hold in 2020 and early 2021, but activity has resumed, with a stark increase in new installations and replacements.

'There's a strong demand because patients who had abandoned their care journey have now returned,' he explained. 'There's a long waiting list and we have to respond as soon as possible. We can't lose time in intermediate operations that don't contribute to diagnosis.'

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Current market trends

The pandemic has put a strain on already tight resources, and there is a very strong interest in improving workflow with automation.

'Healthcare systems are bled dry, both financially and in terms of human resources. There are difficulties in recruiting skilled personnel, and there are fewer and fewer radiographers and technicians. Physicians have more and more tasks to manage and there's a lot of burnout. Systems must be made easier to use. Workflow must be increasingly simple and fast.'

Automation is becoming the standard, but there are a few obstacles that remain to be tackled, according to Thierry. 'While many companies provide software that enable ease of workflow, these solutions are usually focused on specific applications. And unlike CT, which is increasingly specialized, an MRI scanner traditionally serves all purposes inside a hospital. We need either a more generalized post-treatment solution or a lot of small bricks that correspond to all the needs,' he suggested.

Imaging equipment vendors do not have the means to develop solutions for every application, so the market is likely to move towards a market place style and forge partnerships with AI companies, he predicted. 'There are so many diverse and varied requests that one type of software can't answer all the clinical specificities, especially in MRI, where image types vary a lot depending on the anatomy.'

The challenge will be to meet the different customers' needs and accompany them in performing automated post-processing tasks.

2022 has been a milestone for Canon Medical with the launch of the new Vantage Fortian 1.5T MRI system, now installed in Japan, Spain and France, and further installations in the pipeline. 'It's been a marketing and sales success. We've sold 14 scanners since the system was launched in July and feedback is very positive from the installed equipment.'

The Vantage Fortian was launched together with new features that bring many improvements, which have also been added to other equipment in the portfolio, such as the Orian 1.5T and the Galan 3T systems.



Vantage Galan 3T



Vantage Fortian



Vantage Orian



Vantage Elan NX Edition



Vantage Orian / Encore Upgrade

Canon Medical's MR portfolio.



"MRI is an exciting modality with innovation for decades. Our "Made For Life" philosophy is anchored in our R&D strategy to provide fast, reliable and efficient MR diagnosis solutions."

Thierry Munier, European Director of MRI, Canon Medical Systems Europe.

'The reliability and reproducibility of MR images continue to be improved, and we're very proud to show that we develop solutions that meet the needs of our users and improve their diagnostic efficiency,' Thierry said. 'Part of my team's role is to understand the users' needs and communicate them to Japan, where engineers can develop products that will make a difference.'

Horizon 2023 and beyond

A lot of exciting things are going to happen this year, with the introduction of features such as Auto Consult Brain, a fully automated procedure that covers all steps of an examination from patient positioning to image analysis and reporting, with live automation during the acquisition.

'The choice of sequences automatically takes into account the patient's history,' he explained. 'The software automatically recovers the previous protocol through the PACS or RIS, and reprograms the same type of examination with the same positioning of the slices, which is great for reproducibility.'

At the end of the basic protocol, the data are sent to the automatic analysis software, while the patient is still on the examination table, and the system compares two types of images (FLAIR and diffusion) to see if there is any inconsistency between the two.

Depending on the results, the system either informs that no additional information is needed or sends an instruction to complete the examination using sequences with or without contrast. The protocol is guided by the results of the automation platform in real time.

'Automation systems and real-time analysis will become widespread in the next 20 years,' Thierry said. 'The competence is not necessarily there. Teleradiology is developing more and more, so there may be a medical supervisor on site, who might not have skills in medical imaging. Real-time automation will have an impact on the way imaging services are organized.'

Auto Consult Brain will first target stroke, to enable earlier diagnosis and treatment onset. Other applications will follow, such as oncology, multiple sclerosis, prostate or MSK imaging.

Another exciting release in 2023 will be the introduction of PIQE, an AI-fed tool already used in CT scans to improve image resolution. In MRI, the software will enable to obtain a high resolution on standard acquisitions with small size matrices, by applying the algorithm to raw data. The solution will be applicable everywhere.

'In MRI we want to go for resolution of fine anatomies like the knee, the polygon of Willis, or small ones like the pituitary gland and the inner ear,' he said. 'We also continue to develop a technique of motion correction using AI.'

The challenges for MRI remain to expedite examination times and improve image quality to boost diagnostic efficiency, either with finer images or new acquisition techniques, all the while trying to reduce motion artifacts.

There is no doubt that future equipment will help overcome these limitations, Thierry believes. 'I'm blessed to be working in a modality that is still evolving. I started 35 years ago and I learn every day. It's always surprising to see that things we thought were impossible become so, thanks to advances made in science and technology. We manage to solve problems that we thought were unsolvable before.' //

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Maximizing the Potential of AI in Clinical Medicine

In this article, Dr Ken Sutherland, gives his perspective on what meaningful innovation should entail when it comes to AI. He discusses where we currently stand with AI and touches on critical points of attention needed to move deeplearning algorithms out of the research environment into real-world clinical practice.

How has artificialintelligence evolved so far?

Years of technological innovation has meant that 'off-the-shelf' computing equipment has become so powerful that AI deep learning (the process of generalizing patterns from large numbers of datasets) is possible at a reasonable cost. The availability of good quality, well-curated datasets has also improved, and new methods of AI learning have been invented that are better at mimicking humans. Combining these advances has enabled the application of AI to the entire #Radiology workflow, and this change has the potential to be transformational. We can all learn a lot from the use of AI in the research environment.

From research to practice: What are the caveats?

Caution is required. A great deal is now understood about the pitfalls of training AI with poor-quality or biased datasets and the merits of using a truly representative population for verification.

In truth, the term 'Artificial Intelligence' as we use it in Radiology and Healthcare today is a misnomer. The AI algorithms being developed don't understand the data that they use or the results that they produce. Algorithms alone have no understanding of pathology, disease, patients, or even care, but they are definitely useful given the challenges facing healthcare providers. Particularly during a time when we are emerging from a global pandemic that has changed medicine forever.

Healthcare professionals are becoming increasingly 'AI savvy' and are asking the right questions to industry and partners. AI algorithms that can support humans but not replace them is an achievable and desirable goal for all parties. Increasingly AI researchers are being challenged to demonstrate that their innovation works within a real workflow and not just in the test environment in the laboratory.

"Deployed effectively, AI can free-up healthcare professionals to spend more time with patients and create more time for non-routine work that demands their experience and skill."

Dr. Ken Sutherland, President of Canon Medical Research Europe.



Towards the future: How can we optimally deploy AI in healthcare?
The appropriate use of AI to streamline the entire radiology workflow, from patient positioning on the scanner through to the final diagnostic process, can free-up professionals to spend more time with patients and create more time for non-routine work that demands their experience and skill.

Embedding AI into the clinical environment to create data-driven workflows, in which the relevant information is provided to the clinician at the right stage of the process to enable optimal decision-making, is probably the final challenge that requires vendors to work together. No individual organization or company can currently deliver these next generation 'smart workflows' alone, but the goal of delivering improved healthcare for all is so compelling that alliances and ecosystems are forming to tackle this ultimate challenge at such a critical time.

We can harness AI now for the benefit of us all. It is already creating a positive difference in in image quality, reconstruction speed, enabling reduced radiation dose and accelerating workflows. However, the human expertise of clinicians remains essential and always will.

Find out more about Canon Medical's holistic approach to AI, powered by Altivity. //

Scan the code or click HERE for more information

Dr. Ken Sutherland
Dr Ken Sutherland is President of Canon Medical Research Europe and is responsible for all aspects of the strategic development and operational control within Canon Medical Research Europe Ltd and is also a key member of Canon Medical Systems Global R&D leadership team. He serves as a member of the Scottish Government Inward Investment Forum, where he was previously a lay member of the court of the University of Glasgow, UK, and as an advisory board member of the Scottish Lifesciences Association. He was recently appointed as a Fellow of the Royal Society of Edinburgh, UK.

Ken studied Electronics and Computer Science at Edinburgh University, Edinburgh, UK, and gained a PhD in image analysis and has four years postdoctoral research experience in medical image analysis. He returned to Edinburgh in August 2007 to join Canon Medical as R&D General Manager following his previous post of Operations Director for a European multinational where he was responsible for their imaging R&D facility in Cambridge, UK.

Canon Medical Research Europe
Canon Medical Research Europe works closely with global academic partners and clinical collaborators, as well as Canon Medical Group colleagues in Japan and the USA, towards translating state-of-the-art AI into effective clinical decision support that empowers clinicians and makes a positive contribution to healthcare.



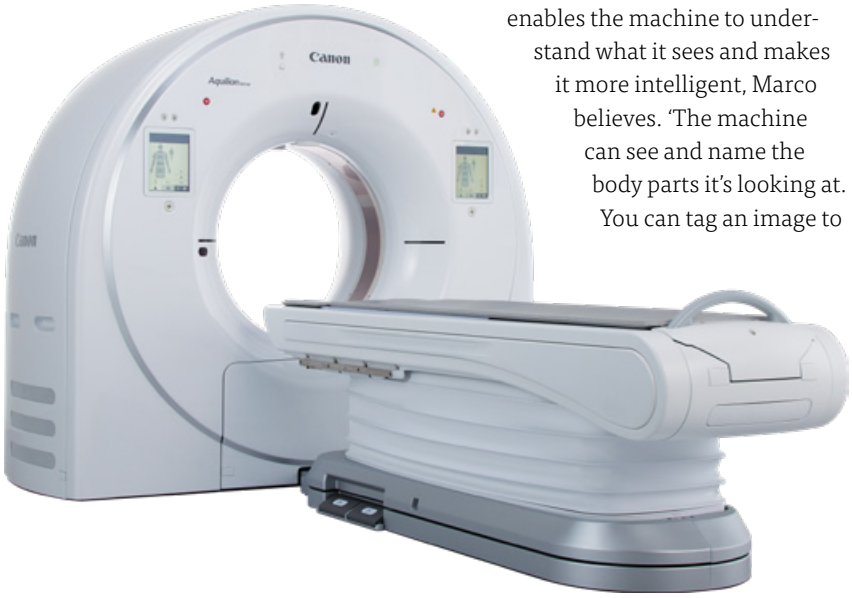
Making the Machine More Intelligent

The automatic scan planning feature on Canon Medical's new Aquilion Serve CT scanner is pushing the boundaries in image acquisition, to let clinicians focus on what really matters: patients. VISIONS spoke with Marco Razeto, Principal Scientist at Canon Medical Research Europe (CMRE) in Edinburgh, UK, about Anatomical Landmark Detection (ALD), the algorithm behind the technology.

Anatomical Landmark Detection is an AI-driven algorithm and one of the most important technologies used in automatic scan planning, according to Marco, who supervised the team responsible for the creation of the tool.

'ALD identifies specific anatomical locations using a 3D landmark scan - i.e. an ultra-low dose CT scan of the whole body, and names them,' he explained.

ALD marks the location with a particular name code so that the machine knows where parts of the body are in space. 'This way, you can set boundaries for your scan and don't have to touch anything else. You can focus on exactly what you want to image.'



The tool improves workflow, increases clinicians and technicians confidence, and improves consistency between radiographers regardless of their experience. Radiographers no longer have to take 2D scanos and drag boxes around the area they want to image - a process that can take up to 20 seconds for an experienced technician.

'You save time and energy,' he said. 'The clinician and the technician can care more about the patient and less about planning the examinations.'

With automatic positioning, the risk of making a mistake is also drastically reduced, as the system doesn't get tired or distracted.

The main benefit of ALD is that it enables the machine to understand what it sees and makes it more intelligent, Marco believes. 'The machine can see and name the body parts it's looking at. You can tag an image to say what's in it, and you can pre-process the image to be used for a clinical application. The machine can name the content of the image. It gives you automatically fulfilled information.'

An innovation started over a decade ago

Initial works for the creation of ALD started over a decade ago, to answer a concrete clinical question. 'Scientists wondered if we could find an anatomical location directly from 3D images,' he recalled. 'We developed the tool over many years for different purposes, including aligning images of the same patient over time on different modalities.'

About four years ago, the CMRE team was invited to adapt the algorithm to automatically determine the borders of a CT scan.

Over 30 scientists have worked to refine the algorithm for this particular setting. 'It's really a collaborative effort between everyone at CMRE, Canon Medical Europe and Canon Medical Japan,' he said.

The team initially trained the algorithm on hundreds of manually annotated CT images. For the automatic scan planning feature, they did additional training on hundreds of 3D landmark scans, since the dose and appearance are different from routine axial CT images.

"The clinician and the technician can care more about the patient and less about the control of the examinations."

Marco Razeto, Principal Scientist at Canon Medical Research Europe (CMRE) in Edinburgh, UK



The researchers at CMRE were among the first to develop a solution using AI and faced a number of issues at the time. 'We solved most problems before the explosion of machine learning and deep learning,' said Marco, a graduate physicist and computer engineer, who helped pioneer image analysis powered by AI and other computational methods 20 years ago. 'We were exploring a new technique, so there wasn't much understanding on the market yet.'

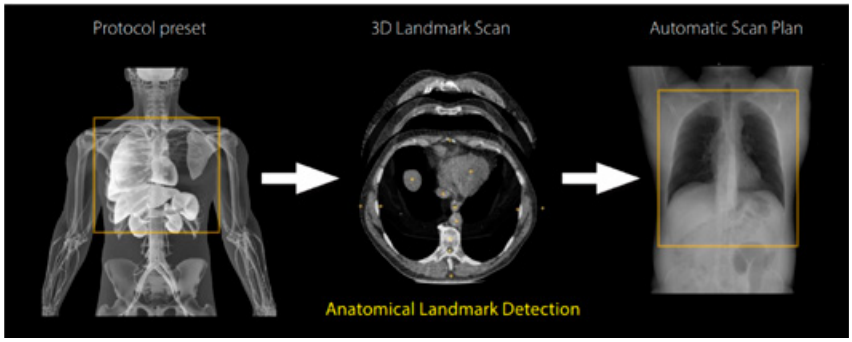
Another problem for these early developers was the lack of availability of the right data. 'That's an issue with every machine learning algorithm. Even today, it's hard to explain that we need a mountain of data to be able to do these things.'

Furthermore, the product is based on a particular type of imaging which was available only at one or two sites in the world back then, slowing down data collection.

Nevertheless, the team found a way to tackle these issues and managed to test the tool with quantitative analysis of the results. 'We checked not only whether we identified the landmarks we wanted but also how far they are from their original positions - the right place. We test the tool continuously.' ALD's detection accuracy is in the 2mm range, making it very reliable to work with in daily practice.

Further improvements of ALD will focus on making it faster, better and, possibly, extending it to other modalities, depending on the clinical needs.

A low-hanging fruit with the technology is the ability to do cross-modality imaging, as ALD can be adapted to MRI or ultrasound, Marco believes. 'That could be very interesting for patients with cancer or chronic diseases that require life-long imaging,' he concluded. //



Employing a 3D Landmark scanogram, Canon's Anatomical Landmark Detection (ALD) can accurately identify over 300 physiological landmarks to automatically plan all routine scans. This saves time and ensures consistent, high-quality results.

Marco Razeto is a Principal Scientist at Canon Medical Research Europe (CMRE). Marco graduated in physics in the late 1990s at the University of Genoa, Italy. He then moved to the UK, where he completed his PhD in computer engineering, computer vision and medical imaging in 2005 at Heriot-Watt University, Edinburgh. He started working for Voxar, which was later acquired by Barco and then Toshiba Medical Systems, which Canon Medical acquired in 2016.

Canon Medical Research Europe (CMRE)

Canon Medical Research Europe (CMRE) in Edinburg, UK is a 130-strong team working on improving and automating patient care workflow, right from the start of the patient journey - from image acquisition to diagnosis, treatment and monitoring. CMRE is a centre of excellence for the development of Machine Learning technology and half of the team is working on developing new technologies.

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Bringing State-of-the-Art Multimodality Imaging to Veterinary Healthcare

The Puchol Veterinary Hospital in Madrid, Spain, is the largest independent, veterinary referral hospital in the country. Established in 2017, by Veterinarian, José Luis Puchol, it now treats over 9,000 patients per year and has 120 staff. The Hospital, which is operational 24 hours a day, offers a full range of veterinary specialisms including trauma, orthopedics, oncology, neurology, ophthalmology, cardiology, internal medicine, dermatology and rehabilitation and physiotherapy. With such a comprehensive remit and high workloads, high quality imaging across all modalities is essential to deliver accurate diagnoses and treatment. The Hospital turned to Canon Medical to meet its evolving imaging needs. Some of the specialists at the Hospital explained to VISIONS how Canon Medical's Vantage Elan MRI, Aquilion Lightning CT and Aplio i900 Ultrasound, provide the advanced capabilities required.

The clinical opportunities offered by advanced imaging equipment actually inspired José Luis Puchol to set up the independent veterinary hospital. He has dedicated his entire professional life to small animal surgery, and has practiced for more than 40 years as a soft tissue surgeon, traumatologist, and neurosurgeon. Along this long period he was collaborating with Clínica Puerta de Hierro en Madrid.

"The decision to take the huge leap from working at a veterinary clinic to creating my own veterinary hospital started when I needed a room at the clinic. in which I could install an MRI machine that would allow me to properly address my neurological patients," he said. "Although I am not a neurologist, over the years I have received hundreds of patients with herniated discs that required immediate surgical intervention. One thing led to another…since we put MRI, why not also a CT to help us with our orthope-



"We met with the providers of advanced medical imaging and, without a doubt, Canon Medical was the best by far."

Dr. José Luis Puchol, founder and owner of the Puchol Veterinary Hospital in Madrid, Spain.

What makes Canon Medical's systems ideal for veterinary imaging?

Vantage Elan MRI
The Vantage Elan offers outstanding performance and reliability and is a small-space MRI system that delivers day after day without compromise—for when reliability matters most.

Aquilion Lightning CT
The Aquilion Lightning - Canon Medical Systems' 16-row 32 slice helical CT system for whole-body imaging - employs cutting-edge technologies to optimize patient care and accelerate clinical decision making. Innovative features ensure that high-quality isotropic images are routinely acquired with low patient dose. The workflow is streamlined and a wide range of advanced 3D and post processing applications provide clinical flexibility.

Aplio i-series Ultrasound
Aplio i-series is designed to deliver outstanding clinical precision and departmental productivity. Crystal-clear images with enhanced resolution and penetration as well as an abundance of expert tools help you get your diagnostic answer quickly and reliably.

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dic and oncology patients...? Finally, the answer came to me that to address this situation with a 360º vision, I needed to create a facility that could offer all possible referral options to veterinarians, the best conditions and with the maximum guarantees... this was the start of the Veterinary Hospital project, Puchol."

A clear choice

In the process of equipping the new hospital, they met with many companies that offer advanced diagnostic imaging technology, studied the features of their equipment and listened to their offers, they considered Canon Medical to be the best option by far.



The Puchol Veterinary Hospital in Madrid, Spain.

"We first purchased a Vantage Elan 1.5T MRI and an Aquilion Lighting 16-slice CT from Canon Medical, to which we added advanced ultrasound through the Aplio i900 and echocardiography equipment that would be used by different specialists,' he said.

"Looking back, I still wonder how we were able to diagnose and medically and surgically treat some patients with complicated pathologies without advanced imaging capabilities," he added. "We tend to take for granted that we need it to help our patients on a day-to-day basis - not just traumatologists or neurologists, but for all specialties: internal medicine, cardiology, dermatology, intensive care, and so on."

Fast and reliable MRI benefits Neurology

Approximately 50% of the patients referred to the Neurology Department at the Hospital require an MRI. Many of them almost immediately or at least within 24-48 hours.

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The Puchol Veterinary Hospital in Madrid, Spain.

"As a Neurologist, the possibility of having advanced MRI examination equipment, such as the Vantage Elan, 24-hours a day and being able to interpret the images, on many occasions in real time, represents an enormous advantage for the entire neurology service, since we can make the best therapeutic decision in the shortest possible time for each patient," remarked Pablo Amengual, Neurology Specialist at the Hospital.

Essential CT capabilities in Trauma Care

Veterinary trauma specialists often require CT for optimal care of their patients.

"CT images enable us to make specific diagnoses, for example, in the case of elbow and shoulder dysplasia," said Pedro Godinho, orthopedic surgeon and traumatologist. "In the field of soft tissue surgery, examinations with the Aquilion Lightning allows us to decide if a surgical intervention needs to be performed on a patient, what type of technique we are going to use and what the prognosis might be. For example, in the case of abdominal or thoracic masses, or in other cavities depending on their extension and the invasion of adjoining areas."

Meeting diverse Internal Medicine needs

The work of the veterinary internist can be especially complicated, as patients generally present chronic pathologies, with or without diagnosis, and may not have responded to previous treatments. In order to characterize the pathology in these patients, the internist must rely on the physical examination and the performance of complementary examinations, among which Ultrasound and CT, which frequently have a central role as diagnostic imaging tests.

"Especially abdominal and thoracic Ultrasound, helps us to evaluate the anatomical structures and take samples by fine needle aspiration of the different organs and abdominal fluids, which are then used mainly for cytological examination and culture, but we can also obtain biopsies for histological examination with the 'tru-cut' technique," explained Isabel Rodríguez, Internal Medicine Veterinarian.

"CT has infinite applications in internal medicine, for example, on many occasions we use it in association with



Dog scanned with Canon Medical's Aquilion Lightning.



Canon Medical's Vantage Elan at the Puchol Veterinary Hospital in Madrid, Spain.

endoscopy to characterize respiratory pathologies affecting the nasal cavity, trachea or bronchi," she added. "In these cases, CT helps us locate structural problems and endoscopy allows us to take samples (biopsies, bronchoalveolar lavages) or even apply treatment (foreign body removal, aspergillosis treatment, polyp removal). Other frequent indications for CT in internal medicine are the characterization of portosystemic shunts or pathologies of the urinary tract."

Providing Intensive Care

Abdominal- and thoracic ultrasound, as well as echocardiography, either in its FAST exam, or as an advanced diagnostic test, are essentials for Intensive Care in the Hospital.

"Our patients need constant monitoring and frequent reviews to assess the progression of their condition and to enable us to make quick decisions, as they are often unstable," said Gloria Cerviño at the Intensive Care Unit. "Our state-of-the-art ultrasound system - the Aplio i900 – means we can minimize patient movement and save time."

Investigating eye diseases

Advanced imaging is essential in the diagnosis of many eye diseases in animals.

"Although ultrasound is the most widely used modality in veterinary ophthalmology, CT and MRI provide us with high-quality 3D images, as well as elucidating the relationship between the different structures and cavities," said Fernando Laguna at the Hospital's Ophthalmology Department. "The CT also allows us the possibility of taking biopsies in a guided way, as well as draining orbital abscesses.

"We take advantage of the high contrast resolution of MRI on soft tissue to diagnose muscle diseases, such as myositis of the masticatory or extraocular muscles," added Manuel Villagrasa. "It also allows examination of the optic nerve, which clarifies the diagnosis of inflammatory, infectious and neoplastic diseases."

Long-term technology partner

Veterinary healthcare is, of course, evolving just as rapidly as human healthcare. It is just as important for imaging systems used in veterinary healthcare facilities to be of the latest generation and of the highest possible quality.

"We have recently renewed our collaboration with Canon Medical as a technology partner of the hospital because its equipment has always been very reliable, but we must also highlight its technical service and its commercial department, which have always responded quickly to any need that has arisen, taking into account that we are a hospital open 24 hours a day that has a high demand for imaging tests," said Dr. Puchol.

"We are confident that we can continue to provide the best service to our referring veterinarians, which is the most important thing for us, and always hand-in-hand with companies, such as Canon Medical.' //

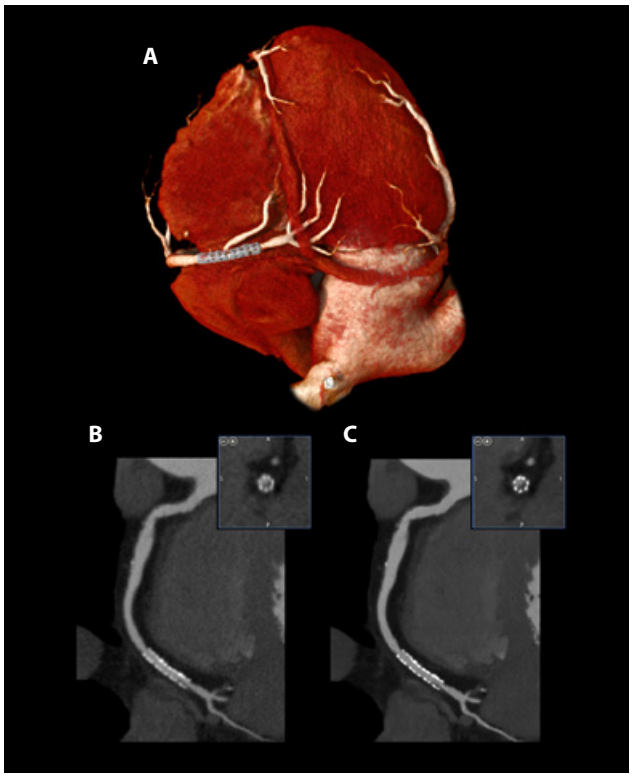
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Altivity

Altivity, Intelligent Healthcare Made Easy

Canon Medical works in close collaboration with some of the world's leading experts in all modalities to develop relevant technologies. Innovations in Artificial Intelligence (AI) have become a key focus in this in recent years. The Satellite Lunch Symposium held at ECR 2022 provided some important insights into how the progress that Canon Medical has made in deep learning is already of benefit in clinical practice.

The symposium, which was entitled: 'Altivity, Intelligent Healthcare Made Easy', was moderated by Prof. Mathias Prokop. Prof. Prokop is a Radiologist and Chairman of the Departments of Radiology at Radboud University Medical Center in Nijmegen, and as well at the University Medical Center Groningen, in the Netherlands. Prof. Prokop is recognized the world over for his achievements in new imaging technologies. Following a short introduction by Prof. Prokop, the audience listened to three presentations from eminent speakers about some of the most innovative applications of Canon Medical's deep learning technology in clinical practice.



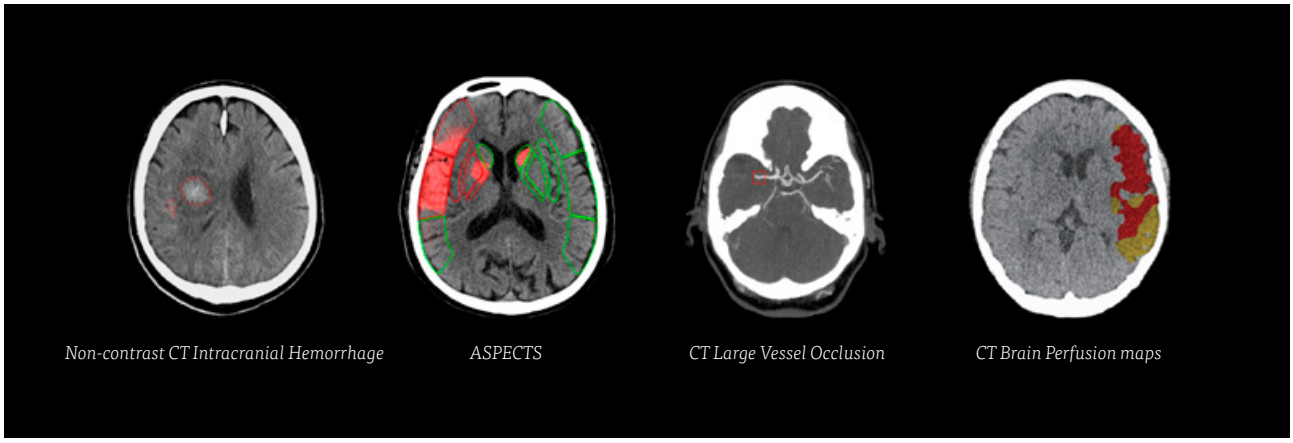
"We have some exciting innovations in CT and also MR that leverage AI in clinical routine but are not what we usually expect when we hear about AI, namely that AI is being used to help find these diseases," said Prof. Prokop. "Today, we are looking at something completely different, which is the use of AI to make images better, and in that way, help us to achieve the right diagnosis."

Super Resolution Cardiac CT

Cardiac imaging is one of the most demanding scans for CT because it requires the highest temporal resolution. It also requires a very high spatial resolution to enable a clear view of stents and calcifications. Therefore, Canon Medical has focused considerable attention on developing deep learning solutions for Cardiac CT. This builds upon the opportunities provided by the robust technology within its flagship CT scanners, the Aquilion ONE and Aquilion Precision, as well as the medical imaging industry's first deep learning algorithm Advanced intelligence Clear IQ Engine (AiCE).

Dr. Zhou Yu, Ph.D., Director of CT R&D at Canon Medical Research USA, Inc. explained how Deep Learning Reconstruction with Super-Resolution (DLR-SR), which has been developed by Canon, creates new horizons for Cardiac CT.

Cardiac CT reconstructed with (B) traditional Hybrid-IR reconstruction (AIDR3D) and (C) Super Resolution Deep Learning Reconstruction (PIQE). Note the increased conspicuity of the stent and the in-stent restenosis in the PIQE reconstruction. Image (A) shows a 3D PIQE reconstruction with Global Illumination rendering. Courtesy Hanaoka Seishu Memorial Hospital, Japan.



Stroke CT Package
As part of the Automation Platform offering, innovative solution where created that helps optimize treatment outcomes for stroke patients when speed and accuracy are everything.

"We wanted to find a way to get the best of our two high-end CT scanners (the Aquilion ONE and Aquilion Precision) together, without huge cost, so as to provide the best value to our customers," he said. "We think the solution is a particular technique called Super Resolution. Super Resolution is a type of algorithm that has been worked on for decades, but with the introduction of deep learning in recent years, it has advanced a great deal. It has, for example, been successfully applied in satellite imaging and in natural image processing on cell phones. So we wanted to bring this technology to CT and see what it could do. That's how we came up with the idea of a Super Resolution Deep Learning. And our resultant product is called Precise IQ Engine (PIQE)."

To train any neural network three ingredients are required: A training target that represents the ideal case, training input that represents the current system, and the neural network that can do the job.

Canon Medical has invested in all three components to optimize the algorithm and its performance. For the training target, Canon Medical has had the unique advantage of being able to access high resolution clinical data from the Aquilion Precision, which was introduced five years ago. This represents a wealth of high-quality clinical cases at a very good dose to present what the ground truth will look like. To create a training input the image is reconstructed at the highest resolution achievable. Denoising is implemented after, to allow us to preserve the best resolution possible. The neural network used is three-dimensional neural network.

"In clinical cases, we have seen the benefits of PIQE, including improved visualization of stents, calcium, small vessels, aortic valves, and reduced blooming artifacts from calcium and stents," remarked Dr. Yu. "All the doctors who have used PIQE agree that for the small structures that I have mentioned earlier, the conspicuity, the diagnostic confidence, has been greatly improved. I hope that this technology gets into the hands of more customers to enhance the care of patients."

Optimized CT Workflow in Stroke with Deep Learning

The Diagnostic Image Analysis Group (DIAG) of Radboud University Medical Center in Nijmegen, the Netherlands, has been involved in the development and implementation of advanced imaging techniques that feature AI-solutions, in collaboration with Canon Medical for some time. One key focus is on the use of advanced neuroimaging tools to improve detection, diagnosis and treatment of stroke. In acute stroke, imaging needs to be performed and interpreted immediately, so that the right treatment for each patient can be determined and implemented fast. Recently the Medical Center has evaluated Canon Medical's Automation Platform. Dr. Anton Meijer, Neuroradiologist provided an update on the applications around stroke, and workflow in particular.

"Time is of essence especially in stroke imaging so optimize CT workflow is crucial," emphasized Dr. Meijer. "There are different points in the workflow which can be optimized with deep learning and AI."

He explained that AI can also support the technician in selecting the correct scanning protocol to have image reconstruction either for optimized image quality but also to reduce radiation dose and can also support the physician in making the correct diagnosis, in stroke, with AI tools to instruct imaging for detection of hemorrhage or large vessel occlusions. He recognized that it can also support specialists in treatment decision-making.

"It is really important that we collaborate with the software engineers because the algorithm must be well trained and

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optimized," he added. " We must have adequate reference standards that should not only rely on the density of the abnormalities, especially in the skull base."

"In stroke, it is important to have quick processing of perfusion CT. Deep learning really speeds up our workflow to make our diagnosis quick and fast and it is expected that also this CT perfusion acquisition will improve with deep learning processing, especially if we take clinical characteristics into account to have a more accurate prediction of outcome," he said.

However, Dr. Meijer recognizes the challenges for the tools in clinical practice.

"The AI tools used in clinical practice must serve the clinicians and the radiologists," he reiterated. "The ultimate goal is to improve the outcome of the patient, but for this we need real life outcome measures in order to have an idea what the added value of such tools are in clinical practice and often those are lacking in general, as is study of the effectiveness and value in clinical practice."

"AI can facilitate the workflow which is really important for stroke imaging it can aid detection of relevant pathology and treatment decision-making, but it is really important that you know your AI tool that you manage expectations, and also that you evaluate your AI tool and collaborate with your with your vendors," he concluded.

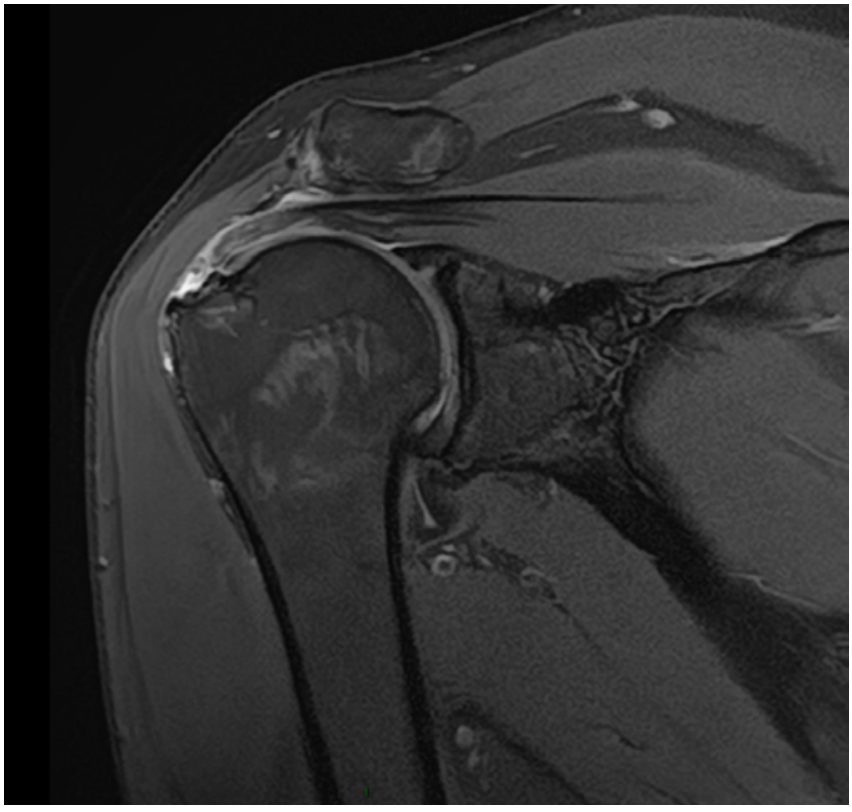
High-Quality MRI of the Shoulder combined with Deep Learning

Open MRI Zen is a diagnostic center in Sluis, the Netherlands, which has been using a Vantage Galan 3T MRI system from Canon Medical since the beginning of 2019. The system features Advanced intelligent Clear-IQ Engine (AiCE), in combination with Compressed SPEEDER. MR Theater has also recently been added.

Dr. Jan Veryser, a Radiologist at the Center, explained how it is often necessary to acquire high-resolution images in shoulder imaging with MRI to be able to depict subtle pathologies. In addition, an intra-articular contrast injection is commonly used to show subtle intra-articular pathologies like glenoid labrum tears, articular sided tears, capsular or ligamentous tears.

"With the advanced features of Canon Medical's Vantage Galan 3T system, we can effortlessly obtain high-quality images of the shoulder," said Dr Veryser. "The higher resolution images can be obtained thanks to Canon Medical's Deep Learning Reconstruction algorithm AiCE, while MSOFT provides homogeneous fat saturation in combination with the 16ch Flex SPEEDER coil."

"With these high resolution scans we have very nice images and very good diagnosis," he added. "When we perform an MRI-scan of the shoulder, we do this without contrast injection and we can see a lot of things in three planes very well. And then we decide if we require a direct arthrogram. I think we perform direct arthrograms in around 10-15% of cases, and this has improved a lot also with the introduction of Artificial Intelligence. We see much more detail on much better images. So, without contrast with high resolution images and Artificial Intelligence - it's very important for everything extra-articular, and we see the natural situation of the shoulder."



Coronal PD FS showing a partial supraspinatus tendon rupture, clearly visible due to the Deep Learning denoising Reconstruction (AiCE).

Insight made possible

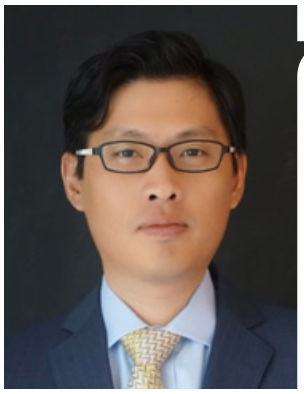
The ECR Satellite Symposium provided a broad spectrum of insights into how AI is successfully used in clinical practice, made possible by Altivity, Canon Medical's bold new approach to AI innovation that uses smart technologies to make a whole new level of quality, insight, and value across the entire care pathway possible. //



Prof. Mathias Prokop, MD, PhD

Radiologist/ Chairman of the Department of Radiology, Radboud University Medical Center University Medical Center Groningen Nijmegen, Groningen, the Netherlands.

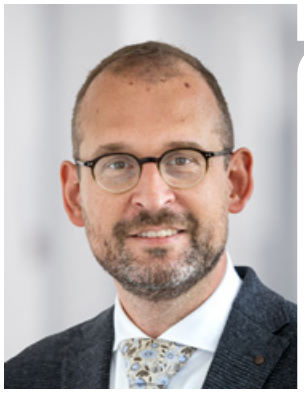
Prof. Mathias Prokop, MD, PhD, is the department head of Imaging (Radiology, Nuclear Medicine and Anatomy) of Radboudumc in Nijmegen and the Department Head of Radiology at the University Medical Center Groningen in the Netherlands. He is the current president of the Dutch Society of Radiology (NVvR). Prof. Prokop is an expert in body imaging and multislice CT. Since 2004, he has focused on the early detection of disease, especially lung screening and cardiac imaging and thoracic applications of machine learning. His departments host one of the largest research teams in Europe. Besides main clinical groups that tackle lung, breast, prostate, and pancreatic cancer and metabolic disease and vascular malformations, the department's research covers ultrasound, CT, MRI, nuclear medicine, and AI, including computer-aided diagnosis and robot-assisted interventions.



Dr. Zhou Yu, PhD

Director of CT R&D, Canon Medical Research USA, Inc., Chicago, USA.

Dr. Yu, Ph.D., is Director of CT R&D at Canon Medical Research USA, Inc. In this role, he leads the strategy and execution of CT research at CMRU. He manages a portfolio of advanced research and product development projects for Canon's CT product lines.
Zhou is a well-recognized expert on AI and deep learning image reconstruction and has more than 30 patents and 30+ peer-reviewed papers.



Dr. Anton Meijer, MD, PhD

Neuroradiologist, Radboud University Medical Center, Nijmegen, the Netherlands.

Dr. Anton Meijer is a Radiologist at the Department of Medical Imaging of Radboud University Medical Center, with a specialization in neuroradiology, and emergency radiology. He participates in clinical and research projects in neurovascular and neurodegenerative diseases. He is involved in the development and clinical implementation of advanced imaging techniques and AI solutions.



Dr. Jan Veryser, MD

Radiologist, Open MRI Zen, Sluis, the Netherlands.

Dr. Jan Veryser is the founder of Open MRI Zen, a private center in the Netherlands dedicated to musculoskeletal radiology. He is an active ESSR member and a member of the Imaging Guided Intervention Subcommittee. Dr. Veryser has a strong focus on musculoskeletal radiology and interventional ultrasound, especially in the field of nerve interventions. He regularly organizes workshops and lectures during international conventions (ECR, Arab Health, etc.) to improve the quality of ultrasound diagnosis and guided treatments.

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Groundwork for Success

In addition to immediate diagnosis and treatment of elite athletes with injuries, medical imaging is vital in the continual monitoring of health, fitness and progress. Canon Medical's systems play an important role in monitoring team health for the Soudal Quick-Step Pro Cycling Team in Belgium. Patrick Lefevere - CEO, Alessandro Tegner - Marketing and Communication Manager and Philip Jansen - Head Medical Team, spoke to VISIONS about their ambitions and aspirations for 2023 and how medical imaging support helps towards achieving them.





"We look back on 2022 with great pride in what we have achieved and look forward to building upon that in 2023."

Patrick Lefevere, CEO of Soudal Quick-Step Pro Cycling Team.



High expectations for 2023

"We have made some new additions to the Team, with Jan Hirt, Casper Pedersen and Tim Merlier bringing their own individual talents. We have seen how strongly they can perform physically, but we also think that they will be a great fit in our group. Integration as a team has always been our strength."

"As an individual, Remco Evenpoel had a fantastic year. This was made possible by the work that the team around him carry out day after day. As we strive to achieve new goals, we seek to strengthen that team to help him and us achieve new goals in 2023. In the first half of the year, we will work towards defending his title in the Liège–Bastogne–Liège 2023 in Belgium, and the Giro d'Italia, Italy, before the World Championships in Scotland, UK, and Lombardia, Italy, later in the year."

"In our new outfit design, they are represented by the blocks – The foundation. They form a structure with a collective strength that far outweighs that of the individual parts."

"The team is a conglomerate of organizations and people, that all come together in our support."

Alessandro Tegner, Marketing and Communication Manager at Soudal Quick-Step Pro Cycling Team.



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Remco Evenepoel, UCI World Champion.



Philip Jansen, Head Medical Team at Soudal Quick-Step Pro Cycling Team.

The Team's 29 riders and 60 staff undergo medical checks throughout the year. Philip Jansen, Head of the Medical Team, explains how their health, fitness and progress are analyzed.

Preparation for the new season is in full swing. How many training camps will take place?

We carry out three training camps in preparation for the new season. The first training camp takes place in December, and is usually held in Calpe, in Spain. This is the only time during the year that the whole team spends two weeks together. The other two camps are in January but are missing the riders and staff who have left for races in Australia and South America. During the December camp, the riders are still building their condition, so the trainings are shorter.

That means there is more time for activities other than cycling. This is not as relaxed as it may sound. It is completely filled with photoshoots, interviews, tests (medical, nutritional, psychological, lactate, bike-fit, aerodynamic, saddle pressure, insoles, etc.), discussions about goals and programs, PR training, power training, core-stability sessions and a lot of meetings. At the second and third training camps, the focus is clearly on riding the bike, with longer training sessions and a heightened priority for complete recovery. So, we try to keep the additional activities to a minimum.

What does the medical screening of the cyclists involve?

Screening can be divided into two categories: general and specific. The majority of the screening performed in the training camps is general. Every rider in the team undergoes tests in the following categories: cardiology, dermatology, ophthalmology, and others.

General screening:

For cardiological screening, we work with the world-renowned expert, Professor Dr. Pedro Brugada. Heart screening is, for obvious reasons, the most exhaustive and strict examination. Cycling is one of the most demanding activities one can demand from the heart. Everything, therefore, has to be perfect. The riders undergo a blood pressure check, ECG in rest and during maximal exercise, 24-hour Holter monitor and cardio echography. We continue to monitor their heart rates closely throughout the season.

Dr. Johan Vandermaesen carries out the riders' annual dermatological check. Spending so much time cycling outside increases the risk of skin cancer. We try to lower the risk by working hard on awareness and prevention. However, it isn't always logistically and practically possible to re-apply sunscreen in the hectic final of a race. By having our riders

professionally screened yearly, we can keep the risks as low as possible. They are checked with a dermatoscope, any abnormalities are documented, and we monitor the evolution of the lesions. There is a very low threshold to biopsy suspect naevi.

Core stability analyzed by our physiotherapists reduces the incidence of preventable injuries that a highly demanding sport like cycling can produce. Specific exercises are given where needed.

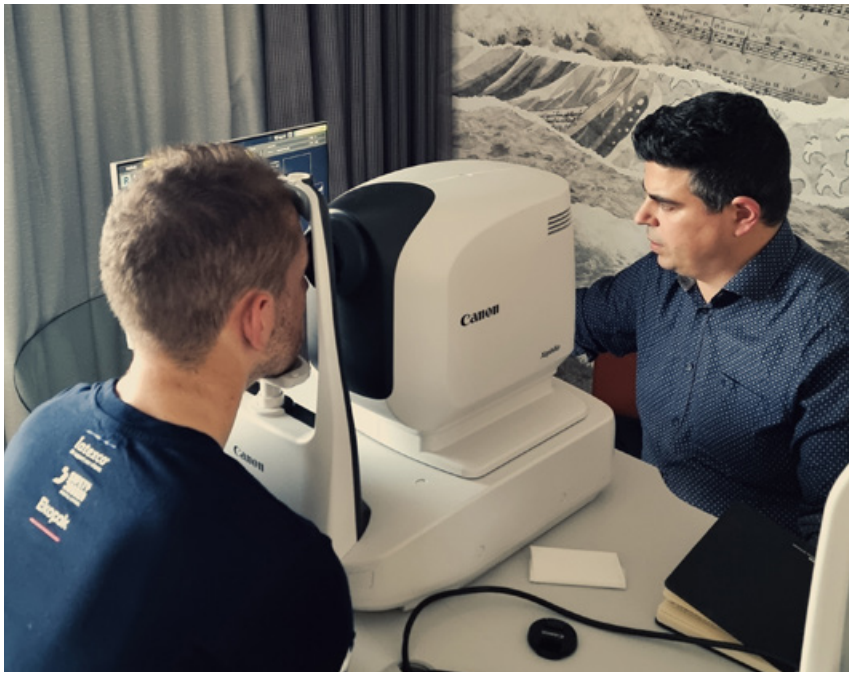
Other medical testing is also done at this camp. It is the ideal time to obtain the baseline for diverse parameters. Everyone undergoes a spirometry to test the lung function, concussion protocol, skinfold measurements, weight checks, hydration and sweat loss, dexa-scan, lactate testing and extensive bloodwork.

Individual screening:

Individual screening takes place when someone has/had a problem and is hyper-specific to the pathology. This can be extremely diverse. Sometimes specialized examinations that must be carried at certain locations, such as saddle pressure mapping with persistent saddle sores, or iso-metric strength testing after an injury. At other times, it can be on-site examinations that are more time-sensitive, like mobile echography after a crash or injury.

All these tests take a lot of time and energy from the riders. Therefore, we tend to work with the best in the world to ensure that we are as efficient and thorough as possible.

What is the added value of an examination for the riders during this training camp in Calpe?
Cycling is different to most sports. There is no 'homebase' where we come together regularly. We are more like a 'travelling circus' - Meeting almost exclusively at the races on location. As the riders are away most of the year at training camps, altitude camps and racing, free time is often a very scarce commodity and something they would rather spend with loved ones.



Eye examination of a Soudal Quick-Step rider by Amir Katzin (eye specialist) with Canon Medical's Xephilio OCT-A1 Eye Care system.

Ensuring that vision is as good as possible should be on top of everyone's priority list. This counts double for elite athletes who spend all day on a bike. Manoeuvring at insane speeds in a hectic peloton on narrow roads with even smaller defects while wearing nothing but lycra means that a crash can have extreme consequences for the rider, their colleagues riding behind, and their loved ones at home. Of course, you can't eliminate the crash risk, even with perfect vision, but the goal should be to reduce it as much as possible. Therefore, we screen all of our riders and enhance their vision where it is possible. The first training camp is the ideal place to take care of things like this in a structured way. We can discuss each case with the eye specialist and give clear and tailor-made advice to each rider.

You also screen the staff of the Team. Do you carry out the same clinical investigations for the staff as for the riders?
For the staff, the situation of constant travel and little time at home is the same. Being able to provide high-quality medical screening on location is extremely convenient. Also because the calendar can change quite often, it isn't easy for them to plan these things when you are home. It is not required for the staff to undergo these tests but it is very popular and much appreciated.

The staff receive exactly the same tests with the same protocol. However, the focus is a bit different. Age-related pathology becomes relatively more important as compared to younger riders. And we are also a bit less strict when it comes to striving for perfect vision.

Science behind success

Medical imaging provides detailed insights that enable the Team to manage the capabilities of the riders effectively and accurately as they work through the season, and strive for success in one of the world's most demanding and competitive sports.

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Eyes as a Window on Health

What is the importance of having a regular eye-check performed by an eye specialist?
Regular eye-checks are important to have your vision corrected to improve your quality of life, and to aid in detecting certain eye conditions such as cataracts, glaucoma and age-related macular degeneration that can lead to loss of sight.

What eye diseases can be detected in an early phase by an eye specialist?
The four most common eye-conditions leading to loss of vision or blindness are cataracts (a cloudy area in the lens of your eye, impairing vision), diabetic-retinopathy (high blood sugar levels damaging the back of the eye), glaucoma (optic nerve that becomes damaged, connecting the eye to the brain and resulting in loss of peripheral vision) and age-related macular degeneration (an eye disease that can blur your central vision, causing damage to the macula).

What are the most common, non-age-related eye diseases that are important to check for regularly?
A regular check for refractive errors is good for maintaining good vision and if necessary, to be corrected by glasses or contact lenses.

A check for Myopia (short-sightedness) amongst children is getting more important since they spend more time indoors doing near-focused activities on smartphones etc.

What are the most common symptoms to be aware of that could indicate a threat to vision?
The most common symptoms are red eyes, night blindness, headaches, light oversensitivity, floaters (jelly-like material inside your eyes, obstructing your vision), flashes (bright spots or points of light in your field of vision), dry eyes, excessive tearing, blurred or distorted vision.

What other non-eye-related diseases can be diagnosed with an eye examination?

Aneurysm, a bubble in the wall of a blood vessel can be detected in the eye.

Brain tumor, can create increased pressure in the brain that gets transmitted to the eye, causing changes to the optic nerve resulting in loss of peripheral vision and/or double vision.

Cancers of blood, tissue or skin can also affect the interior aspect of the eye like melanoma, leukaemia and lymphoma (also tumours in the breast and other areas can spread to the ocular structures).

Diabetes causes tiny blood vessels to leak yellow fluid or blood in the eye even before a person has been diagnosed with diabetes.

Heart disease by detecting microscopic marks left behind by an eye stroke.

High blood pressure by detecting unusual bends, kinks, or bleeding from blood vessels in the back of the eye.

High cholesterol by detecting a yellow- or blue ring around the cornea (transparent layer forming the front of the eye).

Stroke by detecting blood vessels that contain blockages or clots in the retina (back side of the eye), causing blind spots that can point to an increased risk for stroke.

Multiple Sclerosis - a degenerative disease that affects the nervous system, an inflammation that causes blurred vision, painful eye movement or even double vision.

Vascular disease by detecting clotting and bleeding in and around the eye that threatens vision by retinal haemorrhages.

How can the most prevalent eye diseases be prevented?
Eye disease, such as age-related macular degeneration, can be avoided by generally aiming to lead a healthy life by not smoking and avoiding 'secondhand smoking', to exercise regularly, keeping normal blood pressure and cholesterol levels and eating a healthy diet and the best way to prevent such an eye problem and/or stopping it from progression is to make regular visits to your eye specialist. //

Vantage Fortian: Going Beyond Expectations

Canon Medical's Vantage Fortian 1.5T MRI system delivers outstanding image quality in a timely manner, according to its first user in Europe. The equipment even allows to perform studies that were previously reserved to 3T MRI, Dr. Jordi Catalá March, CEO at Guirado Institute in Barcelona, Spain, told VISIONS.



From left to right: Mr. Manel Rodriguez (Canon Medical System Spain), Dr. Salmerón (Guirado Institute), Dr. J. Catalá March (Guirado Institute), Mr. Adachi (Canon Medical Systems Corporation), Mr. Kawagishi (Canon Medical Systems Europe).

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"In the case of prostate studies, we were very surprised by the system's image quality. The high resolution anatomical images allow us to define the structures perfectly."

Dr. Jordi Catalá March,
CEO at Guirado Institute in Barcelona, Spain.



The Guirado Institute is located at the heart of Catalunya's buoyant capital. The center has provided diagnostic care for over 40 years and moved to a new, 1,500 m^2 wide facility in 2018.

The clinic offers a whole portfolio of cutting-edge medical imaging equipment, including Canon Medical's Vantage Elan 1.5T and Vantage Galan 3T MR systems. Recently, the team decided to expand their fleet to meet the growing demand for MR studies and reduce waiting times, Dr. Catalá explained.

'We wanted to increase productivity and maintain the quality of the studies we perform, while reducing waiting times for patients - from the moment they are referred until they're admitted and positioned inside the scanner,' he said.

Private radiology is a competitive environment where providers need to be at the forefront of the diagnostic service, both in terms of image quality and acquisition times.

'Incorporating new state-of-the-art equipment is essential to continue to grow in this environment, ensuring the best diagnostic quality while working to improve patient experience,' he said.

Dr. Catalá and his colleagues purchased the Vantage Fortian 1.5T in April 2022, becoming the first European center to work with the system.

'It wasn't an easy decision, as this was only the second scanner installed in the world. There was no reference to its performance in a clinical environment in Europe,' he recalled. 'But, together with Canon Medical as a team, we're very happy we've taken that risk, because the equipment is giving excellent diagnostic results, even beyond our initial expectations.'

Excellent image quality right from the start

The Vantage Fortian offers excellent image quality, with a very high resolution and within adequate timing, he explained.

'What's very positive about our experience with the Fortian is that, from day one, image quality and the protocols installed on the equipment were very good. Obviously, we worked with Canon to adjust the protocols to our specific clinical requirements and preferences, but we were able to examine patients with the original protocols right from the start.'

With fine-tuned parameters, the team now manage to perform studies they used to carry out on 3T alone with the new equipment - for example, examinations of the inner ear or the pituitary gland, even in oncologic imaging.

Dr. Jordi Catalá March is a radiologist with more than 25 years' experience. He trained in Barcelona and has a master's degree in hospital management and sports-related injuries. He is currently partner and general director of the Guirado Institute, where he previously served as head of the magnetic resonance unit and general manager of teleradiology. He also served as medical director for other companies in the sector.

Early on, he has shown heightened interest in new technologies and their clinical applications. He has extensive experience in multiple facets of radiodiagnosis, such as PACS, post-processing and 3D, 3D printing, maxillofacial, elastography, artificial intelligence, etc.

He has written on many different topics in radiology and has published extensively on musculoskeletal (MSK) magnetic resonance imaging, focusing on ligaments and cartilage.

Since 2001 he has been a guest lecturer at conferences, courses and master's degree classes at various universities, both nationally and internationally.

'In some cases, images taken with the Vantage Fortian are surprisingly similar to 3T images,' said Dr. Catalá, who is also 'very pleased with the performance of the machine, the results we're getting, and the equipment's potential to continue to improve and expand the types of studies we can perform.'

Response has been unanimous among the team, a first in the history of the center, he admitted. 'We're a radiology company, with senior professionals and a lot of experience in each pathology, but it's the first time that there's an initial consensus on the protocols and we all agree there's been a substantial improvement with the equipment.'

Image quality is excellent for all types of studies, and sizable advances have been noticed in diffusion sequences, notably in the brain, neck, prostate and abdomen.

'In the case of prostate studies, we were very surprised by the system's image quality,' he said. 'In such studies, it always comes down diffusion, and with the new equipment and software version, we've increased image quality without distortion and with a high definition of the structures. The high-resolution anatomical images allow us to define the structures perfectly.'



From left to right: Nadia Rus López (Guirado Institute), Alba Iruela (CMS Iberia), Alberto Heredia (CMS Iberia), Dr. Jordi Catalá (Guirado Institute).

In addition, the team has been 'very positively surprised' by the signal homogeneity of the Vantage Fortian.

Although 2D acquisitions still make up the majority of imaging protocols at Guirado Institute, the team chose to incorporate 3D sequences to all their protocols, to benefit from the opportunities provided by this type of acquisition.

'For example, all knee studies now include a 3D acquisition for subsequent cartilage segmentation or for isotropic multiplanar reconstruction,' he said.

An array of tools to improve workflow

Advanced intelligent Clear-IQ Engine (AiCE), the artificial intelligence boosted software available on the Vantage Fortian, is applied to all protocols to obtain high image quality with competitive acquisition times, according to Dr. Catalá.

'It enables us to increase anatomical coverage and resolution or decrease slice thickness and even study time in uncooperative patients,' he said.

The combination of AiCE with Fortian's new acceleration techniques helps boost acquisition times without losing diagnostic quality, he added. 'The Exsper for FSE sequences, for example, has enabled to accelerate these sequences even more, since it doesn't present SPEEDER artifacts.'

Other new tools available on the Vantage Fortian, such as the ceiling camera and the Auto Scan Assist mode, help improve performance and workflow in all phases of an MRI study.

'The system is very focused on reducing the time between scans, thanks to tools such as the ceiling camera with automatic detection of the region of study, which allows to accelerate patient centering. It's also more comfortable for the technicians, as it automates the processes,' he said. 'The equipment also allows to expedite examination time, thanks to the automatic planning techniques in the Auto Scan Assist studies, which perform automatic detection of anatomical planes in various regions, for example the prostate, liver, heart, spine, etc.'

Besides the tools that boost workflow, the main benefits brought by the system are diffusion with field correction, distortion-corrected diffusion and new acceleration techniques, Dr. Catalá believes. 'For me, these techniques, together with AiCE, are a must for any future equipment,' he said.

In a continuous willingness to expand the clinical offering of his institute, Dr Catala would like to see future improvements around the ability to carry out interventional procedures, such as high-frequency ultrasound (HIFU), and more automated biopsy processes with the system. Another welcome upgrade would be further AI software improvement, in line with the team's main concern, which is to offer a reliable and personalized diagnosis, he added.

'We're very proud to be the first center in Europe to install the system, and to collaborate with Canon Medical in the evaluation of the Vantage Fortian in a clinical setting,' Dr. Catalá concluded. //

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Improved Coronary Artery Plaque Visualization with Precise IQ Engine

Patient history

This 56 year-old-man with BMI 26.2 kg/m^2 and prior coronary stent placement presented with atypical chest pain. He was referred for a Cardiac CTA scan. The images were reconstructed with Precise IQ Engine (PIQE) Deep Learning Reconstruction.

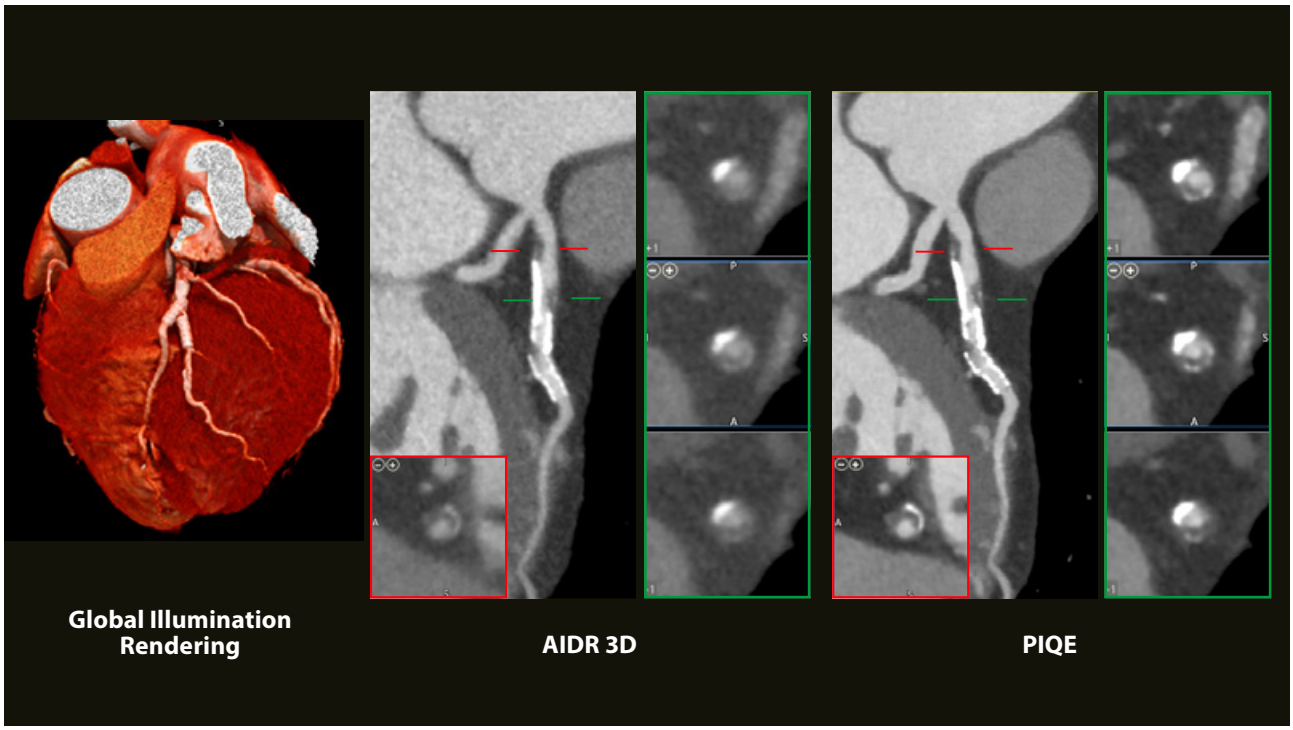
Technology

Precise IQ Engine (PIQE) harnesses the power of Canon Medical's 0.25 mm Aquilion ONE / PRISM Edition and Aquilion Precision detectors to train the 3D Deep Convolutional Neural Network. This next generation threedimensional neural network allows PIQE to maximize the inherent spatial resolution of the detector from ECG gated volumetric scans to provide a new level of cardiac CT image quality.

Conclusion

PIQE provides increased spatial resolution for clear visualization of the vessel lumen for improved assessment of in stent re-stenosis. The high contrast-to-noise properties of PIQE exams also provide better evaluation in heavily calcified coronary arteries with no loss of low contrast detectability*[1] or increase in radiation dose. In this clinical example, PIQE enabled confident evaluation of the vessel lumen in the presence of calcified and noncalcified plaques and stents.

Results



Stents are present in the Left Anterior Descending (LAD) and second diagonal branch. There is significant calcified plaque seen in the Left Main and LAD proximal to the stents. PIQE delivers sharper detail with clearly defined calcified and non-calcified plaque and less blooming from calcium and stents compared to Adaptive Iterative Dose Reduction (AIDR) 3D.

"What I am most impressed with PIQE is its image quality. It has incredible sharpness and detail. The amount of blooming artifact from calcified plaques is minimized with PIQE reconstruction."

Dr. Marcus Chen, MD
NHLBI, National Institutes of Health, USA

Acquisition

SCANNER MODEL:
Aquilion ONE / PRISM Edition

SCAN MODE:
ECG gated Volume

COLLIMATION:
0.5 mm

EXPOSURE:
120 kV, SURE Exposure

ROTATION TIME:
0.275 s

CTDI VOL:
7.9 mGy

DLP:
103.1 mG-cm

EFFECTIVE DOSE:
1.44 mSv

K-FACTOR:
0.014*2

Benefits of PIQE

- Sharper anatomical detail
- Reduced calcium blooming
- No additional dose

Altivity

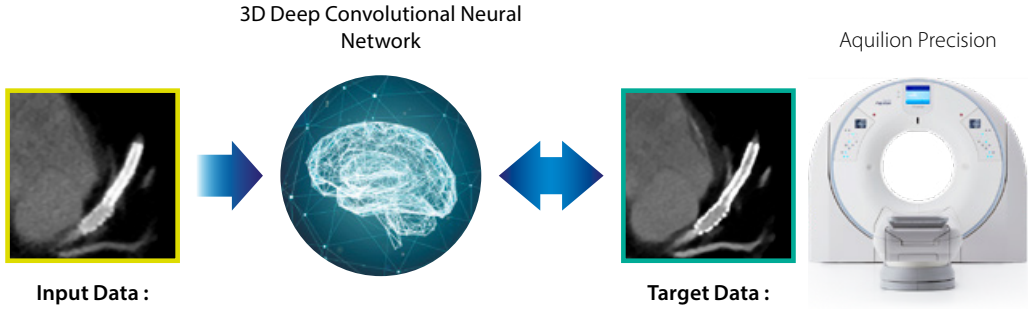
Altivity is Canon Medical's new approach to AI innovation. It is a multimodality, overarching brand, which pulls together all the AI technology that Canon Medical provides under one name.



References

1 Compared to AIDR 3D
2 American Association of Physicists in Medicine (AAPM) Report 96, 2008.
3 Super resolution maximizes the inherent resolution of the detector.

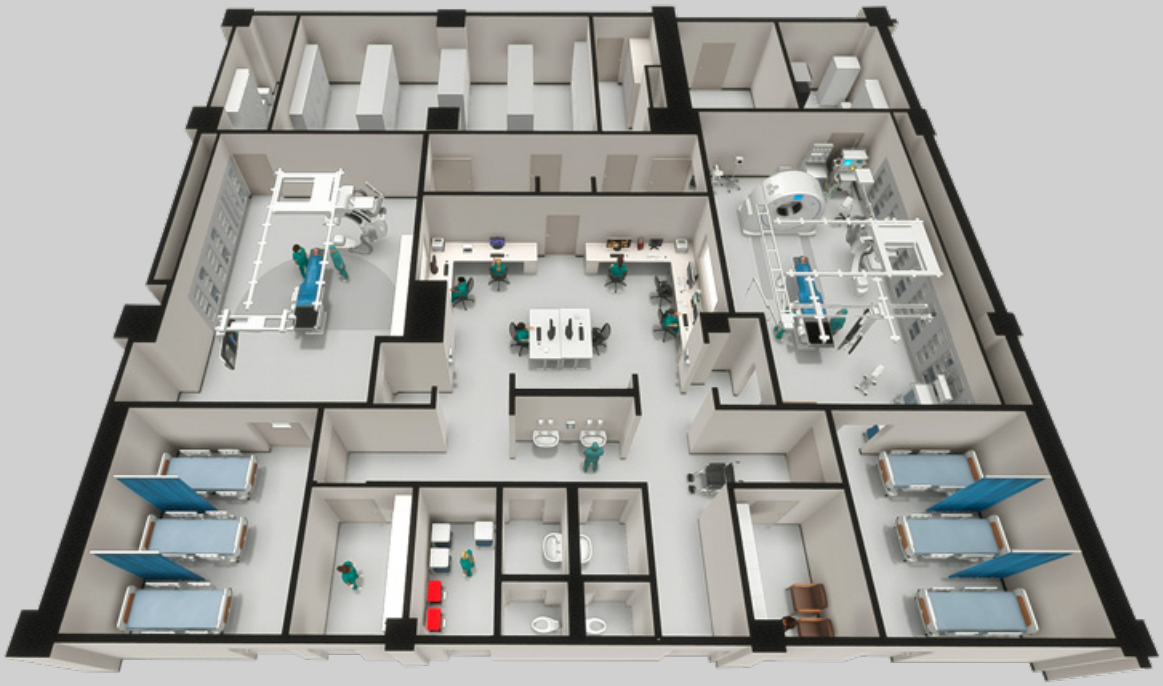
Training PIQE – Super Resolution*3 Deep Learning



Precise IQ Engine (PIQE) Reconstruction – Super Resolution Deep Learning Reconstruction



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EnVision 360 – Planning Insight for Advanced Multimodalities

Following growing demand from customers for support and advice in planning imaging facilities, Canon Medical Systems Germany (CMSG) has become one of the first European Canon partners to offer EnVision 360 – a new interactive 3D site planning tool designed specifically for Canon Medical equipment. Stefan Wiehl, Business Unit Manager Vascular and X-Ray at Canon Medical Systems Germany, and André Schlabe, Team Leader Project Management at Canon Medical Systems Germany, explain how EnVision 360 is a particularly valuable tool when it comes to Canon Medical's most advanced technology, the Alphenix 4D CT – a single room solution with CT and angio suite.

EnVision 360 was developed by Canon Medical in response to customer needs for sophisticated site planning tools. More people from a diverse range of fields have become involved in the planning process for healthcare facilities, space is often limited, and increasingly advanced imaging equipment requires precise placement for optimal use of space.

"In recent years, we have often been asked by customers to visualize our plan proposals in 3D," remarked André. "When EnVision 360 was developed at Canon Medical Systems Europe, we were very keen on acquiring the new tool so that we could convert 2D plans into more easily understood 3D plans."

"The interdisciplinary approach of EnVision 360 is of great importance," added Stefan. "Radiologists, anesthe-



tists, technicians and nurses need to have a common sense of understanding about any new facilities being created or existing features being altered. They have to work in the environment for a number of years. The workflow should be perfect."

Optimal room layout

Before EnVision 360, CMSG assisted its customers in site planning by making 2D drawings using AutoCAD software. The new 3D tool provides an interactive platform that makes it easy for viewers to see how their healthcare facility could be best equipped. The typical workflow with the new system is more straightforward. A PDF or dwg file is required from the customer, and based on this André and his team design a suitable room layout.

"EnVision 360 3D is created from 2D drawings, but involves additional software, such as Adobe Premiere Pro," said André. "The result is a realistic 3D proposal for the optimal room layout. We can discuss different scenarios for placement of a modality with our customers, let the customer walk virtually through the examination room and experience how the proposed arrangement might work with in practice."

"We can also offer virtual site visits that go one-step beyond this through



"Proper planning and 3D visualization is crucial to check there are no potential conflicts."

Stefan Wiehl – Business Unit Manager Vascular and X-Ray at Canon Medical Systems Germany

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EnVision 360," continued Stefan. "The customer can enter their virtual room and see the MR or CT systems within it, click on some features of the system – the hardware, and the details pop up immediately."

Siting sophisticated systems

Canon Medical's Alphenix 4D CT Interventional Suite combines Aquilion CT, Alphenix Angiography and high-quality Ultrasound capabilities in one room. This brings enormous benefits increased workflow and enables more complex procedures to be performed with far greater ease and efficiency. However, the system needs to be properly sited within the customer's room, especially with so many moving parts.

"Our most advanced technology - the Alphenix 4D CT – combines a moving CT-gantry and a moving angiography system," Stefan pointed out. "When other systems are required in the room, such as an anesthesia trolley or stereotactic targeting device, proper planning and 3D visualization is crucial to check there are no potential conflicts."

"With EnVision 360 we can simulate typical workflows with the moving systems in the room."

Circumnavigating other challenges

In addition to the advantages of 3D visualization, the new virtual planning tool has also proved invaluable under the restrictions of the COVID-19 pandemic.



"EnVision 360 is a realistic 3D proposal for the optimal room layout."

André Schlabe, Team Leader Project Management at Canon Medical Systems Germany.



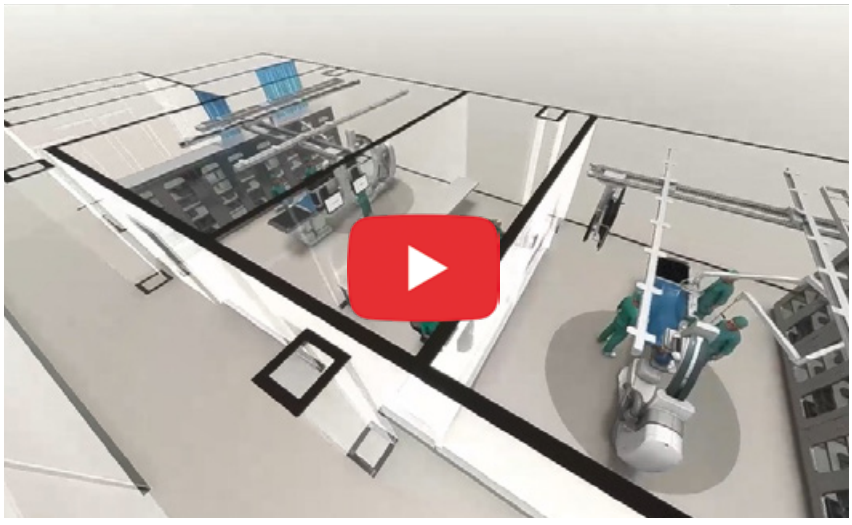
"Under the pandemic circumstances, EnVision 360 provided a big additional advantage, because we were not able to carry out site visits," said Stefan. "EnVision 360 meant that the customer could safely 'visit' their own facility in 3D. And, together with us, effectively progress its development from a distance."

Into the future

Canon Medical Systems Germany will also be using EnVision 360 in the future even more as a presales stage.

"The tool enables us to show even more of our competence in Radiology and Cardiology projects," said André.

"EnVision is definitely a positive step forward and the start of many more developments. we are also talking about the potential of virtual reality, and our customers are interested in this" remarked Stefan. "However, this is not a project which will be immediately available." //



Scan the code or click HERE to watch the EnVision 360 demo video

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Lung Screening at Ultra Low Dose - Made Possible With 3D Scanogram and SilverBeam Filter

CT of the thorax is a well-established technique for examination of the chest and upper abdomen, but has restricted applications in some groups, such as younger patients, due to concerns about radiation dose. Canon Medical's SilverBeam Filter for CT utilizes deep learning to enhance image quality, minimize image noise and significantly reduce radiation dose, while preserving overall image quality and diagnostic accuracy. Dr. Russell Bull, MD, Consultant Radiologist at the Radiology Department of Royal Bournemouth Hospital, Bournemouth, UK, explains how well it works in practice.

The Royal Bournemouth Hospital is a general (723 beds) hospital in Bournemouth, Dorset, UK, managed by the University Hospitals Dorset NHS Foundation Trust, and plays a key role in a £250 million transformation and development plan for the Trust's three hospitals. The Hospital's Radiology Department has collaborated with Canon Medical for many years. It has an Aquilion CT Serve scanner with SilverBeam technology.

"CT is a great test for detecting multiple pathologies. It is fast, it is robust, and is available everywhere while systems continue to get better and cheaper. Some people have lauded CT as the 'physical examination of the 21st century'," remarked Dr. Bull. "However, the problem is the radiation dose, which we aim to lower as much as possible, particularly for certain patient groups, such as young people."

Reducing radiation dose with filtration

In 2017, the Royal Bournemouth Hospital became one of the first in Europe to change the filtration on their CT system to Canon Medical's PUREViSION Optics.

"Our radiation beam was replaced with PUREViSION Optics – Canon Medical's new filtration system at the time," said Dr. Bull. "This already made a big difference to our radiation doses. We reduced our DLP's for high resolution CT by a third and got pretty much the same image quality - just by using increased filtration and filtering out bad photons. This was a surprise."

"In one of my specialist fields - Coronary CT - not only is the dose much lower, but you actually get better images because there are less scattered photons hitting the detector," he explained.

Introducing SilverBeam

"The successor of PUREViSION Optics is SilverBeam. With SilverBeam, you really aggressively filter out low energy photons and you end up with only the high energy photons," said Dr. Bull. "It's almost a monochromatic energy beam with very high energy. You filter out some of the high energy photons as well, so you end up with less photons in general going through the patient."

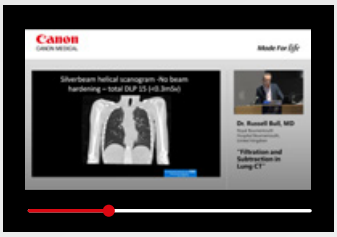
This very high-energy, monochromatic beam gives us the potential for non-contrast studies at very, very low radiation doses. You cannot use SilverBeam for examinations with IV contrast because you need low energy photons for the contrast enhancement."

SilverBeam filtration

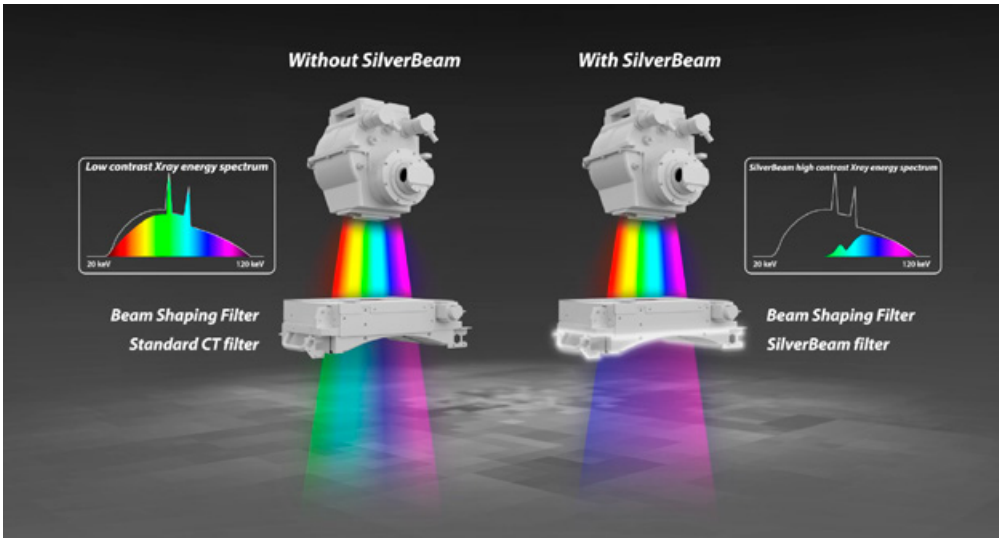
SilverBeam is a filter for Aquilion CT scanners that incorporates silver and selectively optimizes beam energy.

How does SilverBeam work?

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 resolution and low noise for applications such as lung screening.



Scan the code or click HERE to watch presentation of Dr. Bull given at the ESTI (European Society of Thoracic Imaging) 2022 congress.



SilverBeam, a beam shaping energy filter, leverages the photo-attenuating properties of silver to selectively remove low energy photons from a polychromatic x-ray beam leaving an energy spectrum as shown in the image above.

Ultra-low dose 3D scanograms

Canon Medical's SilverBeam Filter enables 3D scanograms, ultra-low dose helical scans, to be made with significantly reduced dose, but superior image quality.

"Conventional 2D Scanograms are low dose but do not offer a great deal of information; we have just been using them for scan planning," explained Dr. Bull. "However, using the SilverBeam filter with a 3D scanogram, we actually get more useful data sets. By using SilverBeam filtration, the 3D scanogram is acquired at radiation doses as low as a conventional 2D scanogram.

With the 3D scanogram we already are picking up a lot of lung cancers. So, essentially, you've got an ultra-low dose lung screening.

"Some people find 3D scanograms somewhat noisy. However, they offer a vast improvement in what we can see compared to a 2D scanogram, in which the aorta, for example, can't be seen at all," said Dr. Bull. "You can measure all sorts of things, like aortic dimensions and see coronary calcification. The 3D scanogram is an incredible advantage over a 2D scanogram."



"Canon Medical's SilverBeam Filter enables 3D scanograms to be made with significantly reduced dose, but superior image quality."

Dr. Russell Bull, Royal Bournemouth Hospital, Bournemouth, UK

Dr. Russell Bull
Consultant Radiologist at the Radiology Department of Royal Bournemouth Hospital, Bournemouth, UK.

Dr. Bull has 22 years of radiology experience at consultant level and almost 20 years of experience in his special interests of cardiac CT and cardiac MRI scanning. He has also been involved in the development of Canon Medical's "PUREViSION" ultra-dose efficient detector for CT. This allows patients to be scanned more safely using lower doses of radiation and IV contrast.

He currently supervises and reports over 500 cardiac CT and 500 cardiac MRI examinations per year and is the immediate past president of the British Society of Cardiovascular Imaging (BSCI).

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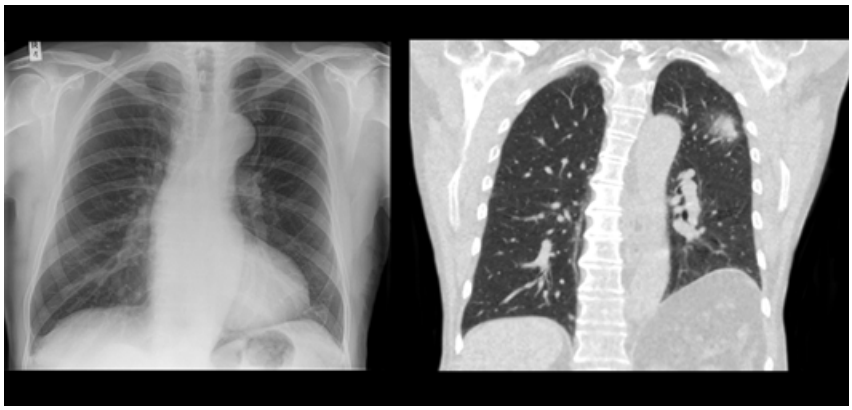


Figure 1, 3D scanogram clearly shows left upper lobe lung cancer in comparison to the chest X-ray

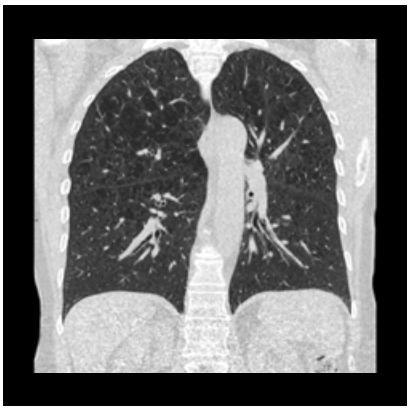


Figure 2, 3D scanogram shows severe emphysema.

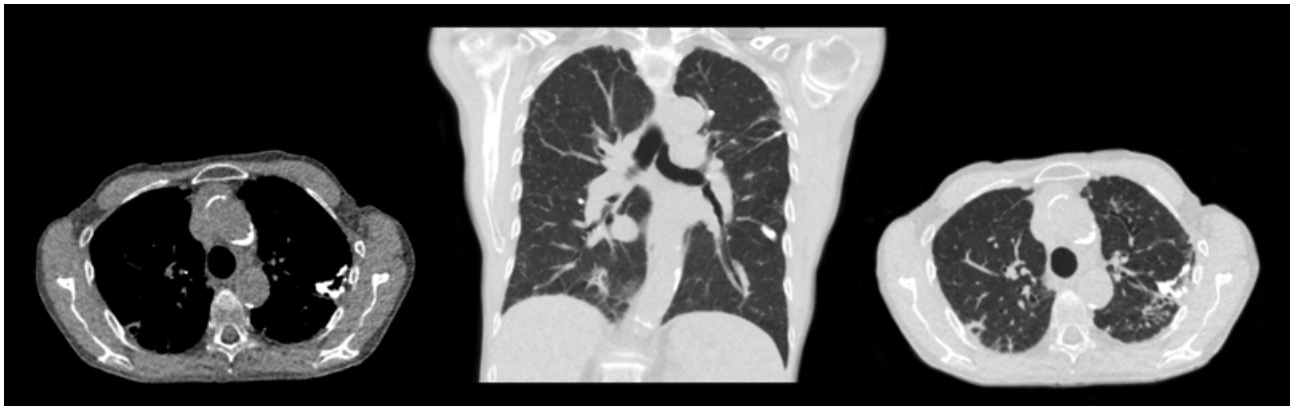


Figure 3, Old tuberculosis is clearly visible on the images of the 3D scanogram.

Extra clarity

Dr. Bull has many examples of how 3D scanogram with SilverBeam has supported diagnosis:

This is a whole chest 3D scanogram with SilverBeam with a DLP of 13 mGy.cm. You see left upper lobe lung cancer, which was not clearly visible on the chest X-ray. It was resected and the patient is probably cured because we did the 3D scanogram as part of a cardiac CT examination. *See figure 1*

In a patient presenting with dyspnea on exertion, the 3D scanogram, shows why they are breathless on exertion. "This image at very low dose clearly shows that the patient has very severe emphysema," said Dr. Bull. *See figure 2*

"This patient had old tuberculosis. The dose for the 3D scanogram is basically the dose of a lateral chest X-ray, he remarked. *See figure 3*

Further potential

The Radiology Department is also exploring the use of SilverBeam filtration in subtraction and perfusion studies.

"Normally for a Subtraction scan we are utilizing a pre- and post-contrast scan. The SURESubtraction lung application isolates the iodine signal and displays the result as a color overlay and shows the distribution of contrast media in the pulmonary parenchyma. We wanted to find out if we could perform a Subtraction CTPA without a pre-contrast and use the 3D scanogram with SilverBeam as a mask," said Dr. Bull. "While it is early days, it would appear that you can achieve a very similar image, basically using the mask of the 3D scanogram."

"Currently we are exploring the use of 3D scanograms in combination with Automatic Landmark Detection (ALD) on our the latest Aquilion Serve CT scanner. With ALD, the scanner is able to perform a complete automatic scanplan independant of patient size and weight , without any interference of the Radiographer."

Meeting growing imaging needs

As part of the expansion of the University Hospitals Dorset NHS Foundation Trust, a brand new building will be constructed at the Royal Bournemouth Hospital by 2026 to provide new facilities in emergency and critical care, and women's and children's health. //

Optimizing your assets

Canon Medical continually develops new technologies to improve product performance. Upgrading our products means that we can provide new functionality, help our customers benefit from the latest technology, and extend the longevity of their systems.

The views and opinions expressed in this article are those of the clinician and do not necessarily reflect the views of Canon Medical.



I would like to thank you for using our products and services. Your continued support is deeply appreciated.

Last year, by combining Canon's imaging technology with the medical technology we have developed over the years, Canon Medical Systems launched CT and MRI products that bring new clinical value by means of improved examination workflow.

We also installed a prototype of a next-generation photon-counting CT (PCCT) system at the Exploratory Oncology Research & Clinical Trial Center of the National Cancer Center Japan. This is the first time that research has been conducted in Japan on the practical application of PCCT. That research is now being ramped up.

Our company released the first domestically developed whole-body X-ray CT system in 1978 and brought our MRI systems to market in 1983. This means that 2023 marks the 45th anniversary for our CT systems and the 40th anniversary for our MRI systems. During that time, diagnostic imaging systems have undergone a remarkable evolution and we have been involved in the development of many kinds of new technologies to meet the clinical requirements of high-precision imaging combined with examination efficiency to reduce patient burden. The healthcare environment is now more challenging than ever, and there is a growing need for new solutions that can drastically improve the efficiency of clinical practice.

This year, we will establish a new company in the United States, the largest and most influential medical imaging market in the world, and we will launch our "Global Marketing Center". By building a global network with our customers, we will create new value by developing products and proposing solutions that follow the latest healthcare trends and meet the needs of clinicians.

In the Chinese zodiac, 2023 is the year of the rabbit, and the associated element is water. It is said that with the combination of water and rabbit, past efforts will bear fruit and you will make rapid progress and grow vigorously. At Canon Medical Systems, we would like to fully utilize the growth engine we have maintained to this point and make a further leap this year towards the realization of Made for Life.

Best wishes to you for a successful 2023.



TOSHIO TAKIGUCHI
President and Chief Executive Officer
Canon Medical Systems Corporation

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