

visions

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Canon



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A combination of two
Stockphotos.*

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// EDITORIAL

The coronavirus has presented us all with significant challenges. At Canon Medical, we remain committed to the safety and security of society and strive to minimize the impact of the COVID-19 outbreak, while maintaining customer service at the highest level for the benefit of the patients. We offer our deepest condolences to the impacted people, cities and countries. We also have the greatest admiration and respect for every healthcare professional, who has been fighting the pandemic.

After the outbreak, our team spirit in the company became even more robust. Our new European Management Team started during this challenging time but quickly developed a strong collective spirit.

Our European offices aligned themselves instantly based on their local government policies trying to minimize the impact of the corona crisis. Minimizing social contact was vital in this. Thanks to the outstanding preparation of our IT colleagues, most of our employees were able to work from home and optimized the use of remote conferencing.

Based on our Made for Life philosophy, Canon Medical has, of course, continue to support the healthcare society and contributed even more during the COVID-19 crisis. Through our Mobile Clinical Solutions with state-of-the-art equipment, we have been able to support hospitals and clinicians with their extremely high workloads. We also offer fixed rental solutions to meet local clinical needs.

Kind regards,

MR. NOBUYUKI HATAKEYAMA

President and CEO

Canon Medical Systems Europe

Inspired by a smart 'container concept', the Canon Medical CT Scan Unit is an impressive transportable imaging solution. It is equipped with an Aquilion Prime SP or Aquilion Lightning SP, and includes a separate operating room to lower the risk of person-to-person COVID-19 transmission. With a smart, compact design, it can be transported quickly and easily. This CT Scan Unit can be purchased or rented through a cost-efficient rental agreement. The heavy workflow is optimized thanks to the quality and innovation of our products, resulting in a more confident diagnosis.

Remote connection to healthcare solutions is invaluable during the COVID-19 crisis. Especially when traveling becomes impossible and access to hospitals is challenging or sometimes even impossible. Thanks to our InnerVision remote diagnostics, our highly trained engineers and application specialist are able to monitor your systems remotely and act immediately. By doing so, we can limit the interruption of your workflow of streamline patient care.

You have our commitment, even more, during this challenging period. That is why we expanded our production capacity to meet the high and essential demand in the market. We have continued to expedite the delivery of parts, despite the challenges. Our mindset and philosophy are that nothing should stand between you and the critical work that you do.

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Webinar: The Role of MR in the Post-COVID-19 Era

Watch leading clinicians in Europe and the USA discuss the importance of MRI in a post-COVID-19 world.

The role for CT and Ultrasound in the acute stage of the COVID-19 disease is clear.

For MR, the role is mainly in post-COVID care for patients with neurologic-, vascular- and/or cardiac pathologies. This role was discussed by leading radiology clinicians in Europe and the USA in our webinar. The panel comprised of Prof. Saba (University of Cagliari, Italy), Prof. Lima (John Hopkins University, USA), and Prof. Puig (Comparative Medicine and Bioimage Center of Catalonia, Spain) and was headed by Prof. Dousset (Bordeaux University Hospital, France).

The panel discussed the situation in their respective countries and their observations of the disease with MR. Furthermore, the panel discussed the need for standardized protocols to follow up certain patients. If you are interested to learn more about the significant role the experts see for MR in the post-COVID19 world, please join the webinar here. //



Visit our website or scan the QR code:

<https://global.medical.canon/service-support/>

→ COVID-19 Resources

CT Webinar: COVID-19 Impact and Experiences

The COVID-19 crisis is perhaps the first global pandemic that has called upon the radiology community to help with the delivery of crucial frontline patient care. It is abundantly clear that it is now an absolute necessity to prepare for working in the new (imaging) reality.

A reality where patients are optimally protected, risks are minimized and resources need to be optimized. Three European hospitals have joined forces in the fight against COVID-19, using CT scanners in particular, and now share their initial approach on trying to control the virus, how the hospitals managed and are still managing to cope during the pandemic and of course how CT scanners contributed to the battle against the virus.

Interesting thoughts, opinions and learning curves are shared by Dr. Russell Bull (Royal Bournemouth Hospital, UK), Prof. Catherine Roy (Strasbourg University Hospital, France), Prof. Mickaël Ohana (Strasbourg University Hospital, France), Dr. Monique Brink (Radboud University Medical Center, The Netherlands) and Prof. Mathias Prokop (Radboud University Medical Center, The Netherlands) throughout the webinar "COVID-19 Impact and Experiences". //



Watch the video on our YouTube channel or by scanning the QR code:

<https://www.youtube.com/watch?v=o2P4umCi6WE>

First European Clinical MR Site with Advanced Intelligent Clear-IQ Engine (AiCE)

Clinica Creu Blanca private medical center in Barcelona, Spain, is the first to benefit from deep learning technologies in clinical practice with Canon Medical Systems' groundbreaking Advanced Intelligent Clear-IQ Engine (AiCE) installed on two advanced MR systems - Canon Medical's Vantage Orian and Vantage Galan.

Creu Blanca strives to deliver the best point of care combined with optimal patient comfort without compromise. Dr. Alomar, Head of the Radiology Department and R&D at the medical center, continuously adopts early-stage innovative technologies towards achieving this goal.

The demand for simultaneously high resolution and fast imaging techniques continually increases, and AiCE could deliver both benefits without compromises.

Compressed SPEEDER (CS) is another advanced technology that has been installed on both Canon Medical MR systems. This advanced software enables faster acquisition for various body parts, while adding AiCE to Compressed SPEEDER acquisition will combine the benefits to provide fast imaging with high spatial resolution.

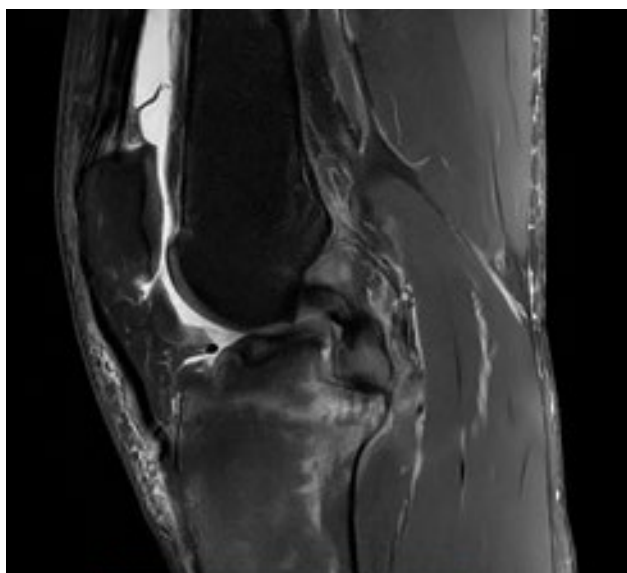
An important concern for healthcare professionals is to consider the possible long backlog of patients requiring scans in a post-COVID period. Flexible technologies that can meet the dynamic needs of the present and future will be required. AiCE and Compressed SPEEDER can play an essential role in supporting smooth and fast operation and reducing waiting times.

Canon Medical Systems is carrying out many installations of AiCE & CS across Europe. Stay tuned to get clinical insights from early adopters! //

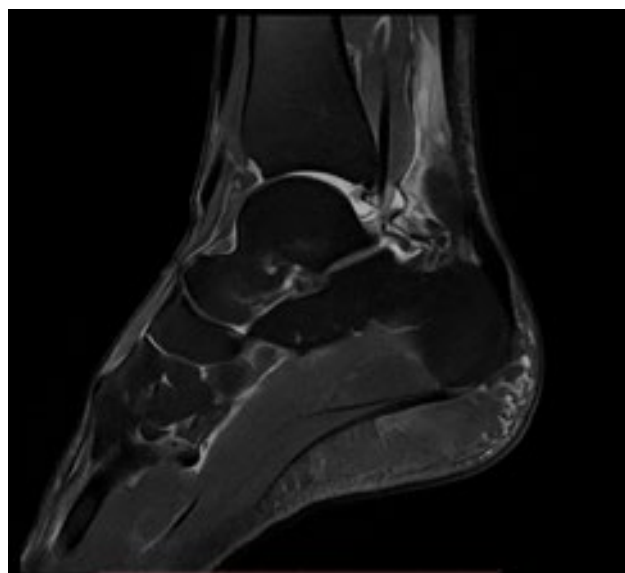


Visit our website:

<https://eu.medical.canon/magnetic-resonance-ai-ce/>



System	Vantage Orian 1.5T
Protocol	Knee SAG PD FatSAT
Resolution	0.5 x 0.5 mm
Slice thickness	2.5 mm
Scan Time	1'22"
Technologies	CS x 3, AiCE, MSOFT
Coil	16ch Flex SPEEDER



System	Vantage Orian 1.5T
Protocol	Ankle SAG PD FatSAT
Resolution	0.5 x 0.5 mm
Slice thickness	2 mm
Scan Time	1'36"
Technologies	CS x 3, AiCE, MSOFT
Coil	16ch Flex SPEEDER

Fit to Race – Premiere For a Mobile CT in Moto GP

At the RedBull Ring in Spielberg, Austria, the very first mobile CT scanner was used to increase the safety for drivers and take the diagnostics options to a new level.

Moto GP is the premier class of motorcycle and is the oldest established motorsport world championship. The race circuit in Spielberg and the team of the Emergency Medical Service sports Austria are well known for their high safety standards and ranked within the top 3 motorsport locations worldwide.

For the Moto GP events, a CT Scan Unit was installed within the paddock, next to the medical center and besides the rescue helicopter and the medical car. In case of emergency on the circuit, drivers are able to get the best possible on-site care. Within 15 seconds, a full body scan can be performed and provides fast and precise data for the medical team. In case of fractures, cranio cerebral trauma or internal injuries, even if the driver is unconscious and unresponsive, the medical team



can decide whether the patient is fit for transport. Another huge benefit is that the data can be sent to the nearby hospital in advance, allowing doctors to prepare for the patient arriving by helicopter in just a few minutes.

Keeping in mind that we're still in the middle of a global pandemic, Canon Medical makes sure that the unit is completely Corona proof thanks to separate air circuits for doctors and patients. All features and benefits combined takes medical care in the racing industry to a new level.

Want to know more about the CT Scan Unit? You can read all about this solution in the article on pages 10-15 in this VISIONS edition! //

Canon Designs Recognized with Internationally Renowned iF Design Awards for 26th Consecutive Year

TOKYO, February 19, 2020—Canon Inc. announced today that eight Canon Group product designs were recognized by iF International Forum Design GmbH with prestigious 2020 iF Design Awards.

iF Design Award 2020 (Product) winners:



The EOS R System Imaging system



PowerShot G5 X Mark II Compact digital camera



EF 400mm f/2.8L IS III USM
EF 600mm f/4L IS III USM
Super telephoto lenses
(EF 400mm f/2.8L IS III USM pictured)



XF705
Professional handheld 4K UHD camcorder



Sumire Prime
Fixed-focal-length cinema lenses for PL mount cameras



OCT-A1
Optical coherence tomography (Eye Care, Canon Medical)



IVY REC
Compact digital camera (INSPIC REC in Japan)



Arizona 1300 series*
UV flatbed printer (Arizona 1380GT pictured)

This year marks Canon's 26th consecutive year of winning iF Design Awards. Encouraged by the recognition of the Company's design excellence, Canon will continue striving to realize products that combine the highest levels of performance and design.

Established in 1953, the iF Design Awards are recognized internationally as one of the most prestigious awards within the field of design, with outstanding industrial designs chosen from all over the world each year. This year over 7,200 entries from 56 countries and regions were judged by internationally active design experts across seven disciplines: product, packaging, communication, interior architecture, professional concept, service design and architecture. //

<https://global.canon/en/news/2020/20200219.html>

* Not available in Japan.





“The fight against COVID-19”

I would like to start this message by acknowledging the frontline workers who continue to sacrifice so much in the fight against COVID-19. These have been unprecedented times for all of us, but I am particularly aware of the dedication and resilience you have consistently brought to your duties, and for that I offer my deepest thanks.

I know that for many of us, the hope is to get back to normal as soon as possible, but I don't believe that 'normal' will ever mean the same again. And nor should it.

The health care industry, along with many other sectors, has had to change irrevocably since COVID-19 began making its way around the world. We have had to adapt - in many ways for the better - and I am inspired by the speed, agility, and conscientiousness shown by our colleagues and partners during this time.

In recent months, I have been lucky enough to hear from a number of customers regarding their approach to managing the pandemic - specifically with our solutions. I have been heartened by the insights they've shared, and I believe that the topics discussed are extremely pertinent to the future of our industry, and I hope you will get as much out of it as I have.

As always, I hope that you and your loved ones are staying safe and well, and I look forward to updating you with our latest developments in due course.

TOSHIO TAKIGUCHI

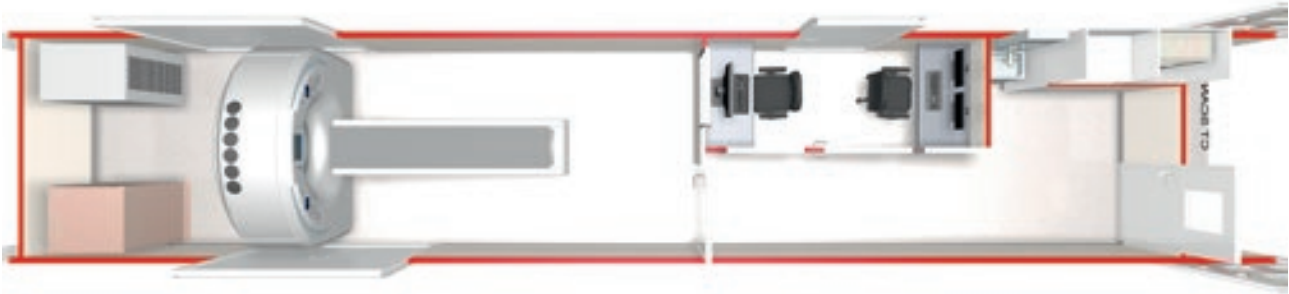
*President and Chief Executive Officer
Canon Medical Systems Corporation*

Providing Solutions for the Frontline of the COVID-19 Pandemic

CT can play a critical role in managing patients with infectious disease, but its use in this context requires specific safety and workflow protocols. One essential for health professionals during the COVID-19 pandemic is to be able to carry out CT scans, especially due to the potentially catastrophic effects of this virus on internal tissues and organs, particularly the lungs. As a consequence, there has been a sharp rise in demand for CT capacity in many hospitals, as well as extra emphasis on the importance of effective, thorough and rapid disinfection and recognition of the need to isolate scanning processes. Canon Medical Systems Europe have developed a quick and flexible response unit to meet this increased demand. VISIONS explores how this benefits healthcare institutions that are under pressure in dealing with an unprecedented public health crisis.



Canon Medical's CT Scan Unit.



Canon Medical's Refurbished and Mobile Imaging Solutions Group, is a well-established entity in the European market for mobile and rental solutions. Within weeks of the start of the COVID-19 crisis, the team had developed a CT Scan Unit for deployment in emergency responses. The first units were manufactured and delivered to customers in Germany, Italy and Norway.

Key priorities for times of crisis

The CT Scan Units are designed with some specific and key objectives in mind. Firstly, to provide hospitals with the capability to isolate CT space to keep patients and staff safe through the use of deployable imaging units. And secondly, to deliver confident diagnoses through Artificial Intelligence (AI)-based imaging for improved visualization and technology and particularly fast imaging for patients with short breath-hold capacity. With the breathing difficulties associated with severe Coronavirus cases, this is extremely important.

Mobile Trailer and CT Scan Unit Solutions

"Our Mobile Trailers and CT Scan Units provide successful solutions for equipment procurement and capacity planning - relocatable units with flexible rental and leasing solutions." says Johan Vochtelloo, Canon Medical's Director Refurbished

and Mobile Imaging Solutions. "Both our rental solutions are available for short- and long-term needs, and designed to be parked on site and up and running within one hour. All that is required to take advantage of the Mobile Trailer or CT Scan Unit solution, is sufficient parking and power facilities. With a European service network, we aim to provide 100% uptime. Our application staff provide full explanation, training and set-up of the equipment that is tailored to the customer's needs."

CT Scan Unit

"Our new CT Scan Unit is a fully equipped and shielded CT imaging facility. The CT Scan Unit contains separate, control-, scan- and preparation rooms, with fully separated airflows that support efficiency and comfort of patients and healthcare professionals, and meet all safety regulations at all times," Johan continues. "The Unit is equipped with state-of-the-art imaging equipment to ensure premium image quality, fast scanning and superior workflow, with a choice between Canon Medical's Aquilion Prime SP or Aquilion Lightning SP CT systems. Advanced technology, such as Advanced intelligent Clear IQ Engine (AiCE), Canon Medical's innovative Deep Learning Reconstruction technology, can also be provided to guarantee that the best possible imaging results are available - even under emergency conditions."



"We invite you to discuss your clinical needs for mobile imaging solutions with us and we will bring together all the resources to provide scalable solutions to meet your evolving demands."

Johan Vochtelloo, Director Refurbished and Mobile Imaging Solutions at Canon Medical Systems Europe.

Based on a 12.19 m (42 feet reefer unit) shipping container, the CT Scan Unit is a 114.3 cm (45-inches) high Cube Container with a twist-lock system. It is engineered in such a way that it can be transported as one unit by road, rail, sea or air quickly and easily, to anywhere that it is needed. Unloading and set-up is achieved in a minimum amount of time. The Unit has hospital-grade walls and flooring, 360° lead-shielding, and a separated airflow for patient and operator rooms, making working easy, safe and affordable at any time. The Unit can easily be included in a tent environment or combined with portacabins to create a temporary building facility.

At the forefront of disease control

The Leiden University Medical Center (LUMC) was one of the first hospitals in The Netherlands able to adapt to the crisis with extra CT capacity isolated from the rest of the Medical Center.

“At the beginning of March 2020, we contacted Canon Medical Systems for help with a CT imaging facility for extra capacity in the growing COVID-19 crisis,” said Dr. Daan Katchaki, Manager Radiology at the LUMC. “We needed a lung CT scanner. It had to be good, quick, easy-to-install, easy-to-use, and easy-to-clean. At that time, we did not have a prepared room in our building and separated patient-routing was not yet specified in regulations. However, the pandemic was evolving rapidly, and we needed fast service from Canon Medical Systems. They reacted almost immediately to our needs with several possible solutions. One of the options proposed was an Aquilion Prime SP CT scanner in a trailer which was immediately available – It was exactly what we needed, and within a matter of days, the solution was transported and installed.”

“As we have been Aquilion CT users since 2001, it was so easy to use the Aquilion Prime SP,” he adds. “Scan times are short and both spatial and temporal resolution are more than sufficient to diagnose lung infections.”

The LUMC simultaneously built an internal department specifically for managing patients from the COVID-19 crisis. This part of the Medical Center is isolated from the rest.

“With this in place, we installed and started using another Canon Medical Systems CT scanner within the building,” says Dr. Katchaki. “We were able to switch from the Aquilion Prime SP in the Canon Medical mobile unit to an Aquilion Lightning SP (also an 80-detector-row-CT) in our building. We were delighted to have been able to use the Aquilion Prime SP CT Scan Unit in the first six weeks, when the COVID-19 outbreak was evolving so quickly. Excellent cooperation between our Hospital LUMC staff and the Canon Medical Systems staff has made our rapid response to the crisis possible.”

“The Aquilion Prime SP was exactly what we needed and within a matter of days, the solution was transported and installed.”

Dr. Daan Katchaki, Manager Radiology at the Leiden University Medical Center (LUMC).



Control room of the CT Scan Units.



CT Scan Unit being transported from Canon Medical Systems Europe's headquarters to the customer.

A dynamic response

Core to the success of any disease control strategy is the use of reliable, validated methods and technologies to successfully detect and manage the disease. Ever since the beginning of the COVID-19 pandemic, urgent, smooth and innovative collaboration between Canon Medical Systems and healthcare professionals throughout Europe has enabled both to work together fast to help contain the initial spread of the virus.

“Canon Medical Systems’ Refurbished and Mobile Imaging Solutions has been able to offer a remarkably swift, dynamic and valuable response to the crisis, because it works so closely with customers and is tuned to their needs, even when they change drastically - within hours in this case!” says Johan.

Refurbished and Mobile Imaging Solutions recently expanded team and new facility in the headquarters of Canon Medical Systems Europe in Zoetermeer, the Netherlands, have adapted their workflow to absorb the demands of a global health crisis within days. Refurbishing medical equipment is already subject to many strict regulations and legal aspects. The Canon Medical Department has succeeded in increasing production capacity to meet the high demand, enabling delivery of multiple CT Scan Units per week.

“We are continuously busy developing and implementing new technologies and extending our mobile imaging solutions to be able to improve our services for our customers – healthcare professionals, as well as the patients that they treat. At a time when you’re being called to do the impossible, you deserve an imaging partner that innovates solutions that are ‘Made Possible’,” Johan concludes.

Fast installation

- Deployable imaging solution with uncompromising workflow and imaging performance.
- Quick and easy transport anywhere needed by road, rail, sea or air.
- Unloading and set-up in a minimum of time.
- The CT Scan Unit can easily be included in a tent environment or combined with portacabins to create a temporary building facility, or connected directly to the hospital.



Safe and comfortable

- Enables work to be efficient, comfortable and safe at all times.
- Hospital-grade walls and floor installations.
- Separate air flows for patient and operator rooms.

High performance

- State-of-the-art 80/160-row imaging equipment.
- Reliable diagnoses with short scanning times and a superior workflow.
- Advanced AI-based technology available to enable the best possible imaging results.

Mobile imaging solutions Made possible.

Made For life



Mobile Trailer

Our Mobile Trailers are developed with the highest safety regulations and to create a comfortable environment for patient and staff. To ensure that we create the most comfortable environment, we developed a Mobile Trailer that has a good working-space, including a separate control room, specified to GDPR regulations, with air conditioning, patient monitors, outside surroundings monitors, telephone and PACS connections, contrast control panel, comfortable chairs for the operators, and privacy glass.

The Mobile Trailer features a very spacious scan room, which is fully air-conditioned and can be monitored easily. It also has wall- and ceiling art, dimmable lighting that can be changed to different colors, and calming music to help the patient feel more comfortable and relaxed.

The wide bore medical equipment provides a non-claustrophobic experience for the patient. Patients restricted to beds can be maneuvered into the trailer via the patient lift. The trailer has a waiting and dressing room, washing facility, panic button, and stair entrance for those not confined to a bed that can also be monitored.

The Mobile Trailer is equipped with Canon Medical's Aquilion Prime SP with Advanced intelligent Clear IQ Engine (AiCE), HII Vital data processing, Contrast Dual injector, Life Pulse, contrast oven and washing facility.

The deployment model ensures that Mobile Trailer can be quickly transported to wherever needed. Before delivery, Canon Medical carries out a site survey to ensure seamless installation prior to delivery.

Our Mobile Trailer solutions can provide excellent support for customers to meet peaks in demand, extend capacity for a longer period, cover a period of planned downtime, or as a rapidly deployed back-up. For governmental screening programs, these are a fantastic solution.



Canon Medical's Mobile Trailer in front of the hospital 'Krankenhaus der Barmherzigen Schwestern Ried' in Austria.



We aim for 100% uptime and 100% satisfaction through our outstanding European customer and service support. Renting our equipment enables clinical teams to access the latest technological developments and enhancements, while the responsibility for servicing the equipment lies with us, as per the rental agreement.

Renting equipment can be a rewarding solution to fulfil immediate clinical needs while avoiding larger capital investments. //

“After delivery, we could immediately work in the trailer. The spacious area around the CT and the couch offers sufficient freedom for movements even for interventional procedures. Thanks to the patient couch lift, the system is also suitable for patients with limited mobility. Also the post-processing solution and the complete PACS connection is integrated in Mobile Trailer unit.”

Dr. Claus Kölblinger, Head of Radiology Department at Krankenhaus der Barmherzigen Schwestern Ried, Austria.



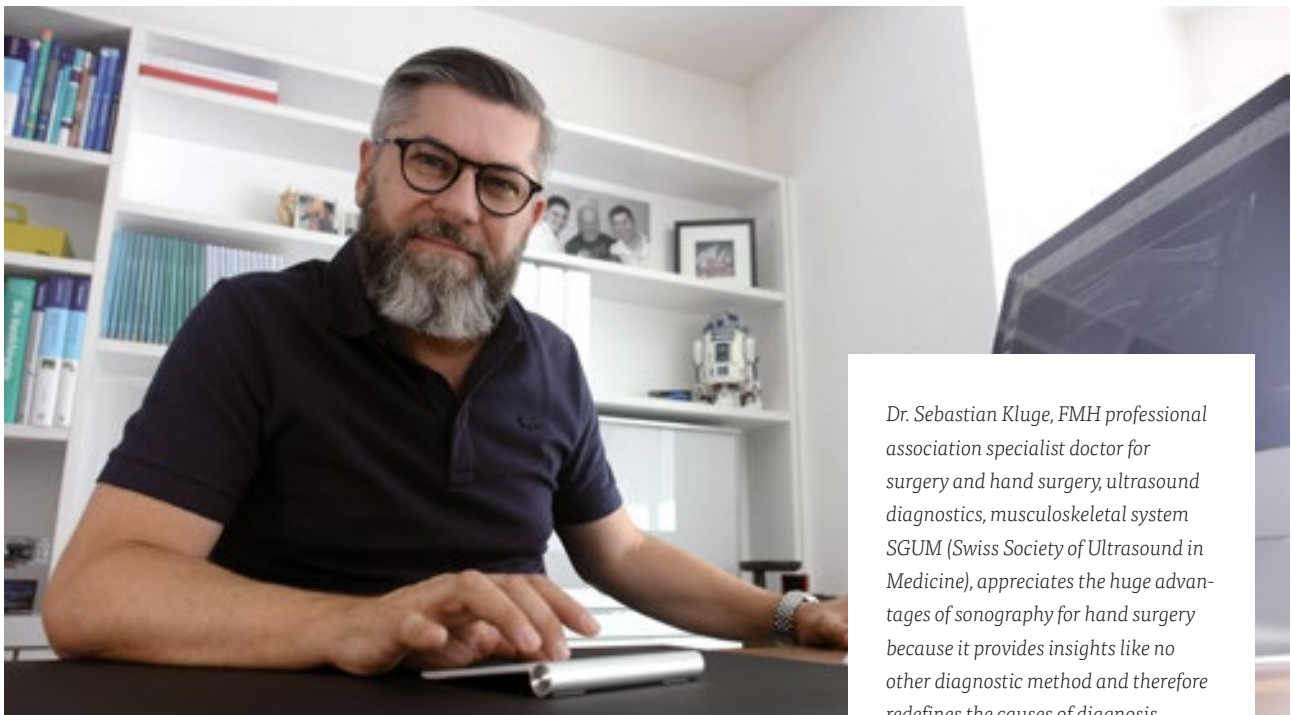
Control room in the Mobile Trailer.

High-Resolution Sonography Redefines Hand Surgery Diagnostics

The Handchirurgie Seefeld (hand surgery) clinic in Zürich, Switzerland, relies on high-tech medicine with the state-of-the-art Aplio i800 ultrasound diagnostic system of Canon Medical.

The major challenge in hand surgery is the precise handling of delicate structures. There is hardly any other specialty where elements of plastic surgery, orthopaedic surgery and micro surgery are so closely related and deal with extremely complex and small anatomical structures. Therefore, diagnosis with sub-millimetre-level accuracy has a significant impact on optimal treatment success. Specialists like Dr. Sebastian Kluge, FMH professional association specialist doctor for surgery and hand surgery, ultrasound diagnostics, musculoskeletal system SGUM (Swiss Society of Ultrasound in Medicine), use the high-tech Aplio i800 sonography device to redefine the approach to a highly differentiated field. “The Aplio presents structures and situations in a spatial resolution which would not be possible for any CT or MRI, whilst simultaneously providing the possibility of dynamic assessment,” he explains.

Dr. Sebastian Kluge started his medical career around 20 years ago at the Berufsgenossenschaftliche Unfallklinik (occupational accident clinic) in Ludwigshafen, where he completed civilian service after finishing school and discovered his interest in hand surgery. “Until that point I was all set on studying drums and piano. It was only my fascination with hand surgery that made me embark on a career in medicine.” Today he is one of the most well-known specialists in his field, and his expertise makes him highly respected by his patients and his medical colleagues alike. He has delivered lectures and ultrasound seminars around the world and worked with fellow specialists to write a standard textbook entitled “Ultraschalldiagnostik der Hand” (Diagnostic Ultrasound of the hand).



Dr. Sebastian Kluge, FMH professional association specialist doctor for surgery and hand surgery, ultrasound diagnostics, musculoskeletal system SGUM (Swiss Society of Ultrasound in Medicine), appreciates the huge advantages of sonography for hand surgery because it provides insights like no other diagnostic method and therefore redefines the causes of diagnosis.

“The presentation of soft tissue and bone surface and their dynamic interaction with a resolution of 24 MHz is staggering and proves the huge potential of sonography.”

Dr. Sebastian Kluge, FMH professional association specialist doctor for surgery and hand surgery, ultrasound diagnostics, musculoskeletal system SGUM (Swiss Society of Ultrasound in Medicine).



Ultra-high frequency redefines causes of diagnoses

The Aplio i800 sonography device from Canon Medical is an important “hand tool” in his daily routine. He decided to invest because “this system offers previously unforeseen new possibilities in hand surgery.” By this he means in particular the extremely high resolution that is possible in combination with the 24 MHz probe, therefore enabling the differentiation of structures down to a sub-millimetre level. In particular, where the small distance between the skin surface and bone means that a high penetration depth is not needed, the system displays a sonographic image in the highest resolution. Dr. Kluge therefore sees big advantages for high-frequency ultrasound in rheumatology, neurology and orthopaedics.

Dr. Kluge’s specialties are post-traumatic changes in the forearm, wrist and fingers, the non-operative and operative treatment of nerve compression syndromes and inflammatory-degenerative and arthrotic changes in the hand and finger joints, including joint replacement. “The spectrum of causes problems and the range of treatment options available are immense”, the doctor explains. “In this respect, various suspected diagnoses need to be isolated from each other extremely precisely and treatments need to be planned and implemented with the utmost precision,” he added.

The Aplio i800 is ideally suited for all of this work. This is because while sonography was previously carried out at sound frequencies of between 15 MHz and 18 MHz, Canon Medical offers matrix technology in the ultra-high frequencies of 24 MHz and 33 MHz. “The resulting increase in spatial resolution not only allows the person carrying out the examination to take the very important step of

moving from a suspected diagnosis to absolute diagnostic certainty for many matters, it actually redefines the cause of certain diagnoses.”

High-resolution imaging allows for high-precision interventions

The extremely high resolution of the sonography system provides valuable support even for ultrasound-controlled interventions. The most common indication in hand surgery is stenosing tenosynovitis. This imbalance between the annular pulley width and flexor tendon thickness may result in clicking of the affected finger. When attempting non-operative treatment, a cortisone injection can even be given with ultrasound support. This results in a lower rate of side effects due to more precise placement of the needle in the digital canal. However, the method only really comes into play in the event of differentiated hand surgery interventions such as occult wrist ganglions, which are “destroyed” under sonographic guidance, so in many cases the complaints can be permanently eliminated even without surgery. “In these special cases, the immense spatial resolution even allows for targeted ultrasound-controlled anaesthesia of the nerve supplying the wrist joint capsule, which makes this a pain-free intervention. Even minimally-invasive carpal tunnel operations can now be done under sonographic guidance.”

Another example for the usefulness of high-resolution ultrasound can be seen in the case of post-operative complications. Implant protrusions, which may occur occasionally after surgery on radial fractures, for example, may cause irritation of adjacent flexor and extensor tendons. This often results in an extensor tendon rupture, usually of the long extensor tendon in the thumb. "The ideal method for localising any implant-related complications of this kind is ultrasound", says Dr. Kluge. In these cases, CT shows the implant protrusion but not the soft tissue trauma caused, while in an MR scan the soft tissue injury is frequently covered by metal artefacts. "In this case, sonography allows for optimum differentiation of bone surface, soft tissue and implant – in high resolution", Dr. Kluge summarised.

"We not only have a responsibility to the patient, but also to our colleagues." Patients are also repeatedly referred by fellow hand surgeons for ultrasound diagnosis – usually with very precise and differentiated problems. "In this case in particular, the expectations of a precise diagnosis are extremely high, because our colleagues base their further treatment on this diagnosis", said Dr. Kluge.

Optimal ease-of-use makes work processes easier

The hand specialist has got to know the advantages of ultrasound technology "from the bottom up". In the wards where he completed his medical training in Frankfurt, Bern and Zurich, great importance was always placed on sonography. This is why he gives lectures and seminars on diagnostic and treatment options with the aid of modern sonography systems.

Dr. Kluge gets to the heart of the matter when he says "the processing of the sound information and the resulting image quality in the new Canon Aplio systems are phenomenal." They can be used to produce very exact findings. Even for the finest structures such as digital nerves it is possible to differentiate between intact and destroyed nerve fibres. This is particularly helpful when planning nerve reconstructions, because the length and thickness of a nerve transplant which is needed

can be precisely measured before the operation and nerve transplants can be planned or ordered in the correct size. In his experience, "the Aplio i800 is also an extremely user-friendly system". An example of this is "when the program is selected, the system also changes to an optimised key assignment in the control panel, which means that there is no need to search for functions unnecessarily."

However, the perfect integration of the device into the practice's work processes is also important for Dr. Kluge. The ultrasound device is integrated into the practice's information system via a wireless network. After the hand specialist has carried out a clinical examination on a patient, he can access all of the patient information necessary for the examination on the Aplio i800 and then connect further diagnostics there immediately. The results are then automatically transferred to the practice's software and are available there for further processing.

"An accelerated workflow is just as important for us as comprehensive clinical examination is for our patients. Suspected clinical diagnosis are often able to be confirmed or excluded during the initial consultation thanks to the sonography.



In combination with the 24 MHz ultrasound probe, structures can be shown precisely and without artefacts.

In many cases, there is absolutely no need for additional imaging procedures such as CT and MR, which in the latter case also results in cost reductions and reduced radiation for the patient from CT", the hand specialist explains. Thanks to the iDMS (intelligent Dynamic Micro-Slice) function of the matrix probes from Canon Medical, the crystal elements can be aligned so that a very narrow and focus-independent sound field is produced. "This "sharpening (of) imaging slice thickness" makes it possible to focus on even the smallest joint spaces between individual carpal bones", stresses Dr. Kluge.

A new look for micro-vascular situations

"In addition to the usual Doppler and Power Doppler functions, with Canon there is an additional Doppler algorithm available, which can show the micro-vascular supply to a region very specifically", adds the hand specialist. This "Superb Micro-vascular Imaging" (SMI) for contrast-free examination of micro-vessels provides insights that would otherwise be difficult or impossible to achieve. As in subtraction angiography, the surrounding tissue can also be hidden and the focus can be placed solely on the micro-vascular supply. Inflammatory joint conditions such as synovitis can be presented in a highly differentiated manner using the sonography device from Canon Medical. "Thanks to the quantification of the synovial circulation, inflammatory joint changes can be diagnosed and the activity of the condition can be assessed. The response to medication, which may be prescribed for rheumatoid arthritis for example, can therefore be monitored and the dose can be adjusted if necessary. Specific changes in the cartilage surface allow additional conclusions to be drawn about causal crystal deposition diseases."

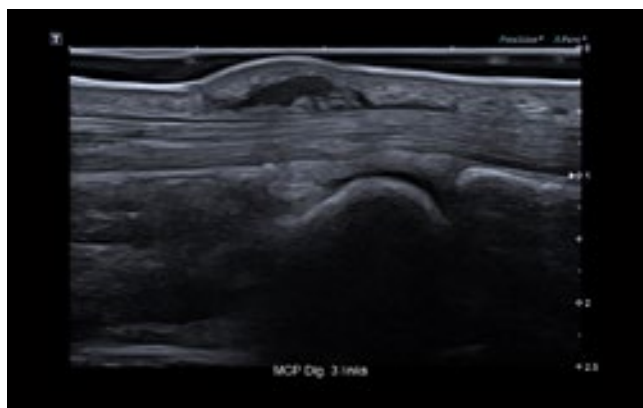
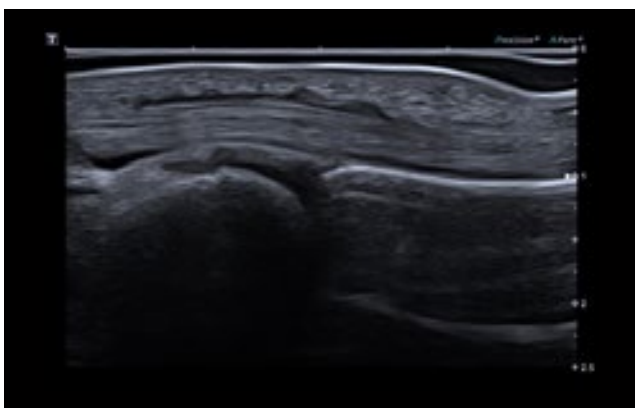
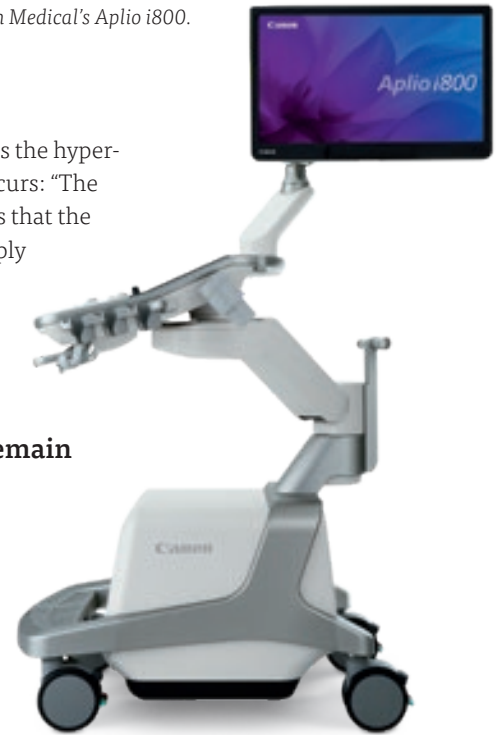
Dr. Sebastian Kluge is also fascinated with the efficiency of the Superb Micro-vascular Imaging in the detection of glomus tumours, which are frequently located under the finger nail and can be very painful for patients.

The Aplio i800 captures the hyper-vascularisation that occurs: "The coloured display means that the increased vascular supply to these tumour areas is positively highlighted from their surroundings."

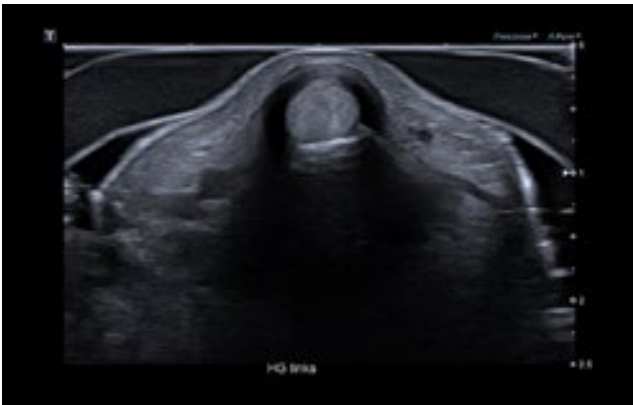
Sonography will remain exciting in future

Sonographic imaging has played a key role in the life of doctor and passionate music lover Sebastian Kluge for around 20 years, and to some extent he thinks of it as a work of art. He has been using it for a good 15 years as a hand surgeon and knows that "this diagnostic technology offers enormous opportunities that have by no means been exhausted yet". He looks forward to the next developments, which he is monitoring keenly. He has already been able to scrutinise the Aplio i800 in advance as part of his own advanced training events.

He thinks there is great potential in the further definition of software algorithms and image processing, and also in the further miniaturisation of the systems. He said "making high tech ultrasound systems like the Aplio i800 from Canon Medical portable would be a vision that would be worth achieving in many respects, not least because it would mean that high-frequency imaging could even be used in ultrasound-guided operations on the hand without having to be tied to a single operation site." //



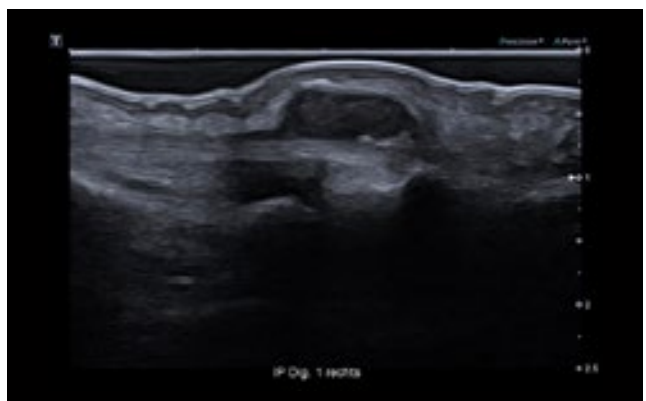
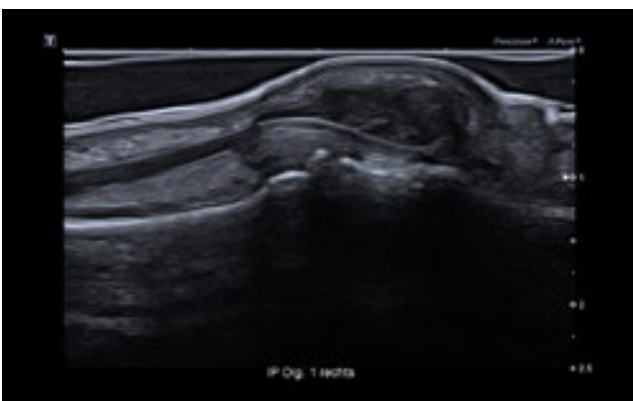
Stenosing tenosynovitis. This is one of the most common conditions in the hand. In addition to primary causes such as the thickening of the A1 annular tendon at the level of the joint at the base of the finger (left), the condition can also be caused by synovitis of the flexor tendons. Subcutaneous Dupuytren's nodules can also radiate into the digital canal or the A1 annular pulley and result in a secondary constriction of the digital canal (right). A differentiation, which is relevant for the therapeutic approach, can be made reliably using sonography.

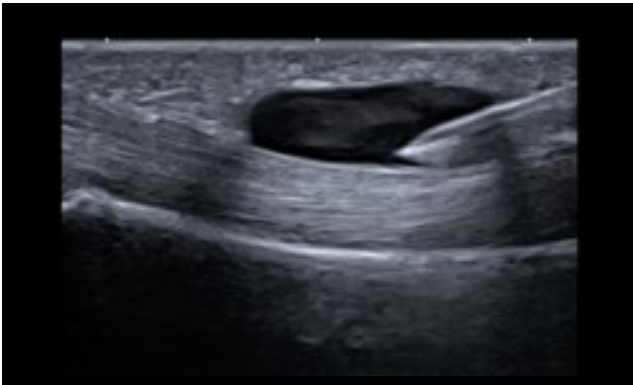
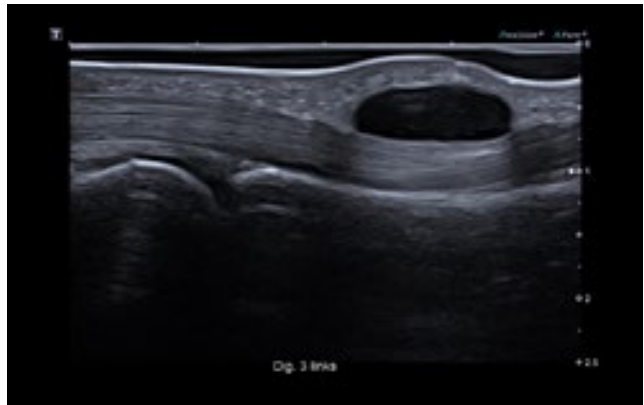
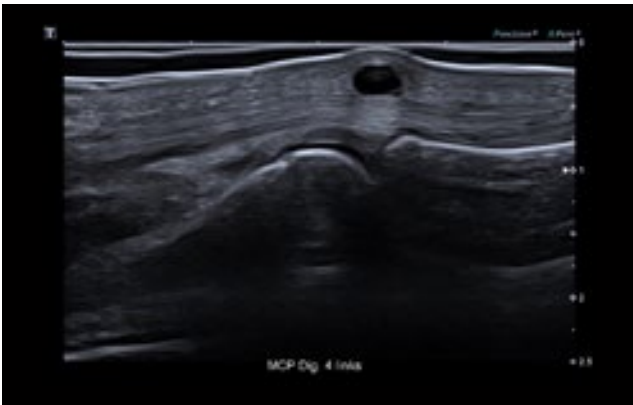


De Quervain's tenosynovitis. This is an entrapment syndrome of the first extensor tendon compartment. The tendons of the abductor pollicis longus and extensor pollicis brevis muscles are compromised and can barely be differentiated from each other as individual structures anymore, while the extensor retinaculum displays a halo-like thickening (left). Some patients present with an additional partition of the first extensor tendon compartment (subsheath), which can also be easily distinguished using sonography (right). Knowledge of this is important for treatment, as patients with a subsheath do not respond as well to non-surgical treatments.

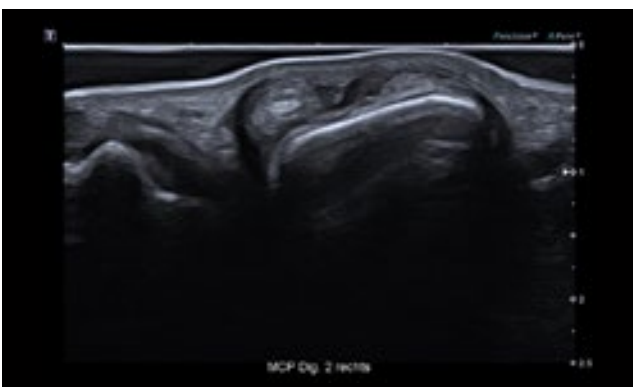


Differentiation of tumours. Ultrasound also allows for reliable differentiation of many masses in the hand (left). This has become established not only for peripheral nerve tumours. Giant cell tumours of the tendon sheath and pigmented villonodular synovitis (PVNS) emanating from the joints are histologically identical and can only be differentiated based on their cause. This has relevant effects on the therapeutic approach, because in the case of PVNS (below) the joint in question also needs to be cleared intraoperatively in order to minimise the risk of the tumour relapsing.

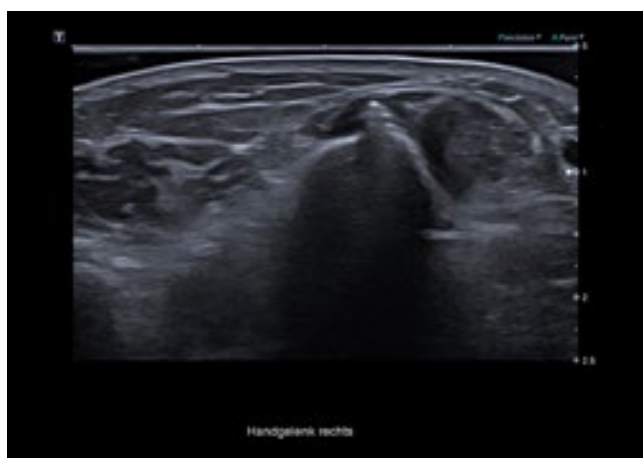




Ganglia of the digital canal. Ganglia are benign tumours that may occur in both the wrist and the digital canal. They are filled with a clear, gel-like, viscous fluid. They can easily be differentiated due to their homogeneous reflex patterns, the sound amplification remote from the swelling and a shadow at the edge of the cyst (Dr. ip-off phenomenon). On the digital canal they can mainly be found at the level of the A1 and A2 annular pulley (above) and if non-surgical treatment is requested they can even be treated using ultrasound-guided needle aspiration (left).



Extensor hood lesions. They are a frequent cause of persistent swelling and pain following trauma in the joint at the base of the finger. In many cases, subluxations of the respective extensor tendon(s) occur. This means that there can already be a clinical presumption of the diagnosis. However, sometimes these clinical indications are more subtle, so the correct diagnosis can often only be made using imaging procedures. In comparison with magnetic resonance imaging, the advantage of sonography lies in the higher resolution and the possibility of a dynamic examination.



Implant-related complications. Postoperative complications caused by osteosynthesis materials which have been inserted are not uncommon. In the case of radial fractures treated using surgery in particular, prominent plate designs or excess screw length may result in irritation and a rupture of the flexor and extensor tendons. In this situation, the diagnostic advantage of sonography in comparison with CT relates to the simultaneous presentation of the cortex, relevant implant protrusion and soft issue, and the advantage over MRI relates to the absence of metal artefacts.



*Interview with Patrick Lefevere (CEO),
Koen Pelgrim (Head Coach) and
Dr. Toon Cruyt (Head of Medical) from
Cycling Team Deceuninck – Quick-Step.*



Portable Performance, Perfect for the Peloton

There's no doubt that professional cycling is an endurance sport like no other. Races, such as the infamous Tour de France, cover unimaginable distances and torturous terrains that stretch these elite athletes to their mental and physical limits. For the 28 riders of Belgium's celebrated Deceuninck – Quick-Step World Tour Cycling Team, this is a way of life. Since the team's inception in 2003 they have racked up an incredible 700 UCI victories, including 19 Monuments, 4 World Road Championships, 6 World ITT Championships, 4 World TTT Championships, 2 World Cups and an Olympic Title.

The Wolfpack, as they are affectionately known, takes its nickname from a race report written by Sports Director Brian Holm who concluded "we are the wolfpack and we don't take prisoners." But more than just an inside joke, Team CEO Patrick Lefevere believes that the name describes their 'family' well:

"We race together, win together and live together – and nobody is ever left behind. The team is stronger than the single individuals." This extends to the support network around The Wolfpack who attend to their performance, health and wellbeing all year round, as well as in the peloton.



THE WOLFPACK

“The team is stronger than the single individuals.”

*Patrick Lefevere, CEO
Deceuninck – Quick-Step.*

Head Coach, Koen Pelgrim and Head of Medical, Dr. Toon Cruyt, lead this team of professionals who play a critical role in the Deceuninck – Quick-Step’s success. “I’m responsible for designing training programs for our riders and follow up their performance, both in training and racing,” explains Koen. “It involves a variety of things like decision making and planning of team training camps and collaborating with my colleagues on the race programs of our riders.” Dr. Cruyt’s priority is the physical health of the riders and he regularly deals with the inevitable injuries that occur in such a gruelling elite sport. Some are fairly straightforward (such as abrasions, saddle sores and muscle strain), but there are also more serious injuries, like fractures and concussions, that might put a rider out of action long-term if not treated swiftly.

Together, they manage the needs of the riders through a demanding and strenuous race calendar. “Cycling on a professional level is always seeking the limits and every day the riders take big risks,” says Dr. Cruyt. “When a cyclist is seriously injured during a race, it has a big impact on the whole team. In such moments we are confronted with the

fact that cycling is a dangerous sport.” However, he has been attending to the injuries of cycling teams for over twenty years, rising to the challenges of being a ‘medic on the move’ and now has the support of an extended team through a partnership with Canon Medical Systems Europe. This gives Dr. Cruyt and his fellow medical professionals full access to the most up-to-date diagnostic imaging equipment.

A handheld tool for medics on the move

The whole team shares an appreciation of the enormous role that technology now plays in addressing the unique scenarios that team cycling regularly presents. When following the riders and administering on-the-spot treatment, doctors can encounter the sort of unconventional and unusual locations that make hospital visits difficult. In the event of an accident, pro cyclists will often have a quick check-up with the race doctor (who follows the peloton) and then resume cycling to finish the stage, rather than lose their place in the race. Afterwards, Dr. Cruyt and his team make a more detailed examination, using tools like Canon Medical’s Viamo sv7 portable

ultrasound scanner, which is around the size of a tablet computer and can be used to give an immediate diagnosis on muscle injuries, detecting tears and the presence of fluid. “It has significantly evolved the way we look after the team,” says Dr. Cruyt. “For example, in case of localised muscle pain, with ultrasound you can make a differential diagnosis of hematoma or muscle strain or muscle tear. In case of hematoma you can let the rider start the next day, in case of a muscle tear we stop him. Being able to use the scanner in a quick and efficient manner, at the point of care, wherever we are, can make a huge difference to a rider’s recovery.”

The timeframes within which the stages take place means that as well as being on the road and in remote locations, Deceuninck – Quick-Step are also against the clock. By the time the cyclists have completed a stage and have returned to their hotel, it’s late and the following morning starts early, so it’s an incredibly narrow window of opportunity in which to find and access the nearest ultrasound facilities. Dr. Cruyt gives the example of a rider who crashed and suffered a swollen elbow, which was x-rayed in hospital,



but showed nothing untoward. Yet, the next day the rider could not bend his elbow. “With Canon Medical’s Viamo sv7 we can check if there is a traumatic bursitis or if there is an intra-articular bleeding which can be an indication for further imaging of the elbow,” he explains. “Most of the injuries in cycling are multiple injuries and it’s often only one or two days later that some painful sites become manifest.

At this point the ultrasound is the number one way to reassure the cyclist that it won’t do any harm to race a few days with pain, and that it will only get better.”

Diagnosis, recovery and long-term planning

Knowledge is most definitely power in performance sport and having a tool which can provide the team medics with immediate insight allows them to effectively and accurately manage the capabilities of the riders as they work through the season. For example, Dr. Cruyt treated a rider who had arrived at the 2020 Paris-Nice race earlier this year having crashed at a race the previous weekend. He had a large and painful hematoma on his left hip but was still insistent on going ahead

with the race. The portable ultrasound meant that they could examine him immediately and, to his relief, they discovered no muscle injury, “He could start Paris-Nice with the guarantee that his efforts were not going to aggravate his injury and that time would heal his discomfort.”

Recovery times are understandably variable, but Dr. Cruyt describes professional cyclists as “very tough”. Common abrasions and contusions mean that they will usually continue as normal unless they have other symptoms. A broken collarbone may require osteosynthesis (having the bones fixed with plates, screws or wires) and see the rider back on the rollers after three days, cycling after a week and racing in around three weeks.



Koen Pelgrim, Head Coach Deceuninck – Quick-Step.



“The Viamo has significantly evolved the way we look after the team,” With Canon Medical’s ultrasound scanner we can make a huge difference to a rider’s recovery.”

Dr. Toon Cruyt, Head of Medical, Deceuninck – Quick-Step.

More serious fractures (femur, vertebrae and the like) can have a recovery period of up to six months. However, preparations and objectives for the team are put in place well in advance and early diagnoses support riders to make a smooth transition back into the training and racing schedule. Even this year, with the challenges brought forth by Covid-19, Koen Pelgrim feels prepared and optimistic.

“The main objectives remain pretty much the same as in a normal year, with the highlights being the grand tours and the classics,” he explains. We prepare with a training camp and

then the further preparation depending on the race. For the Tour de France for example, riders will do a big block of racing at the altitude camp to be 90-95% ready, followed by a few preparation races early August to fine tune.”

Beyond the normal scope of medical partnerships, Canon Medical have also been able to provide Deceuninck – Quick-Step with a Canon EOS 90D camera and Canon EF 70-200mm and EF 50mm f/1.4 USM lenses to support their content creation throughout the season. Fans will be treated to creative and beautifully captured images and

videos from wherever The Wolfpack are. It’s an additional dimension to the relationship made possible by belonging to a global family with exceptional imaging technology at its very heart.

The team are in superb hands, who have access to the very best tools available to elite athletes. For team CEO Patrick Lefevere this, along with the confidence and drive to succeed are a winning combination. “The biggest challenge of the team is to reinvent ourselves every year, to keep things fresh and keep everyone motivated to be the best that they can be.” //



THE WOLFPACK

Watch out for The Wolfpack on Twitter ([@deceuninck_qst](https://twitter.com/deceuninck_qst)) and keep up with the latest team news on their website: www.deceuninck-quickstep.com

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The Power of CTA and CTP for Characterization of Ischemia without Obstructive Stenosis

Joanne D. Schuijf, PhD

Patients presenting with symptoms or other signs of myocardial ischemia in the absence of any significant epicardial coronary stenosis are at present underdiagnosed and undertreated as the current diagnostic pathway remains oriented towards finding obstructive coronary disease. Combined anatomic and functional imaging provided with coronary CT angiography (CTA) and myocardial CT perfusion (CTP) could address an important need to better identify these patients.

A large percentage of patients undergoing invasive coronary angiography do not show significant obstructive coronary artery disease (CAD), despite their symptoms of chest pain¹. This finding, called ischemia without obstructive stenosis or INOCA, is reported in up to two thirds of patients and is more common in women¹.

Given the absence of any significant stenosis, these patients are not candidates for revascularization, are often falsely reassured and are frequently not offered any specific treatment or follow-up. Yet, studies have consistently shown that these patients are still at elevated risk for cardiovascular events, indicating the need for adequate and timely recognition of this condition².

Coronary CTA has become an established imaging test for the clinical work-up of patients presenting with chest pain³.

During the same session also myocardial perfusion imaging can be performed to assess the presence of ischemia, a strategy that further enhances the diagnostic accuracy of cardiac CT and is increasingly applied⁴.

In the unique global multicenter CORE320 trial, 381 patients with suspected or known CAD were enrolled to undergo both coronary CTA and stress CTP using the Aquilion ONE from Canon Medical Systems in addition to invasive coronary angiography and SPECT perfusion imaging, regardless of stenosis severity⁵.

The trial confirmed high accuracy of combined coronary CTA and CTP obtained with wide area detector CT to identify patients with flow-limiting CAD as defined by a significant stenosis on invasive coronary angiography and a corresponding perfusion defect on SPECT imaging⁵.

The CATCH2 trial built on to this experience and, again using the Aquilion ONE, showed in 600 patients that a post-discharge diagnostic strategy of coronary CTA and CTP safely reduced the need for invasive examination and treatment in patients suspected of CAD⁶.

“The combination of CTA/CTP can potentially be a more sensitive, more informative and fully non-invasive method to assess CAD as compared to invasive coronary angiography and SPECT imaging.”

Combined anatomic and functional imaging may however also provide important clues for diagnosis and management in those patients who present with chest pain complaints in the absence of any significant epicardial lesions. Recently an ancillary investigation of the CORE320 trial, specifically addressing this question, was published in *Radiology* with its imaging findings featured on the cover⁷. The primary objective of the study team was to explore the prevalence of INOCA in this high risk population using CTA and CTP. In addition, advantage was taken of another aspect of cardiac CT, namely that information on coronary atherosclerosis and plaque can simultaneously be derived in addition to the mere detection of coronary stenosis. Thus, patients with INOCA identified on CT were further characterized in terms of their clinical characteristics as well as extent and type of coronary plaques.

“Non-invasive imagers could play a crucial role in recognizing phenotypes beyond obstructive CAD and guide referring physicians in management decisions.”

In the entire study cohort, INOCA was identified on combined CTA and CTP in approximately one of every 10 patients. An image example is shown in Figure 1. While men showed a higher percentage of obstructive CAD, INOCA was seen in twice as much women. In addition, a link with increased body mass index was observed.

Interestingly, patients with INOCA showed a higher plaque burden as compared to patients with normal perfusion on CTP and no stenosis on CTA. Also, high-risk features like positive remodeling and low attenuation plaque were more often seen. Ischemia on CTP in patients with completely normal coronary arteries (without any evidence of plaque) was very rare. These findings suggest that patients with INOCA should be treated medically not only to control their chest pain symptoms, but also to slow down the build-up of atherosclerotic plaques.

Analyses were also performed using invasive coronary angiography and SPECT imaging. Overall, findings were comparable yet less informative. Detailed plaque character-

ization, which has become almost standard on CTA, cannot be performed using invasive coronary angiography. Also, CTP imaging has a higher sensitivity to detect ischemia and can identify abnormalities in myocardial perfusion even in the presence of only moderate coronary narrowings. While at present SPECT imaging followed by diagnostic invasive coronary angiography is still more common in clinical practice to manage patients with suspected chest pain, the observations from this ancillary study re-affirm that the combination of CTA/CTP can potentially be a more sensitive, more informative and fully non-invasive method to assess CAD. Moreover, given the completely non-invasive and fast nature of CT, patients tend to strongly favor CT over other cardiac examinations⁸.

More recently, also dynamic CTP has been introduced and further developed allowing the quantification of absolute myocardial blood flow and coronary flow reserve which may further enhance the potential of CTA/CTP for clinical decision making^{9,10}.

“The combination of CTA and CTP, as can be easily performed with the Aquilion ONE, provides a promising opportunity for detailed and non-invasive CAD phenotyping.”



Figure 1. Patient with atypical angina. The presence of any significant stenosis was ruled out on both coronary CTA and invasive coronary angiography. On CTP, a defect corresponding to the LAD territory was identified during stress but not during rest, indicating the presence of ischemia and providing a potential explanation for the patient's recurrent symptoms.

Summary

The combination of coronary CTA and CTP as can be easily performed with the Aquilion ONE series provides a promising opportunity for detailed and non-invasive coronary artery disease phenotyping, including the characterization of ischemia without obstructive stenosis. Correct identification of the latter is important as these patients do not benefit from revascularization but require optimal medical therapy to improve their prognosis.

As senior author and principal investigator of the CORE320 trial Dr João Lima (Johns Hopkins School of Medicine, Baltimore, USA) points out, non-invasive imagers could play a crucial role in recognizing phenotypes beyond obstructive CAD and guide referring physicians in management decisions. To this end, the combination of CTA and CTP with wide area detector CT will be an important tool. //



Link to the full article in Radiology.



Listen to the podcast by Radiology Editor David A. Bluemke, MD, PhD, providing a clear explanation of the CORE320 study, the value of wide area detector CT by Canon for cardiac imaging and the concept of INOCA in addition to the main study findings.



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Clinical Research
Manager, Global
RDC, Canon Medical
Systems Europe.

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*VISIONS spoke with
Prof. Paulo E. Stanga,
London Vision Clinic, UK.*

New Diagnostic and Therapeutic Options in Eye Care

Canon Medical's Xephilio OCT-S1 and OCT-A1 will help improve eye care by enabling to scan larger areas of the retina towards the periphery and the vitreous from the cortical to the mid-vitreous, according to Prof. Paulo E. Stanga, a consultant ophthalmologist and vitreoretinal surgeon at London Vision Clinic, UK.

These systems have recently been installed at his London Vision Clinic and their numerous benefits - ease of use, fast acquisition time and high imaging resolution - could help foster screening and reduce reliance on fundus fluorescein

angiography in many scenarios, he believes. The devices have renewed the interest of the team in retinal and vitreous imaging, as they bring new diagnostic opportunities and therapeutic options, he told Visions in an exclusive interview.

Could you describe your team at London Vision Clinic?

My clinical team consists of a retina research assistant, a lead retinal nurse and eleven other nurses and ophthalmic technicians shared between my retinal service and the corneal laser service here at LVC. We are supported by a team of patient care coordinators, clinic coordinators and the management team.

The introduction of Canon Medical's OCT-S1 and OCT-A1 has renewed the team's enthusiasm in retinal and vitreous imaging, specially in high myopia, a condition that affects a significant percentage of my patients through my partnership with world-renowned Prof. Reinstein and his corneal laser service and clinic.

How many people in your staff currently use the latest Canon Medical Xephilio OCT devices?

My retina research assistant Abi Orr and I routinely use these systems, and they are increasingly used by our team of ophthalmic technicians and nurses to scan patients under the care of the corneal laser service - which consists of three surgeons who are supported by optometrists.

Was any specific training required to use the Xephilio OCT systems?

The Canon Medical Eye Care Team has been collaborative by visiting London Vision Clinic to initially train me and a



few other team members on the latest Xephilio OCT system. As it is very intuitive and user-friendly, we have carried out ourselves further in-house training for the rest of the clinical team.

What improvements do you expect for your daily practice with this new equipment?

The Xephilio OCT-S1 and OCT-A1 will allow us to improve patient care by allowing us to scan larger areas of the retina and not just the posterior pole. The systems will help us image the retina using higher resolution and image not only the vitreoretinal interface but also deeper from the cortical towards the mid-vitreous.

These devices may also perhaps allow us to reduce our dependency on fundus fluorescein angiography. Widefield OCT angiography is changing the way we assess and diagnose diabetes.

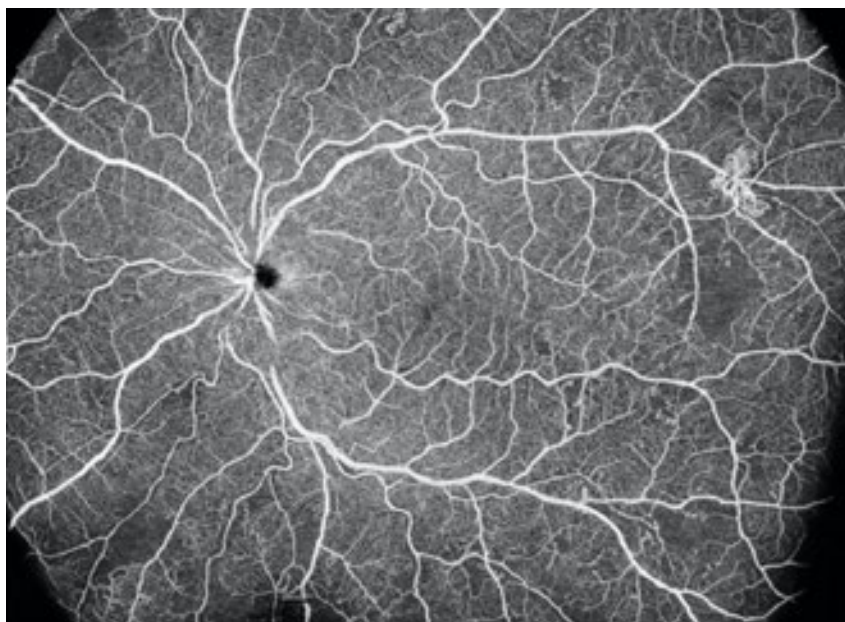
What kind of procedures do you perform with the Canon Medical Xephilio OCT-S1 and OCT-A1?

With the Xephilio OCT-S1, we mainly use the Widefield 3D vitreous, Radial OCT, Multi-cross (grid) and Cross OCT as well as Widefield OCT Angiography (OCT-A) scanning protocols.

And with the Xephilio OCT-A1, we mainly use the High-resolution Topography Maps (3um) and OCT-A.

What are the main advantages for you and your patients?

Imaged patients will benefit from using the new Canon Wide Field Swept Source and high resolution imaging modalities, resulting in additional information that improve diagnosis and management.



Post Treatment Single-scan Wide-Field OCT Angiogram. Perfused and non-perfused retinal areas are clearly defined without the need of intravenous dye. Note that the residual fibrosed superior mid-peripheral NVE remains perfused and the residual minimally fibrosed temporal mid-peripheral NVE is perfused.



“The OCT-S1 and OCT-A1 has renewed the team’s enthusiasm in retinal and vitreous imaging.”

*Prof. Paulo E. Stanga,
consultant ophthalmologist
and vitreoretinal surgeon,
London Vision Clinic, UK.*

For example, these technological advances increase our understanding of which patients suffering from an acute Posterior Vitreous Detachment (PVD) are at risk of developing new or additional retinal tears and perhaps which patients with peripheral retinal lesions may benefit from prophylactic laser retinopexy.

The imaging capabilities of these devices significantly facilitate the assessment of the cortical vitreous, the mid-peripheral retina and areas of retinal non-perfusion.

High myopia is notoriously difficult to image using OCT technology due to the presence of artefacts. However, these are significantly diminished with the Xephilio OCT-S1, partly thanks to the 23 mm scan length and the 5.3 mm deep imaging window. I also expect fewer diabetic patients will need to undergo fundus fluorescein angiography as a result.

Do you think the Xephilio OCT-S1 and OCT-A1 offer new unexplored possibilities?

Absolutely. The capabilities of the Xephilio OCT-S1 to acquire single-scan wide field OCT angiograms and to improve visualisation of the mid-peripheral retina, the vitreoretinal interface and the deeper cortical vitreous should bring new diagnostic opportunities and therapeutic options.

I am excited to see many opportunities for further development thanks to our partnership with the Canon Medical Eye Care Team.

Do you foresee any change in eye care patient management with these systems?

Xephilio OCT-A1 is easy to use with a very fast acquisition time and high imaging resolution. This could be beneficial for screening purposes and clinics with a high number of patients on a daily basis.

Xephilio OCT-S1 could be of significant benefit in the care of patients with retinal vasculopathies, such as diabetic retinopathy, vein occlusions or vasculitis, and reduce their dependence on invasive, costly and time-consuming fundus fluorescein angiography. By definition a wider scan area facilitate earlier detection and treatment of a retinal pathology.

Do you have any particular research projects involving the OCT-S1 and OCT-A1?

Amongst others, we are currently looking into in-vivo cross sectional, en-face and angiographic optical coherence tomography imaging of the cortical and core vitreous, the vitreoretinal interface, the neuroretina and choroid in a population of patients attending our clinic for refractive surgery or vitreoretinal care.

How would you describe your collaboration with Canon Medical Systems?

The collaboration with Canon Medical Eye Care Team is going very well. We have regular video calls and email correspondence and, where possible, in-person meetings to discuss our experience with the Xephilio OCT systems currently at London Vision Clinic.

Ori Zahavi, Clinical Specialist within Canon Medical Eye Care, is always quick to respond to any queries and happy to provide advice on how we can improve our imaging techniques and use the system to its full potential.

The Eye Care Team is very receptive of any recommendations/feedback regarding how the system could be improved in the near future and we find this not only essential in the company we collaborate with but also, at the end of the day, to bring potentially significant benefit for our patients.

We are very happy with Canon Medical’s systems and we are looking forward to developments to be made in the near future as part of our collaboration with the Eye Care Team.



Biography

Prof. Paulo Eduardo Stanga, Consultant Ophthalmologist & Vitreoretinal Surgeon, is Retina Lead & Retina Service Partner at London Vision Clinic. He has over 30 years experience in Ophthalmology and 21 years in the NHS, having left both the NHS and the University of Manchester in 2019. Since 2019, he has been practicing ophthalmology and continuing his research activities at the London Vision Clinic, with which he partnered with in 2017.

Prof. Stanga specialises in vitreo-retinal disorders that require either medical, laser or surgical treatment, ocular trauma and cataract surgery. Since 1993, he has worked in the development and application of new outpatient and surgical therapies & technologies. He is Principal Investigator (PI) on industry-sponsored trials and Scientific Advisor to commercial companies that develop pharmacological/surgical therapies, diagnostic/therapeutic equipment.

He introduced OCT into clinical setting (UK, 1998), Pascal® Laser (EU, 2006), pioneered Optos® Ultra Wide-Field Imaging (Intl., 2006) and helped introduce Swept-Source OCT (EU, 2012). He developed the new Hypersonic Vitrectomy technology for Bausch and Lomb Health from lab bench in 2012 to FDA 510(k) clearance in human in 2017. A year later, he introduced the technology in the EU.

While still in the NHS, Prof. Stanga was PI for a pilot study of the Argus II in Age-related Macular Degeneration (AMD).

He successfully implanted the first ever electronic retinal implants in AMD as part of a trial. He also had a pivotal role for NHS England to fund and evaluate Argus II in advanced Retinitis Pigmentosa, the first use of artificial vision in the NHS in 2016. He performed the first Argus II implantations in Retinitis Pigmentosa in several countries and helped set up artificial vision programmes, for example in Russia.

Prof. Stanga is a former Principal Investigator (PI) and Surgeon in a Gene Therapy Study in Retinitis Pigmentosa (RPGR), the results of which have recently been published in Nature Medicine. He continues his activities in

the field of Gene Therapy in Age-related Macular Degeneration (AMD) at the London Vision Clinic.

His current research interests are in vitreo-retinal imaging, laser-tissue interaction, laser photocoagulation techniques, development of hypersonic vitrectomy, electronic retinal implants/artificial vision, gene and anti-complement therapy and photo-biomodulation.

Prof. Stanga actively publishes in peer-reviewed scientific journals with an H-Index of 30 and an RG score of 36.89, indicating a score higher than 95% of all ResearchGate member's scores.

He has received several distinctions, including the prestigious Achievement Award of the American Academy of Ophthalmology (AAO). //

Vantage Orian Opens New Perspectives in all Fields

Dr. Thorsten Leibecke

At the Schön Klinik Neustadt – situated right on the Baltic Sea coast between Kiel and Lübeck – 1,150 employees care for around 20,000 inpatients from Germany and other countries. From a medical perspective, the academic teaching hospital of the University of Lübeck offers highly skilled specialised services in eight medical expert centres. One of these is the Clinic for Diagnostic and Interventional Radiology. Next to their focus on musculoskeletal radiology for orthopedics trauma surgery and spinal surgery, the clinic also provides quality radiological services in the fields of oncology, cardiology, gastroenterology, neurology vascular and abdominal surgery. “We provide our clinical partners a broad spectrum of radiological investigations,” said Dr. Thorsten Leibecke, Senior Radiologists in the Clinic for Diagnostic and Interventional Radiology, “including whole-body imaging and guideline-based multiparametric prostate imaging as part of tumour diagnostics.”

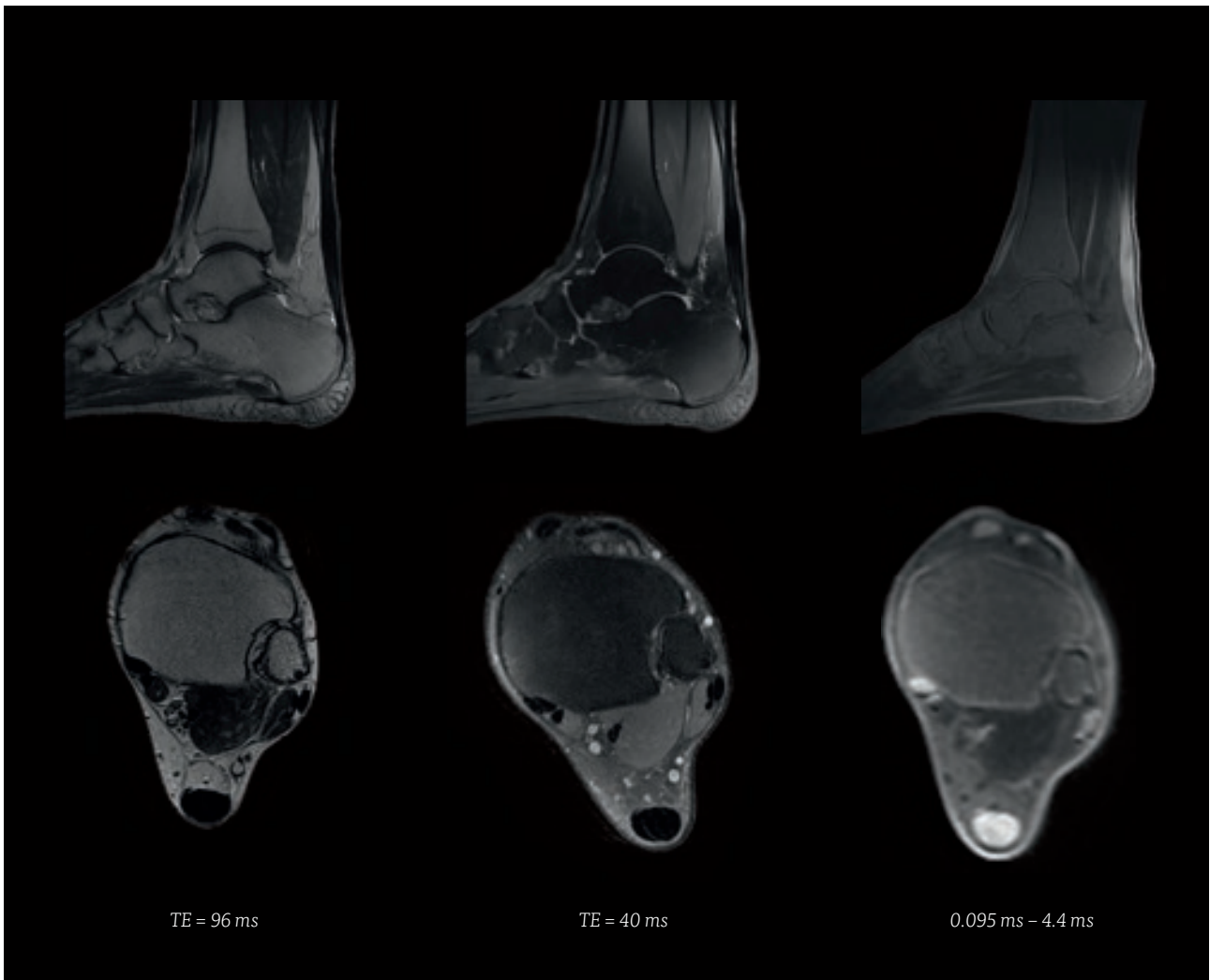
His team have been using the Vantage Orian from Canon Medical since the end of November 2018. “We opted for this machine following an intensive selection process in July 2018,” says Dr. Thorsten Leibecke. “In addition to the strong gradients required for the neuro- and cardio-imaging frequently performed in our clinic, it needed to be a 1.5 Tesla system due to e.g. the long implants in scoliosis surgery.” Spinal surgery is – next to arthroplasty – a key focus in the medical work done in the Schön Klinik Neustadt. “We are very pleased with the Vantage Orian, equipped with cutting-edge technology.” The Senior Physician and his colleagues were also impressed with the reduced energy consumption thanks to the ECO Mode. “When purchasing new equipment, we consciously support any opportunity to save energy,” said Dr. Leibecke.

Patients and staff are now benefiting from the Vantage Orian in their day-to-day clinical work. The dockable patient couch and the wider gantry opening allow personnel to move all patients into position without any problem. This applies particularly to patients with ankylosing spondylitis or pronounced kyphoscoliosis. “For the roughly 1,500 bedridden patients who are examined by MRI each year, it makes a big difference whether we need to move patients twice or four times, as was previously the case with an MR Compatible trolley,” said Dr. Leibecke. “The Vantage Orian’s Dockable Table means we can avoid 3,000 repositioning procedures per year, which also places considerably less strain on our personnel.”

The patients themselves are also much more comfortable. Overweight patients and those with claustrophobia also find the wider opening to be significantly more pleasant. “I would not have thought that an 11 cm wider opening would make much of a difference,” said Dr. Leibecke.

Performing MR studies in Vantage Orian also impresses in a number of technical aspects. For example, the use of flexible coils ensures that the image quality is at least as good as when dedicated coils are used. The coils can be used for any area of the extremities, and are therefore flexible in use. The Pianissimo and Pianissimo Zen technologies make the Vantage Orian one of the quietest MRIs available. “Some sequences, such as 4D angiography of the head, can be performed without any of the typical loud MRI noises,” said Dr. Leibecke. He also highlights the benefit of being able to pause the measurements without having to restart the entire sequence. “This spares the patients from having to lie down for so long,” he said. He adds that the homogeneous magnetic field, even in the off-centre areas, allows the arm to be positioned beside the body for wrist imaging.

Dr. Leibecke’s assessment after the first period with the Vantage Orian is that the training, service and application were and remain outstanding. “So far, the whole operation has run smoothly and we haven’t had any unexpected downtimes whatsoever,” he enthuses. “And this has also represented a significant expansion to our portfolio.”



MSK Images - UTE - Depiction of the tendons.

For example, radiologists at the Schön Klinik Neustadt are increasingly performing angiograms without contrast agent. Amongst others, techniques such as FBI (Fresh Blood Imaging), Time-SLIP, 3D PCA, 3D TOF, mASTAR (time-resolved), and FSBB (Flow Sensitive Black Blood) are routinely used here. The cerebral 3D TOF angiography often carried out in daily clinical practice impresses with its excellent depiction even of peripheral arterial vessels. Arterial Spin Labelling (ASL) also offers a native method for illustrating cerebral perfusion on the Vantage Orian.

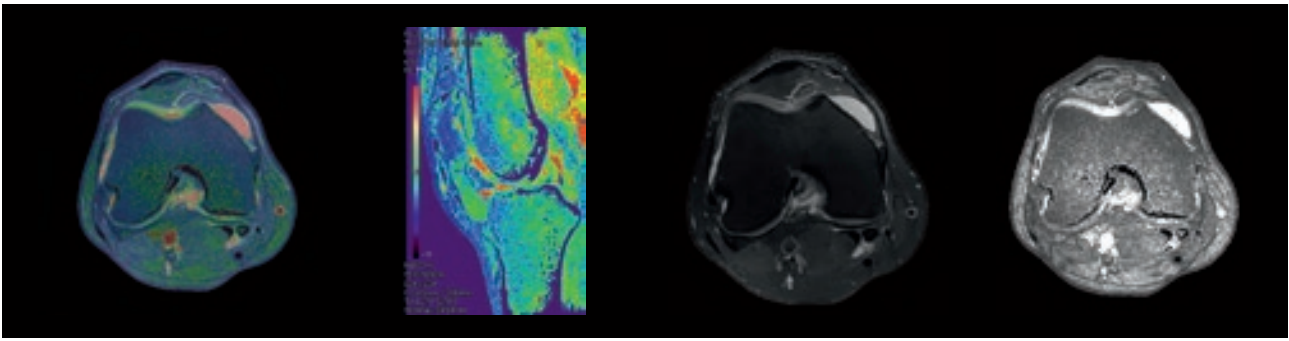
In musculoskeletal radiology, the range of features has also been expanded with “cartilage mapping” and Ultrashort Echo-time (UTE) imaging. The so-called UTE sequences help to identify even very discrete findings of pathologically altered tendon and ligament structures which would not be clearly shown by conventional sequence with longer echo-time (TE). This is possible with the Vantage Orian because UTE sequence allows for ultra-short TE’s with a spoiled gradient echo sequence. In addition, thanks to its EasyTech CardioLine+ technology, the system can independently detect a total of 14 different heart axes in line with the Society of Cardiology guidelines. This significantly simplifies and speeds up cardiac MRI investigations.

For abdominal diagnostics, free-breathing protocols in particular make the investigations easier, both for the technician and the patient.

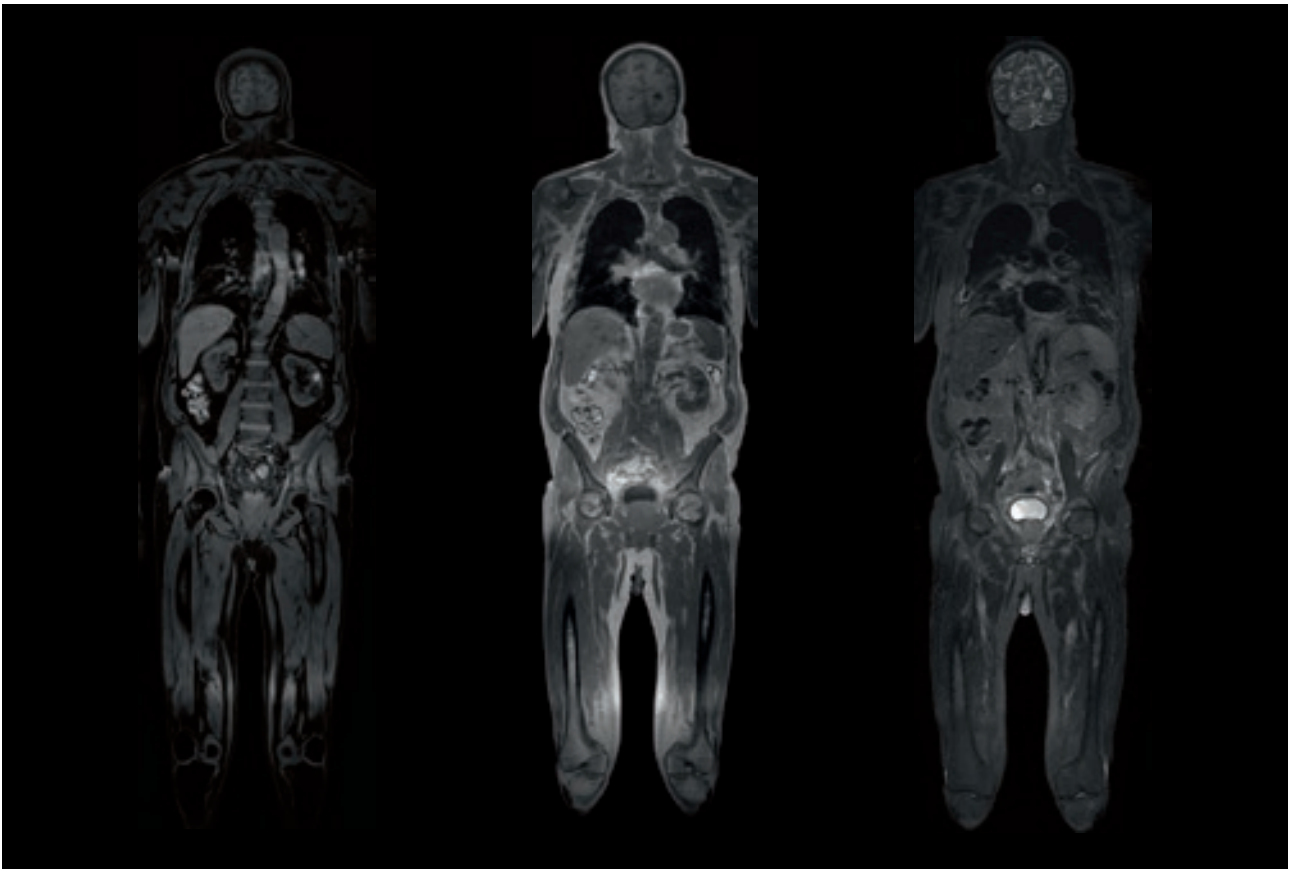
Regardless of which Vantage Orian technology the radiologist has used until now, whether working in a specific team or between disciplines, the high expectations for MRI are met in all fields. “In Canon Medical we have a reliable and forward-thinking partner that we can trust,” said Dr. Leibecke. “We look forward to continuing our excellent working partnership.” //



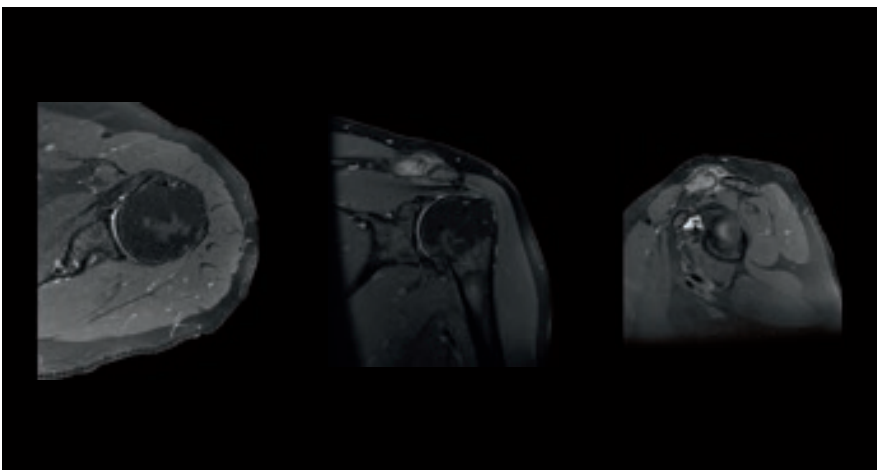
Dr. Thorsten Leibecke
Senior Physician for Diagnostic and Interventional Radiology, Schön Klinik Neustadt, Germany



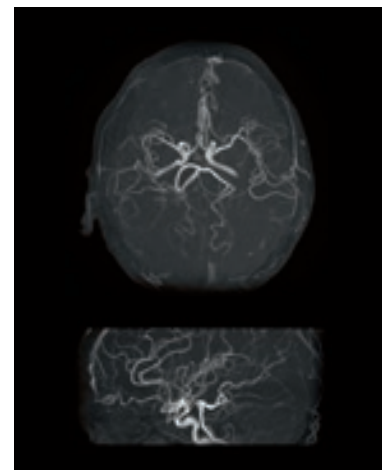
Cartilage Imaging of knee: Color-coded T2 Map axial / color-coded T2 Map sagittal / Pd-Fatsat axial / T2-map greyscale.



Multistation imaging with automated stitching: T1w 3D fatsat / T1w 2D / T2w 2d fatsat.



MSK, excellent off-center homogeneity: axial, para-coronal and para-sagittal PD fatsat of the shoulder.



MR-Angiography: 3D TOF axial and sagittal projection.

Shaping Biomedical Research of the Future

Dr. Manel Puig, Director of IGTP, Sara Capdevila, Technical Director at CMCiB and Dr. Josep Puig, Imaging Scientific Advisor at CMCiB.

The Comparative Medicine and Bioimage Centre of Catalonia (CMCiB) is a unique, new facility for research and training in biomedicine in Europe. Located in Barcelona, Spain, it is a facility of the Institute for Health Science Research Germans Trias i Pujol (IGTP) – a public health research center in Northern Spain. This Institute is associated with the Germans Trias i Pujol University Hospital (HUGTiP), a tertiary hospital which serves a catchment of 1.2 million people, and is part of a network of leading biomedicine research centers in southern Europe.

The CMCiB employs around 20 professionals to give support to the Research Community, consisting of more than 150 researchers from different international Institutions. CMCiB carries out a full range of biomedical studies that range from basic biomedical, pre-clinical and clinical research to new surgical techniques, all of which comply with European standards for responsible research. Its custom-built facilities are equipped with the most recent technology, which now includes several state-of-the-art imaging systems from Canon: the Vantage Galan 3T / Saturn X Gradient MRI and Alphenix Core +

Interventional System, as well as Olea Medical® and ViTAL Imaging post-processing software.

Redefining research

Bioimaging is key in achieving the CMCiB's overall aim to contribute to the Medicine of the future. While performing responsible research by reducing, replacing and refining the use of animal models in medical- and health research.

“Our goal is to help shape preclinical research of the future,” remarked Dr. Manel Puig, Director of IGTP. “We promote the use of new animal models

and bioimaging in combination with computer models, and so we have invested in the best tools available.”

“We are a support center for biomedical research. Each project in bioimaging is a challenge that requires a diverse team of professionals, from veterinarians responsible for anesthesia and animal health; to engineers and physicists, who program the sequences; expert diagnostic imaging technicians and radiologists with research specialisms,” said Sara Capdevila, Technical Director at the CMCiB. “Together with Canon Medical's professional group, we are developing



“Our goal is to help shape preclinical research of the future and so we have invested in the best tools available.”

Dr. Manel Puig, Director of Institute for health science research Germans Trias i Pujol (IGTP).



Comparative Medicine and Bioimage Centre of Catalonia (CMCiB), Barcelona, Spain.

and optimizing new imaging protocols that allow us to respond to different physio-pathological processes from a global perspective. The development of new protocols requires innovation that we simply do not have within the University Hospital teams.”

Superior MRI capacity supports breakthroughs

The installation of the MR system the Vantage Galan 3T / Saturn X Gradient, means that CMCiB will become one of the research centers leading technological change in the healthcare system in Europe.

“Imaging is a very powerful tool that, together with Artificial Intelligence (AI), will form the medicine of the future. We are currently carrying out projects in the fields of cardiovascular, neurovascular, musculoskeletal and abdominal research,” explained Dr. Josep Puig, Imaging Scientific Advisor.

“We support national and international research projects in cardiac regeneration after a heart attack, through personalized stem cell treatment, as well as cardiac mapping studies, and the treatment of arrhythmias. In the field of Neurosciences, we are also conducting studies towards creating a valid stroke model to train profes-

sionals in thrombectomy, to reduce the sequelae derived from stroke and other brain disorders.”

“The combination of high-end MRI using the Vantage Galan 3T / Saturn X Gradient and Interventional Radiology allows us to support the design and validation of new intravascular medical devices,” added Sara Capdevila. “In recent months, the CMCiB has also been key in supporting research on Covid-19 through the creation of a pig model of Acute Respiratory Distress Syndrome (ARDS). During the peak of the pandemic in Barcelona, our center worked to validate up to ten new emergency ventilation devices in vivo. With Interventional Radiology imaging, we validated that the lung image corresponded to the pathology caused by SARS-CoV-2.”

Versatility

The experts at the CMCiB have found their experience so far with the Vantage Galan 3T / Saturn X Gradient MR system very good.

“We have been pleasantly surprised by the capacity of the system to adapt to any parametric change in improving the acquisition protocol, as well as the speed in the exploration time of the different anatomical areas.

The resolution of the images that we obtain for cardiology, neurology and MSK are of excellent quality, and the equipment is adapted to each of the acquisitions we need to make, regardless of how our approach may vary. It is also important to highlight the speed of the acquisition process. The flexible 16ch Flex SPEEDER coils give high versatility for the capture of the different images,” said Dr. Josep Puig.

“In addition, we appreciate the technical service from Canon, which is excellent,” he continued. “An MRI dedicated to research can bring great professional challenges, as each project requires customization of acquisition sequences that are not standardized at the level of care services. We have had to adjust some aspects of protocols to cover all the needs derived from projects related to cardiac pathology, but have continually received proactive and efficient support from Canon experts.”



Broader horizons

Dr. Josep Puig anticipates that it will be possible to develop procedures, such as T2 mapping sequence applied to cardiac studies or diffusion tensor for brain studies, with the Vantage Galan 3T / Saturn X Gradient.

“However, this is just the beginning, as by applying AI to images, machine learning techniques will create predictive anatomical models for both early diagnosis of diseases and for planning of surgeries, through 3D-models. Mathematical modelling will enable us to better understand the influence of anatomical structure, and the force relationships between structures, for better decision-making in medical therapies.”

Leading in Vascular Interventional Radiology

The CMCiB is one of the few centers in Europe that has Canon Alphenix Core + technology to support preclinical biomedical research. This positions it as a global center for the development and validation of new medical devices and new surgical techniques that require Vascular Interventional Radiology. For example, in cases of cardiovascular interventions and in organ transplants. Its strategy revolves around having equipment for translational research of excellence, in addition to being able to carry out multimodal studies through various equipment and facilities.



“Having all these imaging technologies in a single center, along with experimental operating rooms that are equipped for minimally invasive surgery, robotic surgery, and working with animal models, as well as the diversity of expertise that we have from medical, veterinary, engineering and physical professionals, make CMCiB a unique center for developing healthcare innovation for the future,” explained Sara Capdevila. “With this equipment in our workplace, we can tackle highly competitive projects and advance medicine in our own hospital and other hospitals in Europe, as well as biotechnology companies and companies in the field of innovation, such as the development of medical devices.”

The Alphenix Core + at the CMCiB is already used for peripheral angiographic and interventional cardiology procedures combined with cardiac mapping. One of the most important challenges for the institute in the next year is the development of a porcine model of vascular thrombectomy to create a training plan for neurosurgeons to provide the care system with more professionals prepared for rapid action in case of stroke.

“The sharpness and definition of the images derived from the Alphenix Core + are remarkable. This level of quality is possible thanks to the noise reduction technology,” said Dr. Josep Puig. “The professionals working with

“The Alphenix Core + is quite unique in the field of preclinical research in Europe, and its features will bring a clear quantitative improvement in the research that we carry out.”

Sara Capdevila, Technical Director at the Comparative Medicine and Bioimage Centre of Catalonia (CMCiB).



our new system have already reported a very good preliminary experience. Its C-arm facilitates the development of complex procedures with optimal access range and full coverage. The full multi-tasking capability of the system console makes work more efficient.

The Alphenix Core + is designed to minimize unnecessary dose exposure, while improving the overall workflow. Dose reduction is a critical issue at our center. The integrated dose management program offered by the Alphenix Core + considerably reduces the dose for the operators and staff. In addition, the ability to superimpose a three-dimensional volume on fluoroscopic images contributes to performing interventional procedures with more confidence and safety."

"We anticipate that our workflow will improve with the Alphenix Core + in our equipment suite. It is quite unique in the field of preclinical research in Europe, and its features will bring a clear quantitative improvement in the research that we carry out," added Dr. Josep Puig.

Advanced post-processing software

Both the ViTAL Imaging and Olea Medical software that is installed at the CMCiB contribute to significantly streamline post-processing.



"The progressive and continuous development of Canon software offer provides CMCiB with a wide coverage in terms of advanced image post-processing. ViTAL software offers the possibility of concentrating a large part of the image post-processing analysis.

"ViTAL's set of applications are perfectly adapted to the post-processing of acquisition protocols of different anatomical areas, even beyond the field of MR," said Dr. Josep Puig. "The three-dimensional reconstructions that it provides, as well as the multiparametric and semi-automatic quantification, are characteristics that we have found particularly impressive."

"Canon Medical's experts have been alongside our professionals at all times, working as a team to tackle the projects that have emerged and the challenges that have been raised."

Dr. Josep Puig, Imaging Scientific Advisor at CMCiB

Olea Medical technology developed an interface that allows a large number of parameters to be obtained from advanced and multimodal MR protocols. "The ease and speed of use of all Olea Medical's functions, regardless of the complexity of the acquisition parameters, is remarkable," added Dr. Josep Puig.

Ambitious research

As the CMCiB explore the full potential of the new equipment, they are able to share the challenges of ambitious research projects, such as stroke studies, with Canon Medical's professional specialists.

"Canon Medical's experts have been alongside our professionals at all times, working as a team to tackle the projects that have emerged and the challenges that have been raised. We count on them as support in the new challenges we will be facing, and we hope to be part of the improvement processes of the bioimaging techniques of the future." //





*Inauguration of the Alphenix 4D CT at CHUV
(from left to right): Mr. Nobuyuki Hatakeyama
(President & CEO Canon Medical Systems Europe),
Prof. Alban Denys (Head of Interventional
Radiology at CHUV), Prof. Reto Meuli (Head
of Radiology at CHUV) and Roelof Hoekstra
(Director Canon Medical Systems Switzerland).*



*Interview with Prof. Alban Denys,
Head of Interventional Radiology and
Jennifer Natan, Biomedical Engineer
at the CHUV (Le Centre Hospitalier
Universitaire Vaudois) Lausanne
University Hospital in Switzerland,
about their experiences with the
Alphenix 4D CT.*

Alphenix 4D CT – Cutting-Edge Innovation in one Single Room

The CHUV (Le Centre Hospitalier Universitaire Vaudois) Lausanne University Hospital in Switzerland is ranked as one of the ten best hospitals in the world¹. With a continuous and growing demand for its Interventional Radiology services, it has recently acquired a Canon Medical Alphenix 4D CT Interventional Suite. With combined Aquilion CT, Alphenix Angiography and high-quality Ultrasound capabilities in one room, the CHUV has the potential to increase workflow and enable more complex procedures to be performed with far greater ease and confidence. VISIONS explores how this is proving true in practice.

The Lausanne University Hospital is one of five university hospitals in Switzerland. Its Interventional Radiology Department comprises of three teams: Neurology, Peripheral and Oncology. The Interventional Radiology Team's technical needs are monitored and supported by the Biomedical Engineering Department, who are experts in technical development and multi-year planning of equipment acquisition. Prof. Alban Denys, Head of Interventional Radiology and Jennifer

Natan, Biomedical Engineer at the CHUV, have worked together on bringing in the right system to enable the Department to advance its aspiration and clinical capabilities, as well as meet growing demands. With a constant increase in workload of 5-7% annually, Canon Medical's 4D CT Interventional Suite offered the Hospital the opportunity to reduce delays through its combined modality in one room, which simplifies, streamlines and adds more certainty to procedures.



“With good results and low morbidity the techniques possible with the Alphenix 4D CT system provide high-quality patient care at low medical cost.”

Prof. Alban Denys, Head of Interventional Radiology at CHUV.

Informed choice

The Alphenix system was chosen after in-depth research by a team of CHUV experts in various fields.

“Our project team comprised of the Prof. Denys, who provided expert opinion on clinical and medical issues; a Medical Radiology Technician, who collaborated on required system ergonomics and interfaces; me as the Biomedical Engineer, who specified technical characteristics, implementation and project management; and a Medical Physicist, who assessed dose parameters,” explained Ms. Natan.

“Other stakeholders have also been involved in the acquisition, such as the IT Department for the integration of the equipment with the information system and the Purchasing Department for the management of contractual aspects.”

“The aim of our project was to contribute to the creation of an interventional technical platform, bringing together the Angio-CT platform with a second interventional scanner that is used for simpler procedures, such as drainages, biopsies, or punctures, with the goal of developing better patient management in all visceral oncology,” she continued. “This installation has many advantages: It supports and enhances the current synergies with the Oncology

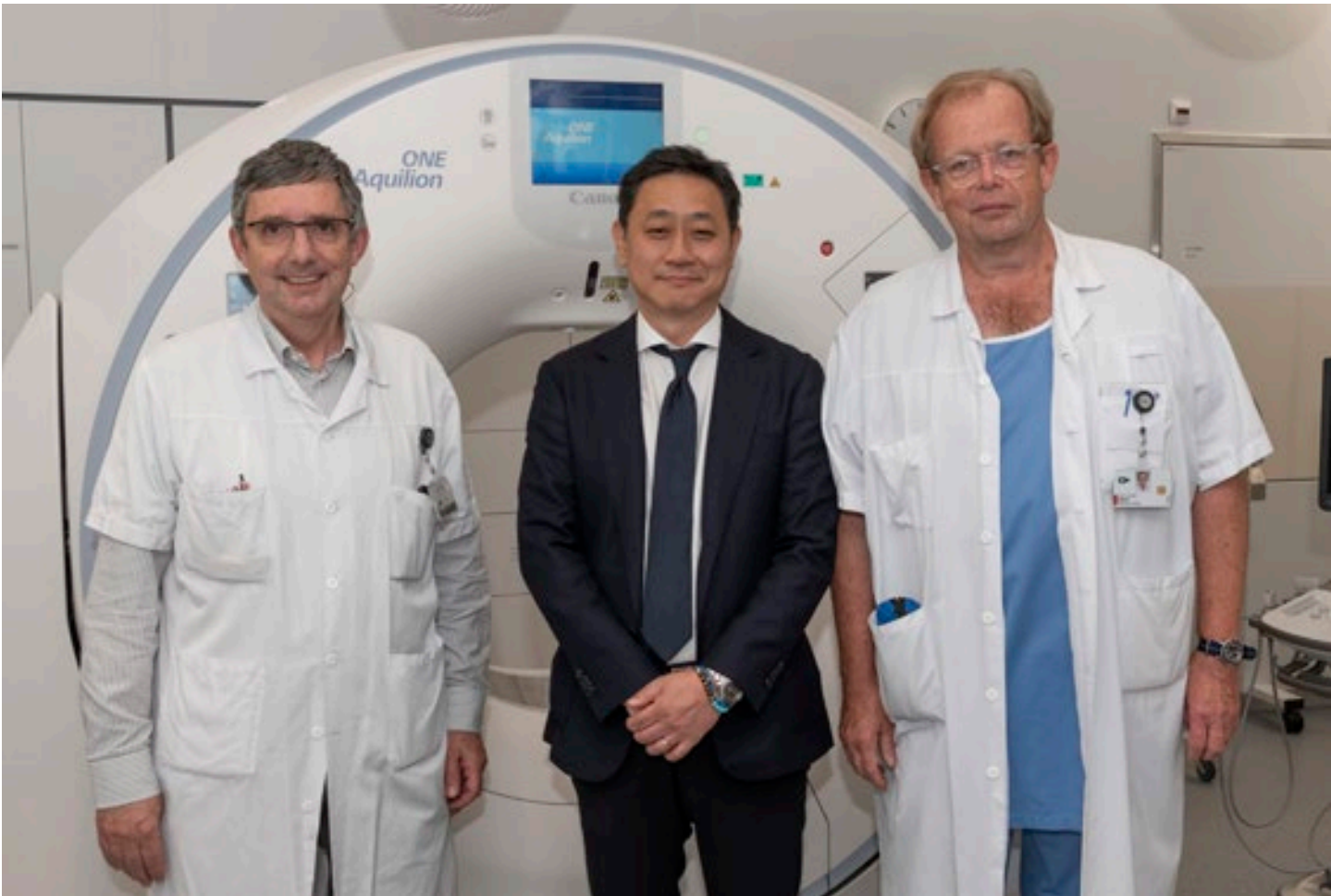
Department, or peripheral hospitals and the Nuclear Medicine Department; it reinforces the participation of the Radiology Department in the development of a care network with a high level of skills and training; it optimizes the flow of patients and reduces the time of hospitalization; and it promotes the opportunity to choose a type of care that is minimally invasive for the patient.”

Meeting a wide range of needs

“Our oncologic activities involve four staff and two fellows. We run two interventional suites. One is the Alphenix 4D CT from Canon Medical, in which we perform all the complex oncologic and abdominal interventions, including percutaneous ablations, Transarterial Chemoembolization (TACE), Selective Internal Radiation Therapy (SIRT), Transjugular Intrahepatic Portosystemic Shunt (TIPS), and liver venous deprivations. The other is a simpler CT interventional suite with the Aquilion Prime SP from Canon Medical, in which biopsies, drainages and gastrostomies are carried out,” said Prof. Denys. “Altogether, we complete around 3,000 oncology-related procedures annually in these two interventional suites. We face a constant increase in workload, with a 5-7% increase in demand for oncologic interventions every year. Opening a 4D CT interventional suite initially offered a chance to reduce

delays. It has proved so pivotal that three months after opening, the room was fully booked. We always use both Angio and CT images in the same procedure for TACE, SIRT, ablations, TIPS, prostate embolization, but we also perform CT-guided only cases, such as lung tumor ablation or purely Angiographic interventions, like fibroid embolization.”

“The opportunity to get a high-quality Angio, a 16cm detector Volume CT, and a high-quality Ultrasound system (Aplio i600 from Canon Medical) in the same interventional room has really simplified our lives and secured our procedures. All the combined procedures, like TACE and/or SIRT plus Ablations are done within the same interventional session. Fusion software helps a great deal in finding tumor feeders, but also in ensuring that the ablation zone fully encompasses the tumor and its margins,” continued Prof. Denys. “Switching between C-Arm and CT position takes only seconds. Changing from Angio to Arterial CT is very fast, and we do not hesitate to perform this, if we feel that the tumor feeder may also have branches to another territory. This is very helpful in prostate embolization, TACE and SIRT procedures. Compared to Cone Beam CT (CBCT), intra-arterial CT scans require far less contrast and provides superior image quality.”



Prof. Reto Meuli (Head of Radiology at CHUV), Mr. Nobuyuki Hatakeyama (President & CEO Canon Medical Systems Europe), Prof. Alban Denys (Head of Interventional Radiology at CHUV).

Research into technology

The choice for the Alphenix 4D CT was made on the basis the results of a comparative study carried out by the CHUV's Institut de Radiophysique Appliquée (IRA) (Institute of Applied Radiophysics) on the dosimetry of commercially available systems. The

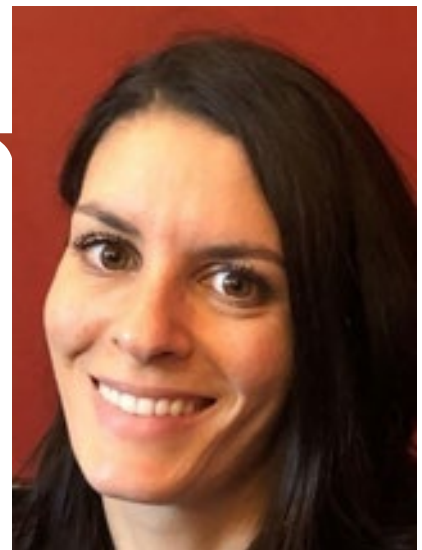
study focused on the maximum dose rate in fluoroscopy and subtraction angiography (DSA). In addition, two technologies were observed in detail: Spot Fluoro option, which reduces the patient's dose area product as well as the peak skin dose received, without altering the operator's reading com-

fort; and the Dose Tracking System (DTS), which can be advantageous when there are risks of tissue effects to the patient.

With the new system fully installed and operational, some research still continues.

“This installation meets the CHUV’s strategic plan for patients, relatives and care partners, as well as development of the oncology activity.”

Jennifer Natan, Biomedical Engineer at CHUV.





“We are working on the SIRT workup comparing intra-arterial CT with perfusion to Technetium-Macroaggregated Albumin (MAA) SPECT/CT,” said Prof. Denys. “We are also working on solutions for ablation margins evaluation.”

Perfect integration

The Alphenix 4D CT has made a positive impression on both technical and clinical staff.

“I was impressed from a technical point of view by the coupling and perfect integration of the two heavy imaging modalities: an angiography room coupled to a scanner - with all the implementation constraints that

can be associated with the installation of this type of system, such as ceiling structure, floor rails, and site coordination,” remarked Ms. Natan.

“The system runs very well and is reliable. Switching from Angio to CT positioning is smooth and fast. The quality of both systems, in terms of both dose and image-quality, is excellent,” commented Prof. Denys. “It has taken a little time to gain experience and understand all the possibilities of such a combination and learn how to use it optimally. Compared to other systems, we particularly like the dose control on the Angio-like Spot Fluoro and Live Zoom. On the CT side, the subtraction

images are really excellent for evaluation of tumor or tissue perfusion at the end of a procedure.”

Holistic support

Canon Medical’s support in terms of project management, support during the different phases of study and implementation, as well as at the application level and technical follow-up was very much appreciated.

“The support from Canon Medical was efficient and their expert team was keen to provide rapid solutions for unexpected problems. This is extremely valuable,” said Prof. Denys.

“With any project, despite the initial planning, some unexpected events can occur that can impact the technical coordination and the commissioning schedule,” said Ms. Natan. “Each issue encountered in installation of the Alphenix system was dealt with quickly and appropriately, demonstrating the flexibility of the Canon Medical Team in adapting to its customer’s expectations.” //

Alphenix 4D CT – Streamlined and Safe

The Alphenix 4D CT offers more possibilities to deliver safer, better treatment to your patients across a wide range of clinical applications. With a streamlined workflow in a single setting, there is no need to transfer patients between rooms, which improves patient care and boosts productivity. Switch easily between CT and angiography system to diagnose, treat and verify.

Canon Medical’s Aquilion CT and the Alphenix angiography system work in concert to provide real improvements in efficiency, workflow and clinical confidence. The unique ^{SURE}Guidance feature synchronizes positional data of the region of interest between modalities. CT gantry, C-arm and table move automatically to do the rest. 3D road-mapping to superimpose a CT-derived 3D volume onto the Fluoro image allows navigation during the angio procedure with greater confidence and accuracy.

References

¹ <https://www.newsweek.com/2019/04/05/10-best-hospitals-world-1368512.html>

The Alphenix 4D CT – More Treatments in a More Accurate Manner

Dr. Olle Haller

Gävle Central Hospital, Sweden, cares for all interventional radiology in the city of Gävle and surroundings with a population of 160,000 people. It is also the main hospital in the Region of Gävleborg and cares for more advanced interventional radiology in an area with a total population of 290,000 people.

Until 2018, interventional radiology and vascular surgery shared an angiography system in the radiology department but when an angiography system was installed in OR the vascular surgeons and their procedures moved there. This opened up the possibility to improve logistics for the increasing number of CT guided interventions that we struggled to schedule in the CT department.

Canon Medical's Angio CT system the Alphenix 4D CT was installed in the department of interventional radiology in December 2018, being the first combined angiography and CT system in Sweden.

In 2019 around 600 interventional procedures were performed on the Alphenix 4D CT. Of these, 150 were angiographies (embolization of hemorrhage, UFE, venous procedures, dialysis fistulas), 150 fluoroscopic procedures

(biliary intervention, complex urogenital intervention) and 300 CT guided interventions (biopsies, drainages, gastrostomies, nerve root blocks).

Another 150 CT guided procedures (mainly biopsies) were performed in the CT department and most nephrostomies and catheter exchanges were performed in the fluoroscopy department.

Thanks to the Alphenix 4D CT the average waiting time for CT guided procedures is decreased significantly. The average waiting time for CT guided abscess drainages changed from a medium of 27 hours to 15 hours and the average waiting time for CT guided abdominal biopsies from 12 days to 8.5 days.

Though, the main reason for investing in Alphenix 4D CT, was improved logistics for CT guided procedures both CT and angio/fluoro was used in 15% of the procedures.



“With Canon’s new Angio CT system, we have become more efficient and have been able to shorten the waiting times significantly for several interventions.”

*Dr. Olle Haller, Head of
Interventional Radiology,
Gävle Central Hospital, Sweden.*

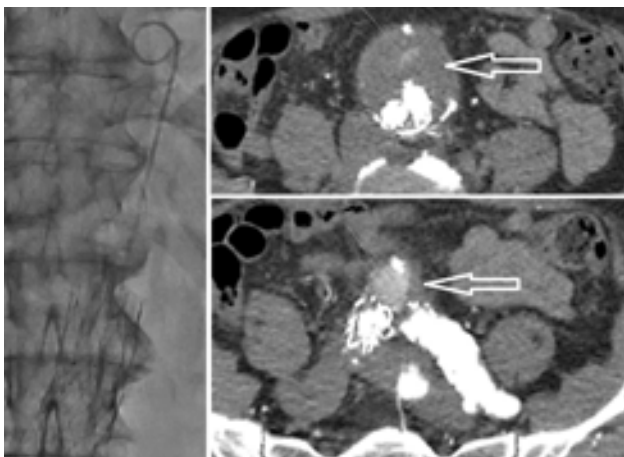
“We found the combination of both systems valuable in complex drainages and nephrostomies, gastrostomies, Onyx embolization of endoleaks with direct puncture and for troubleshooting.”

“The Alphenix 4D CT has also allowed us to initiate new treatments like CT guided nerve blocks in the lumbar and cervical spine, in 2019, 77 nerve blocks were performed with the new equipment.”



Case 1

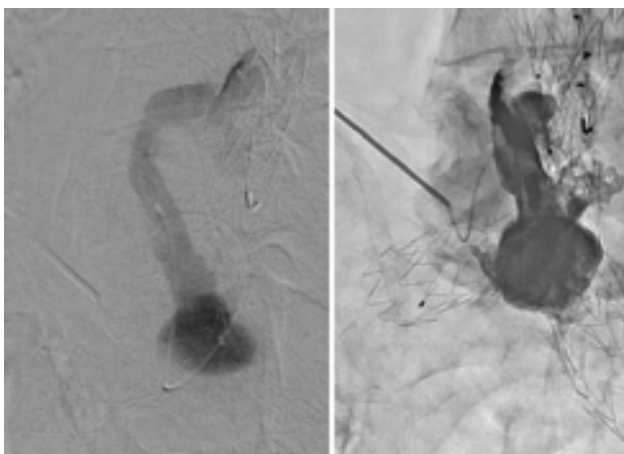
Diagnosis and treatment of typ 2 endoleak (Velinov/Haller). Growth of aneurysm sac after EVAR and due to somewhat impaired renal function imaging has failed to describe the type of endoleak.



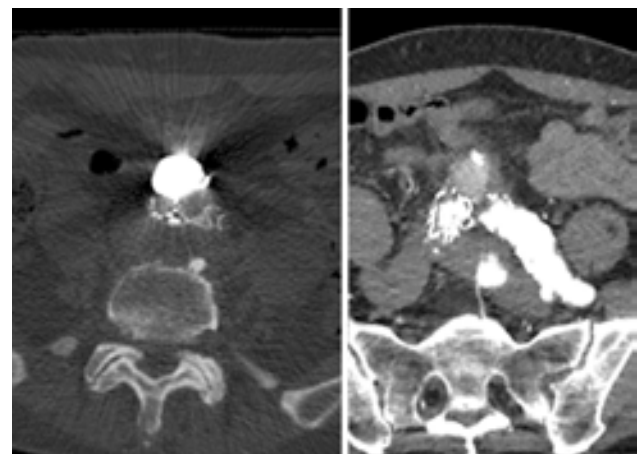
Puncture of the right femoral artery and with fluoroscopic guidance a pigtail catheter is inserted in the suprarenal aorta. CT with injection of 40 ml contrast in the aorta reveals a type 2 endoleak.



In a second session the aneurysm sac is punctured using CT guidance and the needle tip placed at the site of the endoleak. When bloodflow is obtained from the needle a microcatheter is inserted.



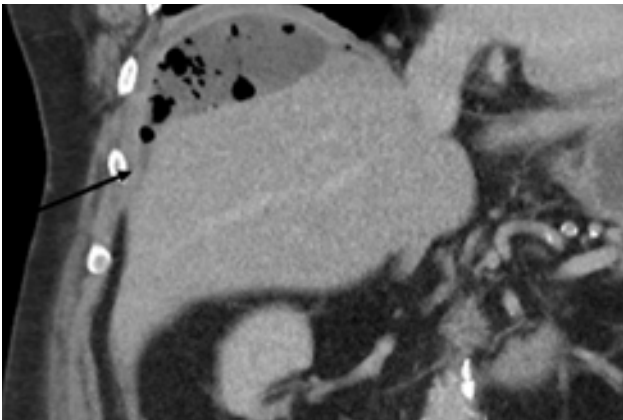
After switching to the angio equipment an angiography is performed to visualize the leak which then is embolized with Onyx.



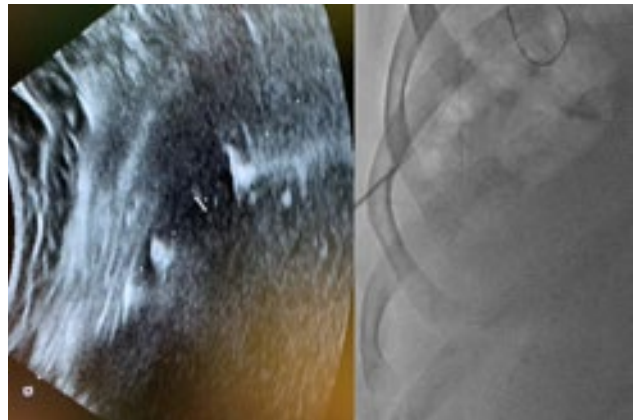
Finally, a CT is performed to ensure that the endoleak seen on CT has been fully embolized.

Case 2

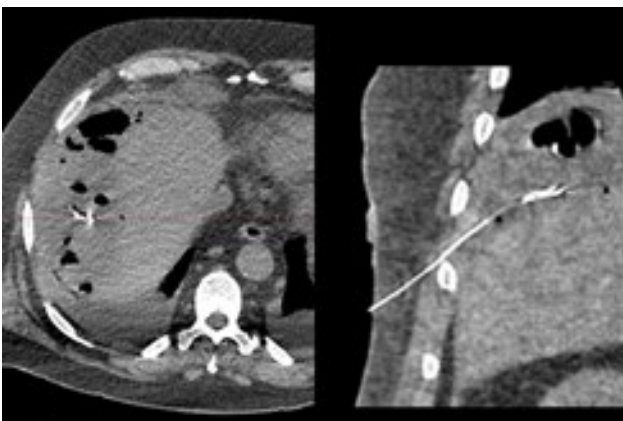
Abscess drainage (Haller).



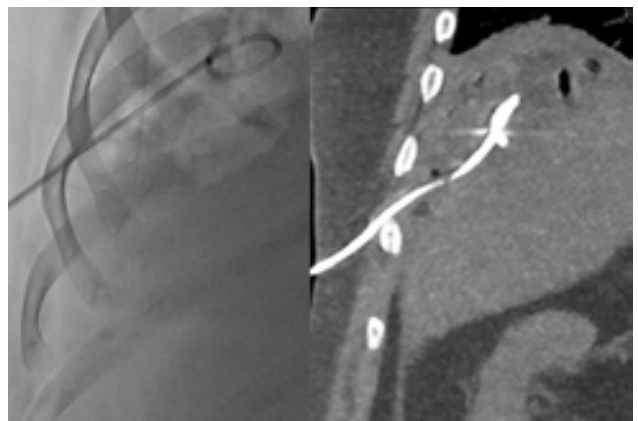
Subphrenic abscess difficult to visualize with ultrasound due to gas content. CT guided drainage is also challenging due to the risk of going through the pleural space.



With ultrasound guidance a thin rim of fluid lateral to the liver is punctured with a 0,9 mm needle and a soft tip 0,018 inch guidewider is inserted.



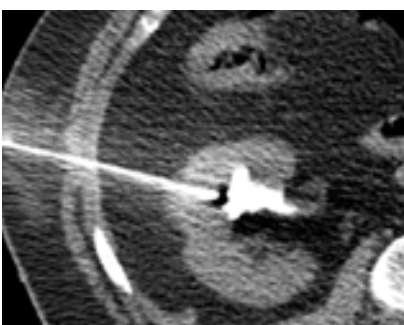
CT confirms that the guidewire is properly placed within the abscess.



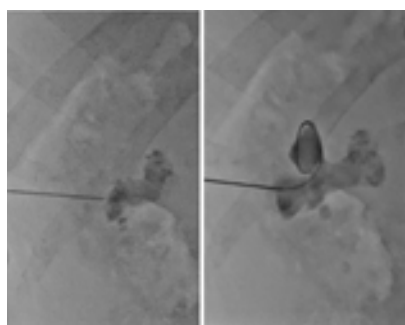
With fluoroscopic guidance the guidewire is changed through a coaxial catheter system to a 0,035-inch guidewire and a 8,5 F pigtail catheter is inserted. CT confirms that the pigtail catheter is properly placed within the abscess.

Case 3

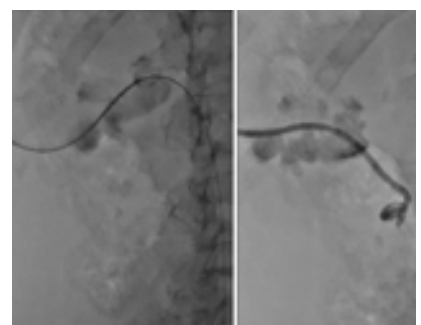
Nephrostomy prior to Percutaneous nephrolithotomy (Velinov). Patient with large kidney stone in the renal pelvis. //



CT guided puncture of the renal pelvis to obtain an access route that is optimal for the surgeon.



Quick switch to fluoroscopy.



Quite complicated catheterization past the stone to the Uretropelvic junction and instertion of a pigtail catheter.

EyeCare solutions
Made possible.

Made For life



VISIONS spoke with Adel Bencheikh (Director Eye Care), Nadiia Cherenko (European Service Support Specialist Eye Care) and Ori Zahavi (Clinical Specialist Eye Care) at Canon Medical Systems Europe.

Eye Care: A New Canon Medical Family Member

Canon Medical Systems is looking at the future with bright eyes with its new Eye Care modality. With innovating strategies, high-end Japanese technology and unique support to distributors, the Eye Care team plans to create unexpected synergies inside the group and expand its role in healthcare.

A pioneering business with its eyes on the future

2019 was a big year for Canon Medical Systems Europe with the integration of the “Medical Product Division” previously based in Canon Europa N.V Amstelveen office. The new Eye Care modality is now located at CMSE headquarters Zoetermeer, the Netherlands. The ambition is to grow and set the tone for the years to come, according to Adel Bencheikh, Director Eye Care.

“The Eye Care industry is currently changing a lot with the introduction of innovative “Deep learning”, “Tele-medicine” and “AI screening” software solutions but also with the introduction of the first wide-field swept source technology made by Canon and now available commercially. Such market dynamism puts us in a position of pioneer and innovators.” he said.

Adel and his team are working on new strategies to position Canon Medical Eye Care as a leader in imaging and research development within the EMEA ophthalmic device market. The first thing to know about Eye Care is that the Canon Medical ophthalmic products are currently not sold not via subsidiaries, but through a large distributor network.

Then, the region covered by Eye Care - Europe, Middle East and Africa (EMEA) - is wider and more complex than the areas traditionally managed by Canon Medical Systems Europe. “Just in Europe, we have a lot of different cultures and partners to manage. So by adding Middle East & African markets we are seen as exotic in terms of market coverage. That’s new and interesting for my fellow colleagues inside the organization,” said Adel, a Belgian sales expert with an international background spanning China, France, Japan, Russia and United Arab Emirates.



“Eye Care’s vision is to innovate and bring the technology that will help to restore your vision.”

*Adel Bencheikh, Director Eye Care,
Canon Medical Systems Europe.*

Last, the very nature of the Eye Care business, which connects cutting edge camera with leading medical care, brings opportunities for unexpected synergies. “Canon Medical new management leadership team is promoting, encouraging and sponsoring new modalities strategies and initiatives, and so it’s definitely a good time to be around. There is a lot of investment and fresh blood coming in the organisation,” he said.

New profiles have emerged in Zoetermeer headquarters, starting with Adel, who took up his role in July 2019, after almost 4 years working for Topcon Medical a leading Japanese ophthalmic manufacturer.

Nadiia Cherenko is also new at Canon Medical. Originally from Ukraine, she has a medical physics background, but accepted new challenge and just finished receiving training at Canon Inc. headquarters in Tokyo for her new role as European Service Support Specialist Eye Care.

“I was able to talk with high end specialists about already launched measurement products. This one-week follow up training was created especially for me by our Japanese colleagues. It was stunning. Our cooperation has improved tremendously and we really

understand each other’s tasks now. Communication becomes smoother and easier,” she said.

This onsite training at the manufacturing heart of Kosugi office of Canon Inc., gave Nadiia new insight about her role, now she feels more steady in support of dealers who may struggle with customers’ technical questions. She plans on sharing her knowledge as much as possible. “Our main purpose is to teach our dealers to be the first line of support, as they communicate directly with customers. I am eager to share my knowledge with my colleagues from all backgrounds. The more you share, the more you achieve,” she said.

“Our main purpose is to teach our dealers to be the first line of support, as they communicate directly with customers.”

*Nadiia Cherenko, European Service Support Specialist
Eye Care, Canon Medical Systems Europe.*





The eye pressure of a patient being checked with a Canon Non Contact Tonometer. Checking the Intra Ocular Pressure can aid in the detection of Glaucoma, a disease that could lead to a serious loss of vision.

Newcomers are not the only professionals who can learn from this new setting at Canon Medical and everyone can learn something useful from each other. For example, some research are showing that Canon Swept Source Xephilio OCT-S1 technology give impressive tomographic images for assessing posterior staphylomas or the fact that the Canon Medical Xephilio OCT-A1 retinal imaging can be a valuable non-invasive way to monitor and predict the progression of Multiple Sclerosis diseases. Spreading this knowledge among Canon Medical employees will certainly inspire new ways to do business together, Adel explained.

“Our medical imaging colleagues realise that it’s sometimes better to use OCT rather than 3D MRI when it comes to imaging the eye, especially to look at the shape of the eye. Techniques that are discovered today may change the way we diagnose and treat patients, by

using different imaging modalities and provide added value with our equipment,” he said.

Rising visual impairment incidence demands more screening

Global predictions regarding visual impairment are alarming. A recent study from the World Health Organization report on vision published in October 2019 showed that at least 2.2 billion people have a vision impairment or blindness, of whom at least 1 billion have a vision impairment that could have been prevented or has yet to be addressed. This 1 billion people includes those with moderate or severe distance vision impairment or blindness due to unaddressed refractive error (123.7 million), cataract (65.2 million), glaucoma (6.9 million), corneal opacities (4.2 million), diabetic retinopathy (3 million), and trachoma (2 million), as well as near vision impairment caused by unaddressed presbyopia (826 million).

Global population is ageing and more people are likely to develop visual impairment, for example cataracts. Diabetes, another risk factor for diabetic retinopathy, is also on the rise. According to IDF Diabetes data, there are currently 60 million diabetic patients in Europe and 74 million in Africa and the Middle East. By 2045, these numbers are set to grow by 51% worldwide reaching 700 million diabetic patient.*

Shortage of ophthalmologists is also deepening and it can take a couple of weeks or months to get an appointment to the ophthalmologist depending on the country. Combined with high incidence of eye disease, low access to Eye Care is putting additional stress on already strained healthcare systems.

*Source: IDF Diabetes Atlas 2019



“OCT is standard in Eye Care departments and has a big role to play in the future.”

*Ori Zahavi, Clinical Specialist Eye Care,
Canon Medical Systems Europe.*

The market is therefore changing to face these multiple challenges and putting emphasis on early eye screening directly at the optometrist, orthoptist or optician’s level. This trend is an opportunity for Canon Medical Eye Care to grow and to position itself in the burgeoning screening market, Adel explained.

“One way to diagnose diabetes is through the eye. There is a pre-screening activity upfront. Optical chain stores are providing clinical primary care to detect if you have diabetic retinopathy, glaucoma or any other type of disease. Eye Care can help prevent blindness by early detection

and screening. So we have a role to play to prevent visual impairment. We can help to identify sooner where we can make an impact,” he said.

Bringing pertinent innovations to foster loyalty

Brand loyalty with distributors is key to grow the business. In order to build that relationship, it is mandatory to bring added value in terms of products but also expertise and support.

“You have to be very flexible and dynamic. We’re trying to change by providing added value in budget expenses, and knowing our customers and understanding their needs and challenges. By

doing that, and by being present, we will gain their respect,” Adel said.

Manufacturing high-end technology remains the business core and Canon Medical launched the new OCT systems that use two exciting novelties: Swept Source OCT and Intelligent Denoise.

OCT is standard in eye care departments and has a big role to play in the future, according to Ori Zahavi, a Dutch Curaçao-born Clinical Specialist working for Eye Care. “OCT can help diagnose macular degeneration, vascular disease, retinal traction disease, choroidal disorders, glaucoma and much, much more,” he said.

Xephilio OCT-A1

The new retinal imaging reality





Ori Zahavi, Nadiia Cherenko, Adel Bencheikh (Eye Care, Canon Medical Systems Europe)

A lot of new research is being done in vascular disease and pachychoiroidal diseases. Efforts are being done in multiple sclerosis (MS) as well, for example at Karolinska Institute in Sweden, to detect early signs before the patient presents with any symptoms. “The retinal cells are the same cells as in your brain, the OCT could be a useful device in monitoring patients with MS,” Ori said.

The OCT Swept Source system developed by Canon helps to bring countless information about the eye, by penetrating deeper into the tissue of the retina and wider scan to see much more into the periphery. Advantage of Swept source is that you can easily scan through opacities such as cataract etc.

Swept Source offer faster acquisition and less motion artifacts. “The scanning process is invisible to the patient. Acquisition is so fast that the screening process has fewer artefacts. The Xephilio OCT-S1 can scan wider and deeper and help by looking at certain diseases in a different way. Especially in diseases in the peripheral retina and in the choroid. Ori said. Since we can see more in the peripheral this can change patient management, if surgery is needed or not. Another great advance in OCT is Intelligent Denoise, which uses the same Canon Medical Advanced intelligent Clear-IQ Engine

(AiCE) technology used in MR to considerably improve image reconstruction. “It’s a very good example of sharing the same technology inside the organisation,” Adel said.

Eye Care plans to leverage these flagships devices to make a statement in the ophthalmologic scenery. “We need to find out where we have been very good, like the Rotterdam Eye Hospital reference site, to learn how we did it and do the same in other hospitals,” he said.

Releasing new devices means bringing new cooperation perspectives and it will be key for Eye Care to ensure all distributors and customers feel they are involved in the organisation. “We should make sure we have win-win cooperation. Only then will Eye Care be successful as medical imaging modalities businesses. We’re still a very small structure but I am very sure we will grow. We are planning further developments this year and this will be very interesting to follow,” Adel explained.

The new retinal imaging reality

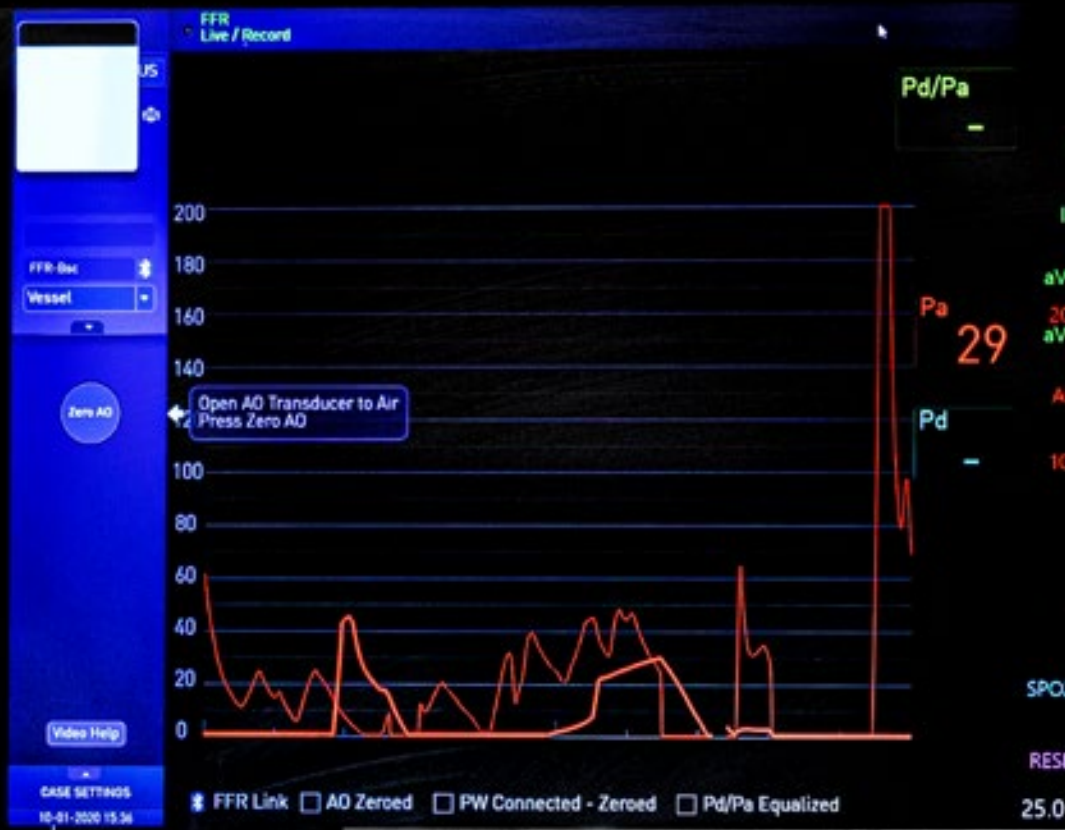
Since COVID-19, the requirement of physical distancing during patient examinations is the new “reality” in Eye Care practices. Canon Xephilio OCT-A1 will allow you to have multiple possibilities to operate the device in a completely safe way. Examinations can be done safely from a few meters away, or even from another room or location.

One last thing to highlight will be the excellence of Canon Japanese technology and craftsmanship, Adel insisted. “The heart of our technology is in Japan. This is something to be proud of. Manufacture sites in Japan are beautifully designed, always clean, lean and precise. Also in electronic and engineering, there is nothing like Japanese manufacturing. Made in Japan is a powerful motto, and I would like to implement this in our philosophy because that makes us unique,” he concluded. //

EyeCare solutions Made possible.

Made For life





RAO 10°
CRA 40°
SID 125 cm
17 cm
0°



*Interview with Prof. Laurent Feldman,
Cardiologist at Paris University and
Director of the Coronary Cathlab at
Bichat Hospital in France.*



Leading Solutions for Your Interventions

Prof. Laurent Feldman, professor of Cardiology at Paris University and director of the coronary cathlab at Bichat Hospital in France, is struck by the numerous benefits brought by the Alphenix Core + that was recently installed at his practise. Canon's cardiovascular intervention system enables to significantly reduce dose with game changing features like Spot ROI and Live Zoom, and to ease procedures while smoothly integrating with the hospital's digital workflow.

Bichat Hospital belongs to the Assistance Publique Hôpitaux de Paris (APHP), a large network of 30+ public hospitals in the Paris area, and is the lead interventional cardiology center of APHP in the northern part of Paris. The cardiac intervention team comprises ten physicians and eight nurses, who perform 2,500 annual coronary procedures, including 900 percutaneous coronary interventions (PCI), 25% of which in an emergency setting.

A service of this magnitude requires a 24/7 access to the cathlab and on call hospital staff. Due to strenuous financial constraints, our staff is relatively small.

Most of the PCI – even emergent PCI – are performed by a single operator; also, we share our nurses with the structural intervention team, a situation that often leads to only one coronary cathlab running for half days.

Personnel involvement has been key to face these constraints. "I am blessed with a team of wonderful people who work in concert for the community. The functioning of our cathlabs during the recent COVID-19 epidemics is a testimony of that. Altogether, it is a pleasure to work here," he said.

Another great help to meet the increasing demand in cardiology interventions is high quality equipment and Prof. Feldman's team has recently purchased two Alphenix Core + rooms.

A huge progress in challenging settings

The difference the system has brought in cardiac workflow is massive, especially after years using ageing equipment, Prof. Feldman explained. "We had been working for more than ten years with two old cathlab rooms

and had become particularly frustrated for the past two or three years. Our old system reached its obsolescence limits, with very frequent breakdowns and long periods spent working in only one room. Besides, the feeling that we were missing most of the technological breakthroughs of the last decade in the field of X-ray imaging, such as large monitors, X-ray dose reduction tools, stent enhancement and multi-modality imaging, was becoming more and more frustrating," he said.

The cardiology team also wanted to better integrate the cathlab in the hospital information system and connect the equipment more fluidly to the reporting system and PACS.

"We were longing for a major strategic breakthrough that would facilitate our long hours spent in the cathlab, improve

safety for caregivers and patients, and altogether be more gratifying for the team and the institution," he added.

The Alphenix Core + has brought all these advances and enables to quickly and safely perform all kinds of diagnostic and interventional coronary procedures, from basic coronary angiography to the most complex programmed or emergent PCI. Even cardiac surgeons perform cardiac biopsies with Canon's system every day.

Bichat Hospital is a leading centre for heart and lung transplantation, performing a lot of right heart catheterizations and cardiac biopsies. To relieve the strain put by the shortage of anaesthesiologists, the team has also started to perform structural interventions that do not require general anaesthesia, e.g. patent foramen oval



Cardiology team, Bichat Hospital, Paris, France.



Biography

Prof. Laurent Feldman is a professor of Cardiology at Bichat Hospital (Paris University) and the director of the coronary cathlab. He did his cardiology internship in Paris, then spent four years doing experimental research in vascular biology at Tufts University in Boston and at INSERM in Paris. He has been working at the cardiology department of Bichat Hospital since 1998.

His field of expertise is coronary interventions and he is very much involved in teaching and tracking innovations and implementing them in daily practice.

“The Alphenix Core + Provides Great Features and Lower Dose.”

Prof. Laurent Feldman, Bichat Hospital, Paris, France.

closure under intracardiac echocardiography guidance or percutaneous mitral valve balloon commissurotomy in the Alphenix Core + rooms.

Prof. Feldman started working in the first Alphenix Core + room in November last year. The second room opened in March 2020, as the COVID-19 epidemics broke out in France, affecting particularly the northern east part of the country and Paris.

At Bichat Hospital, non-emergent coronary procedures were almost completely stopped as a result. “We have been very lucky that both Alphenix Core + rooms were almost completely installed in due time before the outbreak. As we emerge only now from this standstill, I think we still haven’t had enough time to enjoy all the potentials of the Alphenix Core + technology. It is still a work in progress,” Prof. Feldman said.

Great features that ease procedures and lower dose

Many features of the equipment have positively struck the team, starting with the equipment’s design. “When you enter the rooms, what strikes you most is the beauty of the design. It is compact, which was a prerequisite at Bichat since our rooms are rather small, in the 70m² range, and have low ceiling. The equipment is also elegant, with only few visible cables, including the wireless footswitch,” he said.

The team has adopted many features right away, for example the table side-controls that are adaptable to one or two-operator procedures, being both redundant and intuitive.

“When an operator works alone, he or she may choose to use the hyperhandle commands or the tablet, depending on his/her preference. When two operators work together, the lead

operator is closer to the hyperhandle, while the second operator reaches out to the tablet more easily. It eases the procedure and makes it more fluid, with less interference between the two operators,” he said.

Prof. Feldman uses Spot ROI during almost every complex PCI and thinks it is “a hit”, as it cuts radiation dose by almost 50% while maintaining excellent imaging quality in the region of interest. “If necessary, you may even increase the cine rate or the fluoro mode, so that the image is better in the region of interest without increasing patient radiation. We checked this on a series of patients with the help of Canon engineers,” he said.

Spot ROI proves particularly useful when crossing a chronic total occlusions (CTO), for example, and it will be a sea-change in handling complex PCI, Prof. Feldman believes. “Spot ROI is an optimal compromise between the best imaging quality around the target of the intervention and the lowest radiation dose in remote areas. It requires some training and thinking to define where Spot ROI best fits in your personal practice, but once you get used to it and are truly interested in keeping your radiation records on the safe side, it becomes routine,” he said.

Prof. Feldman using the QMAPP during his intervention. QMAPP (product of our sister company Fysicon) is a hemodynamic monitoring system. QMAPP beautifully completes the powerful Alphenix interventional system with cardiac workflow, cardiovascular reporting system and database, to deliver our best possible cardiac imaging and workflow solution. Combined with the Alphenix cardiovascular X-ray system, QMAPP provides a complete solution for the cardiac lab.

Live Zoom has also been broadly adopted by the team, who by default starts every procedure with a 30 cm field of view and a 1.8 Live Zoom magnification, i.e. the equivalent to a 17 cm field of view but with much less irradiation. The multiple layouts of the monitors have also generated a lot of enthusiasm from users.

Dose reduction was a major benefit sought by Prof. Feldman and his team. Coronary interventions have become extremely successful and safe at tackling very complex lesions, but these kinds of complex PCI are time consuming and radiation dose becomes an issue, and even an obsession. "Dose reduction is now a top priority everywhere in the guidelines, but how to achieve it is not always at hand. All the tools that have been made available to us with Alphenix Core + have been very useful to improve the overall safety of our procedures radiation-wise - Spot ROI and Live Zoom, but also sound alerts and the very intuitive dose tracking system," he reported.

With the Alphenix Core +, the team can now lower dose by 40 to 50%, in addition to the intrinsic built-in dose reduction algorithms of the system per se. "It is a huge and constant source of satisfaction," he said.

Successful integration into the hospital's digital system and strategic investment

A key motive for purchasing the new equipment, and one to which Bichat paid much attention, is the system's excellent integration with the hospital's reporting system (Cardioreport, Medireport),



information system and PACS (Orbis, Agfa), as well as the multimodal imaging systems that have become a must in sophisticated interventions, for example intravascular ultrasound, optical coherence tomography, fractional flow reserve, and intra- or extracardiac ultrasound.

"This successful integration of the cathlab in its digital environment has been a great source of satisfaction for all of us since we had been advocating this move for a long time and no one at APHP had succeeded in implementing it to such an extent. Kudos to the engineers and technicians of our institution, our imaging partners and the Canon team!" he said.

Having a state-of-the-art cathlab facility is also a strategic investment for Bichat in the current clinical landscape, as many private interventional cardiology centres have emerged over the years and become direct competitors. "In this competition, there is no room for obsolete equipment and out-dated technology. Our administration was fully aware of our lagging behind in terms of cathlab facilities and was eager to improve our working conditions to stay competitive and maintain a high level of activity. Cardiac interventions is a strategic asset for the hospital and represents more than 50% of its financial incomes," he said.



Canon's Alphenix Core + at Bichat Hospital, Paris, France.

With the Alphenix Core +, Bichat Hospital will rank among the top institutions in Europe, being able to perform high volumes of cases, focus on complex PCI, such as bifurcations, chronic total occlusions or high risk acute coronary syndromes. "Being a European leader means all that and also teaching interventional fellows coming from abroad, leading and participating in high level multicentre research, and organising teaching courses and live cases. All these services require first class cathlab equipment and technology," he said.

Close cooperation with Canon: the basis of a successful installation

The project on installing two Alphenix Core + rooms took place in the framework of a very competitive public market, in which four cathlabs were presented to the hospital's expert committee in February 2019. Once the decision was made to go for Canon and the financing aspects were discussed and agreed upon, things moved forward at a rapid pace.

A timetable was set for the installation of both rooms, taking into account the known fluctuations of interventional activities, which are traditionally lower in August-September and in December-January.

"Working in only one room can be challenging in cardiology since emergencies can come up any time. Therefore, we organised some back-ups with a vascular room in the radiology department and with our hybrid room in case of an emergency or very busy schedule. Most importantly, thanks to everyone's motivation, we suffered no delay in the installation of the new rooms and the process took seven to eight weeks each," Prof. Feldman said.

Another challenge was for everyone involved in the project to speak the same language. The cardiology staff had to understand Canon technology specifics and foresee how it fits in practice, while the hospital informa-

tion system had to accept a relative loss of sovereignty when opening the access to external actors.

The Canon team put together the pieces of the project and played the role of a relentless coordinator, always eager to offer the best of its technology no matter the obstacles, Prof. Feldman recalls.

"For sure, this atmosphere of "shared positive thinking" was instrumental in the overall success of the enterprise. Such a complex project would not have succeeded without a close partnership between Canon and Bichat. Such a partnership entails many aspects, but most importantly it must be two-way, with Canon putting its best technology (and the way to use it) on the table, and the hospital offering access to its expertise and needs in cardiac interventions. No doubt that this partnership will be long-lasting in the interest of Canon Medical, the cardiology team, and, above all, the patients," he concluded. //



*Interview with Landspítali
(National University Hospital)
in Reykjavik, Iceland, about their
experiences with Canon Medical's
CT, Ultrasound and Diagnostic
X-Ray equipment.*



Photography: by Cojan van Toor,
VISIONS professional photographer.
Photo: Iceland
Place: Gullfoss Falls (southwest Iceland)



Canon Medical in Iceland: Landspítali Experiences

Pétur Hannesson and Steinn Erla Thoracius, both Head of the Radiology department, and Kristín Rut Haraldóttir, responsible for the education and training of midwives in Ultrasound at Landspítali (National University Hospital) in Reykjavik, Iceland, share their experiences with Canon Medical's equipment in this dedicated interview with VISIONS magazine.

With 636 beds, Land Hospital in Reykjavik is the leading hospital in Iceland and the largest workplace for healthcare professionals. The facility is divided in two buildings and provides the country with every kind of care and imaging procedures. One of the challenges is to maintain radiology equipment on both sides, according to Pétur Hannesson, Head of the Radiology department.

"We have everything under one roof. We're a medium sized hospital but we attend a population of 360,000 people, so it's also challenging for our team. We're both a primary hospital and a tertiary hospital. Everything is done here. We deal with all cases and all situations," he said.

To make sure it provides the best radiology service to their patients, Landspítali has purchased a large portfolio of Canon Medical equipment: four Aquilion CT scanners, three Adora DRi systems for diagnostic radiography, one DRFi system for fluoro examinations, one Ultimax-i system for extended fluoro scanning, five mobile x-ray units that are equipped with Canon DR plates and three Aplio 400 ultrasound systems.

Imaging equipment is used to the full at Landspítali, as the demand for imaging studies is exploding. Each month, 80 radiographers perform approximately 10,000 examinations with Canon Medical equipment alone.



“The Aquilion ONE / GENESIS Edition is equipped with a 16 cm detector, which makes it an ideal scanner for cardiac and angiography examinations.”

Pétur Hannesson, Head of Radiology at Land Hospital. He studied medicine in Iceland and received his medical degree from the University of Iceland. He did his specialization in radiology in Lund, and started working at Landspítali in 1995. His subspecialty is oncology.

CT imaging

The latest CT scanner at the hospital is the Aquilion ONE / GENESIS Edition. The staff are very happy with the system, especially with the speed at which it can help to perform examinations, according to Pétur Hannesson.

“The Aquilion ONE / GENESIS Edition is equipped with a 16 cm detector, which makes it an ideal scanner for cardiac and angiography examinations. With this system it is possible to scan the heart in a single rotation or one heartbeat. The wide volume coverage of the detector also gives us the opportunity to scan paediatric patients extremely fast and without sedation. We’re very pleased with the capabilities of the system,” he said.

Pétur Hannesson and his team are carrying out an increasing number of cardiac examinations every week, reducing interventional examinations and

traditional angiography for diagnostic purposes. “CT is a wonderful tool, a very strong ally in that regard,” he said.

The capacity to perform coronary studies was key in the decision to select Canon Medical equipment, according to Steinuum Erla Thoracius, Head of the Radiography department.

“We wanted a good system for coronary imaging. The large area detector of the Aquilion ONE / GENESIS Edition allows us to scan the heart very fast with only one rotation. This results in lower radiation doses for the patients and administering less contrast media. I liked that part very much,” she said.

Paediatric examinations are rare in our hospital, but the Aquilion ONE / GENESIS Edition is also helpful in this area, thanks to its ability to lower the dose whilst increasing acquisition speed. The latest iterative reconstruction

technique, which lowers the noise in the images and improves image quality, which is very important.

“Dose has been going down for the last years and that’s why it’s important to have new equipment, to enjoy the latest advances in dose reduction,” Pétur Hannesson said.

The Aquilion PRIME is the department’s workhorse and is used for almost everything, particularly trauma imaging. “It’s very important for trauma centres to have two CT scanners. Imagine not to be able to scan trauma patients because a scanner is in use or undergoing regular maintenance. We must be able to scan trauma patients at any time,” Pétur Hannesson said.

The Aquilion PRIME comes with a series of benefits, starting with the “insta-view”, a beloved option among radiographers, according to Steinuum

Erla Thoracius. “Insta-view” allows us to review the images immediately while the scan is made. “

The balance between low dose and high image quality is a further advantage. “We’ve reduced dose without compromising image quality, which is very good.”

Another valuable asset is the user friendliness of the Aquilion PRIME. It’s easy to perform any examination independently of which part of the body you would like to scan. Due to the iterative reconstruction, the image quality is excellent and the images are less noisy, which is really a plus,” she said.

Diagnostic X-ray: the Adora DRFi

Fluoroscopy is no longer a popular trend and most fluoroscopy units in Scandinavia are waiting for an occasional examination. Petur Hannesson once had four fluoroscopy units in his department, but now offers a lot of examinations using barium swallow contrast material as an alternative.

“You don’t do colon x-ray examinations anymore, but either go for endoscopy or CT. Things have changed a lot,” Pétur Hannesson said.

“A valuable asset is the user friendliness of the Aquilion PRIME.”

Steinum Erla Thoracius, Head of the department of Radiography at Landspítali, where she has been working for over ten years. She has a bachelor and diploma degree in Radiography and a Masters’ degree in Human Resource Management.

Still, it is important for radiology services to continue to offer fluoroscopy, and this is why Hannesson and Thoracius chose the Adora DRFi system.

“We use the equipment 95% of the time for normal x-ray, but the possibility to use it also for fluoroscopy was very appealing. We use the space for two purposes and don’t need an extra fluoroscopy room, so having the Adora DRFi made a lot of sense,” Pétur Hannesson said.

Image quality is excellent with this system as well, and the system is very user friendly, according to Thoracius.



“The Adora DRFi is good for high quality skeletal examinations. It’s also easy to move, which is very important for radiographers. It has good ergonomics. It’s not a mobile x-ray unit, but it’s really easy to move the x-ray tube,” she said.

Landspítali radiographers’ input is always key in the decision to purchase new equipment and ergonomics are always a strong selling point. “They have a unique point of view, as they work with the machine all day. The person who is going to use the equipment knows better what to expect and what matters,” she said.



“The Adora DRFi is good for high quality skeletal examinations and it’s also easy to move.”

“The Aplio 400 has light probes, delivers good image quality and works very well.”

Kristín Rut Haraldóttir, specialised midwife at Landspítali. She graduated as a nurse in 1983 and became a midwife referee in 1985. She completed her Masters’ degree in 2012. She learned how to use ultrasound in 1988 and has been using the modality exclusively since 1995.



A midwife’s experience with Ultrasound

Kristín Rut Haraldóttir is responsible for the education and training of midwives in ultrasound at Landspítali. Teaching is crucial as midwives perform 95% of all fetal ultrasound examinations in Iceland. Landspítali’s Prenatal Department has eight midwives and three doctors who are specialised in prenatal screening. The team carries out around 11,000 fetal scans per year, from the typical 12 to 20 weeks and growth scans to Doppler and invasive tests like amniocentesis and chorion biopsy.

“Every year we can expect to pick up 60 to 100 fetal abnormalities, so it’s very important to have qualified staff and good equipment. You can’t do precise fetal examinations without good equipment,” she said.

In 2016 the hospital bought three Aplio 400 systems to replace the 11-year-old GE equipment. Workflow has improved tremendously ever since.

“It was heaven when it came. It was an excellent gift. You come in the morning and it works! We really needed an

upscale system. Our staff and doctors in night shifts use all these systems and they’re very pleased,” she said.

Kristín Rut Haraldóttir was convinced by the equipment after seeing it at a colleague’s clinic in Selfoss, a nearby town. “We saw it was a small machine, easy to work with and great to do hard work,” she said.

The learning curve was short and the system is great for routine scans. “It has good probe weight - very light, good image quality and it works well.



Since we do 11,000 scans per year, we need something that's easy and works," she said. Kristín Rut Haraldóttir carries out typical examinations with the Aplio. The Advanced Dynamic Flow (ADF) Doppler is extremely useful to depict not just the heart, but also other organs. "We can see the heart extremely well to pick up big defects early on. You have a clear signal and clear image of the heart. I can also see the stomach and the bladder, and I can measure the risk for Down syndrome. It's truly amazing."

Measurements can be done in a row: the fetal head circumference, the leg, etc. "Canon makes it so easy for us. You just enter next, next, next and next, and you can do all your measurements," she said.

The equipment is user friendly and fits everyone's size. "You can turn and move the system very easily. All of us can use it: I'm 1m60 and the next midwife is very tall, so you don't lose time adjusting the equipment."

Low noise is a definite plus. "You don't hear the machine when it's on. When you work all day in a small room and there's a lot noise from the system that can really be annoying. With the Aplio, that doesn't happen. There's been a big improvement in the last years," she said.

The equipment is easy to clean, another benefit when gel has to be used repeatedly. "The keyboard is easy to access, as it is just under the console, which is very spacious. There's no problem with gel. If it falls, you can clean the board easily. That's very important. They have thought about everything. You just need to press a few buttons."

Cooperation with Canon Medical has been crucial in training staff. "It's tailor made. We lose less time with the machine and can spend more time with the patient. A member from Canon Medical was with us for a few days to teach us everything. I can phone her if I have a problem," she said. //

"It's always a pleasure to work with Canon Medical Systems Europe. The communication is always very good, which is important for our direct communication with the customers in Iceland."

*Hlöðver Þorsteinsson, Director of RL hf. – Rafland
(Canon Medical's Partner in Iceland)*



Canon Medical's Partner in Iceland - RL hf. – Rafland

RL hf. - Rafland was established 1964 and has always been a family company. The cooperation with Canon Medical (formerly Toshiba Medical) started in 1970 but at that time only selling Toshiba CTVs, HiFis and later also microwave ovens. Also at that time the company was in cooperation with Canon Corporation for project for turbines for the first Hydropower station in Iceland.

In 1985 the company started cooperation with Canon Medical where the first CT in Iceland was sold to Landspítali in 1986. Through the years the company has been working close to the healthcare system, both private and governmental and always with excellent and trustworthy support from the team of Canon Medical Systems Europe. Canon Medical is known for their reliability and for excellent service. Together with Canon Medical, RL hf. - Rafland has become one of the leading companies, with the highest market share in X-ray business, in Iceland.

Artificial Intelligence to Boost MR Imaging Quality and Productivity

The power of AI is brought to routine MR imaging by Canon Medical's Deep Learning Reconstruction (DLR) technology: Advanced intelligent Clear-IQ Engine (AiCE). AiCE is the world's first fully integrated DLR technology for MRI.

One of the main challenges in MRI is finding the optimal balance between the signal-to-noise ratio (SNR) and image resolution. A higher spatial resolution

could improve visualization of structures, but when spatial resolution is increased, SNR drops. To regain SNR, typically scan times need to be increased, reducing patient comfort and decreasing throughput.

signal-to-noise MR images to detect noise and remove it from the MR images. By removing noise, AiCE enables spatial resolution to be increased or acquisition time to be reduced.

“AiCE changes the way we think about MRI.”

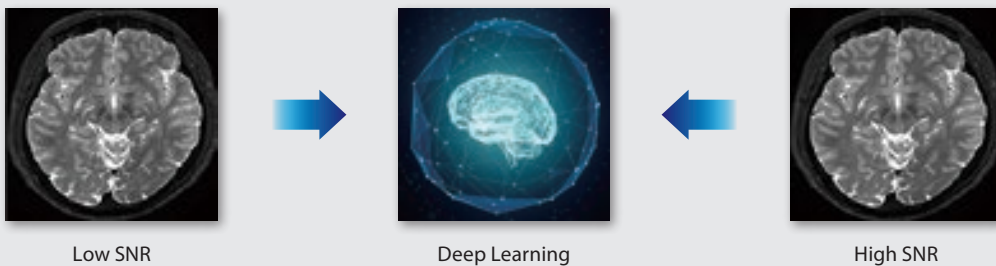
Prof. Garry E. Gold.

Canon Medical found a solution in artificial intelligence: AiCE. AiCE is a deep-learning based solution trained on vast amounts of low and high

AiCE expands diagnostic capabilities, enriches radiologist's confidence and reduces examination times and thus improves patient comfort. With AiCE we enter a new era in MRI. //

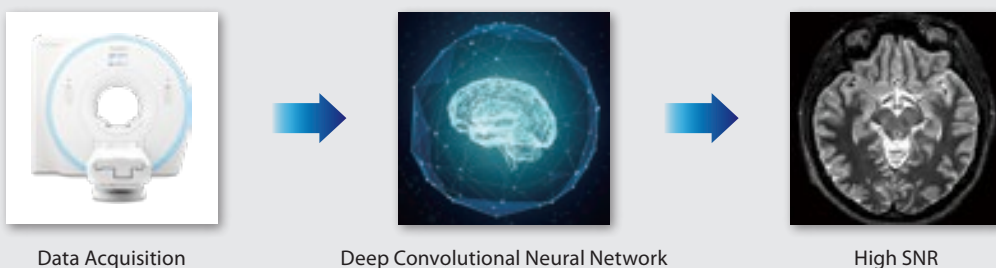
Training Phase

Using high SNR images, Advanced intelligent Clear-IQ Engine (AiCE) learns to differentiate between signal and noise in low SNR images.



Operational Phase

Using the intelligence from the Training Phase, AiCE removes noise from images which results in high SNR.





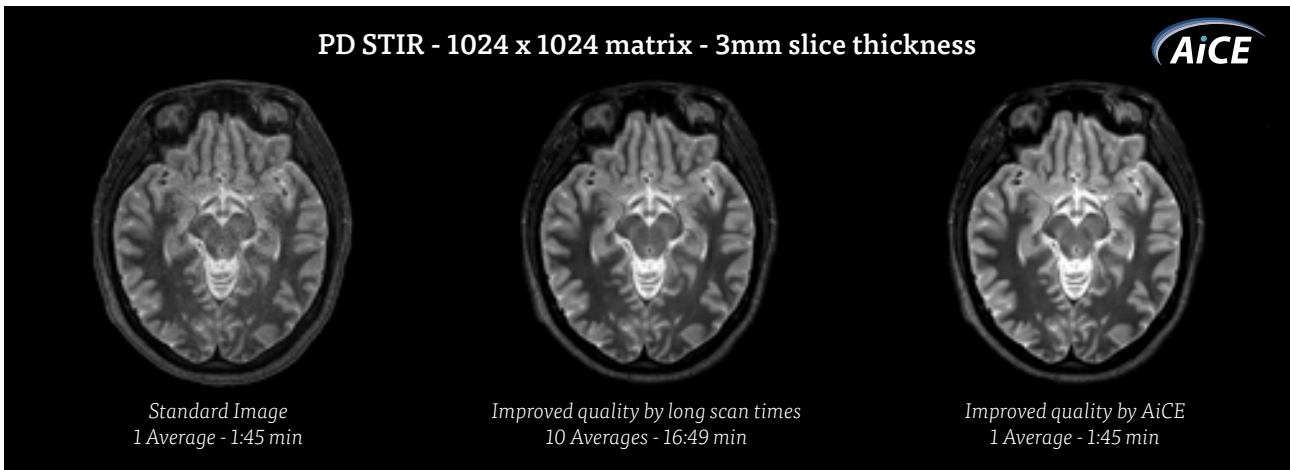
“With DLR we can achieve both high resolution images without losing time or signal and reduce the image acquisition time.”

*Prof. Vincent Dousset,
Head of the diagnostic and therapeutic
Neuro Radiology department at
Bordeaux University Hospital.*

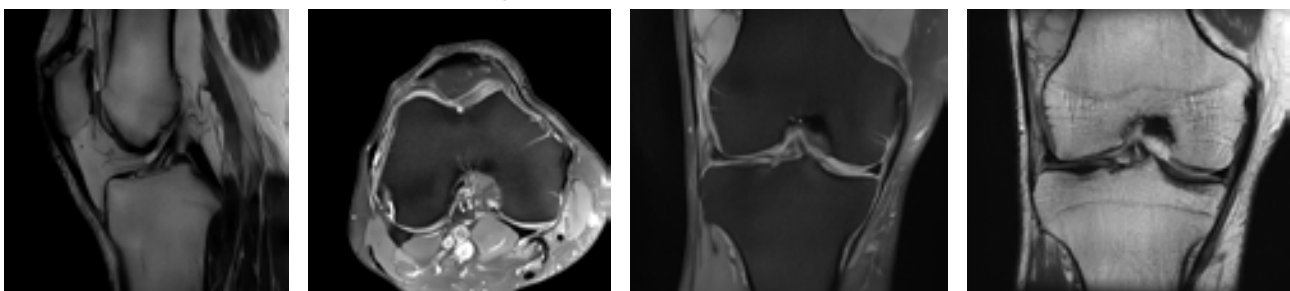


“I’m impressed by the ease-of-use, how it maintains image contrast and structural detail, while at the same time eliminating noise.”

*Prof. Garry E. Gold,
Clinical radiologist and researcher, Past
president of the International Society for
Magnetic Resonance in Medicine (ISMRM)
and the Society of Computed Body Tomography
and Magnetic Resonance (SCBT/MR)*



Fast knee protocol with AiCE on Vantage Orian 1.5T



Sag T2 - 0.5 x 0.5 mm - 0:56 min

Ax PD FatSat - 0.6 x 0.6 mm - 1:30 min

Cor PD FatSat - 0.6 x 0.6 mm - 1:15 min

Cor PD - 0.5 x 0.5 mm - 0:58 min

Revealing the Secrets of Animal Mummies with Canon Technology

Merijn de Bakker, Mike Richardson, Berend Stoel, Irene Hernández-Girón, and Lara Weiss.

The Rijksmuseum van Oudheden (National Museum of Antiquities, RMO) in Leiden has one of the ten most important collections of the ancient Egyptian culture worldwide, among which are several animal mummies. In order to reveal their secrets, the RMO has teamed up with Canon Medical Systems Europe in Zoetermeer, the Netherlands, computer scientist Berend Stoel and physicist Irene Hernández-Girón (Leiden University Medical Center), and Leiden University biologists Michael Richardson and Merijn de Bakker. The 3D-digitization and interactive visualization of CT allow digital autopsies without any damage to the ancient artefacts!





Mike Richardson (Biologist at Leiden University), Lara Weiss (National Museum of Antiquities, RMO), Ravi Somaroe (European Clinical Specialist CT at Canon Medical Systems Europe) and Berend Stoel (Computer Scientist at the LUMC).

Why animal mummies?

The ancient Egyptians were full of the joys of life and they sought to extend it into eternity. Already during their lifetime they invested heavily into tomb building, and eventually, after death, mummification. Only an intact body could survive in the afterlife. Occasionally Egyptian pets were also mummified to keep their owners company, yet most animals mummified were not domestic animals. They were bred in the temples of the gods. The animals were killed, mummified and then sold to temple visitors, who bought these so-called 'votive mummies' in order to donate them to the gods in return for their favour. This practice flourished on an almost industrial scale from the 6th century Before Common Era to the 2nd century Common Era. The ancient Egyptians thus did not worship animals per se, but the idea was that some divine powers could manifest themselves in animal form. For example, the power of dangerous animals such as crocodiles or snakes could be converted and used as a protective force.

The underworld god Anubis was a jackal god. Perhaps he became a protector of the deceased, because wild dogs were frequently seen on the desert plateaus where tombs of the deceased were located. Other animal forms are less evident. The god Thoth was associated with the art of writing and wisdom. He could appear as ibis-headed human, as ibis, or as baboon. The fertility goddess Bastet could appear cat-headed or as a cat, sometimes with several kittens. At Saqqara, about 30 km south of modern Cairo the so-called necropolis of the sacred animals was situated. This was an area of underground catacombs, several temples and shrines. The mummified ibises, baboons, falcons, and dogs were buried in separate catacombs, whereas at Saqqara cat mummies mostly appear in reused earlier tombs.

Digital autopsy

The RMO has a large collection of mummies, because the museum did not unwrap them. The very first director of the museum had already realized in the 19th century that the unwrapping of the more than 2000-year old mummies meant destroying them forever. This was a very wise decision although it would take some patience and time to learn more about the Leiden mummies. X-rays had been discovered in 1895 by Wilhelm Röntgen and started to be used as a non-invasive method to obtain medical images of the interior of the human body one year later. It took until the 1960s to apply radiographs to investigate the first Leiden mummies. X-ray imaging allowed non-destructive investigation of the hidden interior of the ancient remains. In 1972 the first commercial computed tomography (CT) system was released for clinical use, and almost a decade later, the first Leiden animal mummies were scanned (1981). The 1990s saw CT scanning of the whole mummy collection in collaboration with the Amsterdam Medical Center (AMC)¹.

In 2016 two Leiden mummies – a man and a crocodile – were CT scanned again in cooperation with AMC. It was now possible to digitally unwrap the mummies layer by layer in a 3D-model. The latest developments in Computed Tomography image reconstruction, based on deep learning methods, have the potential to boost overall image quality by reducing noise, enhancing edge sharpness while minimizing artifacts^{2,3} compared to previous iterative reconstruction methods. Therefore, in this study, the deep learning reconstruction technology developed by Canon Medical Systems, called Advanced intelligent Clear-IQ Engine (AiCE), was used in combination with one of their latest CT systems (Aquilion ONE / PRISM Edition) to unveil the secrets of the Leiden animal mummy collection.



Lara Weiss (National Museum of Antiquities, RMO) with the Ibis mummy.

Inside and out: what's under the wrappings

On February 19th, 2020, seven animal mummies were scanned at Canon Medical Systems Europe B.V. in Zoetermeer as a first test case of the ideal settings of the Aquilion ONE / PRISM Edition scanner, applying the latest reconstruction method available, AiCE. Some of the mummies had been previously scanned in other CT systems and using other medical modalities, such as conventional X-ray imaging, so prior to scanning no big surprises were expected.

In this particular study, in which the mummies are old and fragile, the imaging protocols had an associated dose at a similar level as used in clinical practice with patients.

Despite the initial modest expectations, the high resolution of the new scans, even on the reconstructed axial slices with AiCE, already allowed the identification of structures inside the mummies not seen in the previous studies.

Additionally, the high resolution of the scans combined with Global Illumination software at the Vitrea workstation from Vital, enabled the creation of highly detailed 3D-models of the mummies. Applying thresholding, the visualized tissues could be custom selected, and the full control over the visualization angle and rotation of the mummies in space, allowed us to virtually unwrap layer after layer of fabric from the mummies without any damage.



Ravi Somaroe (European Clinical Specialist CT at Canon Medical Systems Europe) and Berend Stoel (Computer Scientist at the LUMC) scanning the mummies.



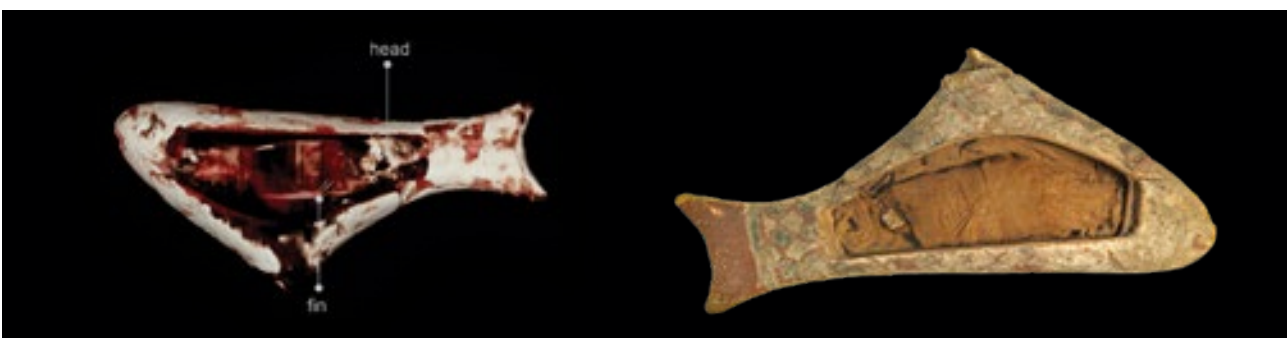
Crocodile mummy Leiden inv. no. AMM 16h

This crocodile mummy's wrapping was designed with a lot of attention for detail. Inside is not a juvenile crocodile, but only a skull, without lower jaw, of an adult crocodile. It seems to have been somehow attached to a stick extending through the whole mummy.



Head of a dog mummy - Leiden inv. no. AMM 16m

The mummified dog head is a nice example of how a CT scan help understanding what kind of objects we are dealing with. It was purchased by the museum as an animal of unknown type in 1828, and long thought to be an ibis mummy, until a scan on 15 May 2000 revealed it was actually the head of a dog. It is odd that the head was mummified separately, which is highly unusual. The question is therefore whether it was a gift for the jackal god Anubis, the protector of the deceased and god of mummification, or whether the parcel was meant to look like an ibis mummy, in which case it would be an ancient 'fake' mummy.



Fish mummy - Leiden inv. no. CI 259

This mummy has its own fish-shaped coffin. Inside is a small fish, identified as Nile perch in earlier publications, of which the head points to the tail end of the coffin. Nile perch were associated with rejuvenation since they lived in the primeval waters of the river Nile. Yet the determination of the fish species is difficult. Nile perch adults can weigh over 100 kg, so while it may be a juvenile Nile perch it could as well be almost any other fish. The coffin seems to have the shape of a Nile tilapia, but this is not indicative. Christian Tudorache and Merijn Bakker did not see any vertebra only a few fin rays of which it is unclear if they are pelvic, pectoral or anal, and what seems to us the head is pointing to the tail end of the coffin. None of its characteristics points to a specific species of fish endemic to the Nile. For a better identification of the fish we would need information of the head and the kind of teeth the fish had, which are invisible in the current scan. We are therefore greatly looking forward to further technical developments by Canon Medical which will improve image quality even further, and will potentially reveal even more information about our mummy collection, and maybe other museum collection items.



Falcon mummy - Leiden inv. no. F 1982/12.10

In an earlier publication, scholars were uncertain if the mummy was a falcon or a sparrow-hawk. The former has now kindly been confirmed by Hanneke Meijer. The falcon mummy consists mainly of its limbs but is missing most other bones, including its head. This does not mean it was a fake since in Egyptian religion, one part could symbolize the whole (*pars pro toto*).



Ibis mummy in ibis pot - Leiden inv. no. H.III EEE 3

Other typical examples of ibis mummies are little vases known as 'ibis pots'. The bird mummy inside this ibis pot is incomplete, but the curved beak, the bones of both upper and lower beak, in the top of the pot identify it as an ibis. At the bottom of the pot is a collection of mainly broken hollow long bones from the wings and legs. This specimen was different to the others, from the scanning point of view, as the vase has a high X-ray attenuation, similar to dense bone. Despite of this, the images show a high level of detail and sharpness, depicting all the small bone chips remaining of the ibis.



Cat mummy - Leiden inv. no. AMM 16 cm

Cat mummies were gifts for the tutelary goddess Bastet. This relatively young and otherwise healthy animal was killed by breaking its neck. It is mummified in an unnatural upright position with its arms alongside its body. The body is also squashed flat and the ribs are out of position, you can also see some of them between the fore-arms. As a part of modern restoration, the animal was fixed with modern pins.



Ibis mummy - Leiden inv. no. F 1956/10.4

This complete juvenile ibis was mummified with its head bend down between its legs (the long hollow bones typical for birds). The curved upper and lower beak are clearly visible at the bottom.

Acknowledgements

We should thank Hanneke Meijer (University of Bergen, Norway) for her help in analysing the bird mummies and Christian Tudorache (Leiden University, Netherlands) for analysing the fish mummy. //

References

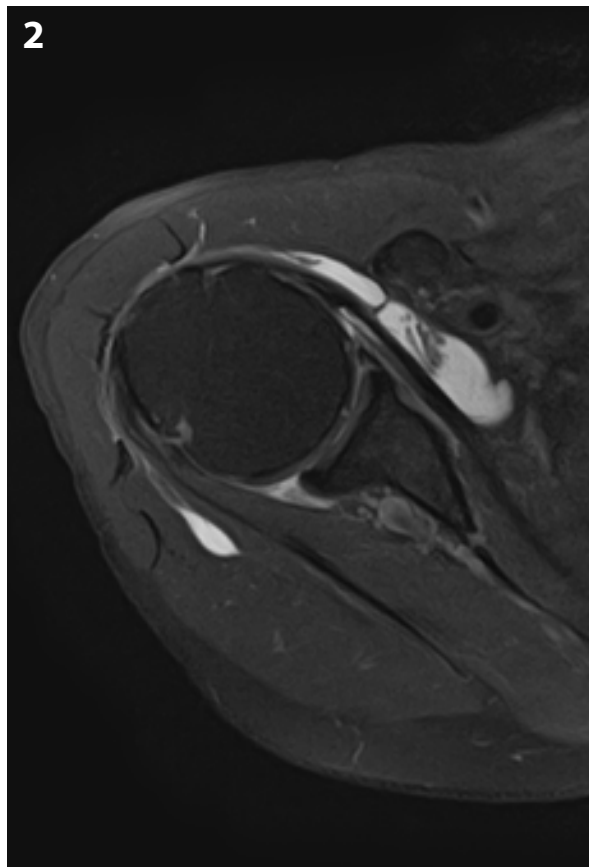
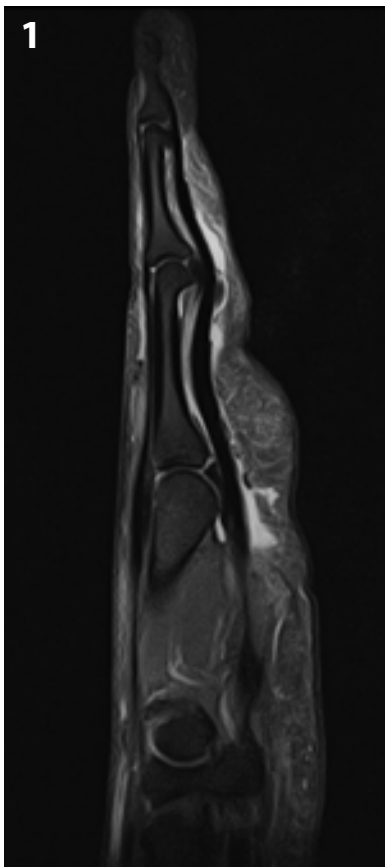
- ¹ Raven, MJ and Taconis, WK. Egyptian mummies: radiological atlas of the collections in the National Museum of Antiquities at Leiden, Turnhout 2005.
- ² Willemink MJ, Noël PB. The evolution of image reconstruction for CT – from filtered back projection to artificial intelligence. *European Radiology* (2019);29(5):2185-2195
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First Vantage Orian 1.5T / Encore Upgrade Installed in Europe

In November 2019, the Encore Upgrade of the Vantage Titan to Vantage Orian 1.5T started at Helsingin Magneettikuvaus, in Helsinki, Finland. Helsingin Magneettikuvaus is a 9 years old company, where they had the so called first generation Vantage Titan. This installation is the first Encore Upgrade in Europe. The Encore Upgrade enables users of Canon Medical's EXCELART Vantage, EXCELART Vantage Atlas and Vantage Titan MR systems to convert their system to the new Vantage Orian 1.5T system, with lower costs and minimal construction work compared to purchasing a new system.

With the Encore Upgrade, the customers now have access to the Vantage Orian 1.5T hardware and digital software platform that can help improve workflow and deliver clinical confidence. Depending on the current platform, new options become available like contrast-free MR angiography, ultrashort echo time (UTE) imaging and Water Fat Separation (WFS), a technique that provides homogenous fat suppression while acquiring four different tissue contrasts in one scan.

After the installation, Jari Erkkila, Clinical application specialist at Tromp Medical (official distributor of Canon Medical in Finland), gave a training to explain about the new features that are now available. As the site had much experience working on the Vantage Titan, it was rather straightforward to rebuild new imaging protocols and learn to use Vantage Orian 1.5T in a smooth and optimal fashion. With the upgrade, they now have the option for new coils like the 16ch Flex SPEEDER coils and the dedicated Knee/Foot SPEEDER coil.



1
Finger scanned with 16ch Flex SPEEDER coil
 - Sagittal PD with FatSat
 - Resolution: 0.6 x 0.6 mm
 - Slice Thickness: 2.5 mm

2
Shoulder scanned with Shoulder SPEEDER Coil
 - Axial PD with FatSat
 - Resolution: 0.6 x 0.6 mm
 - Slice thickness: 3 mm

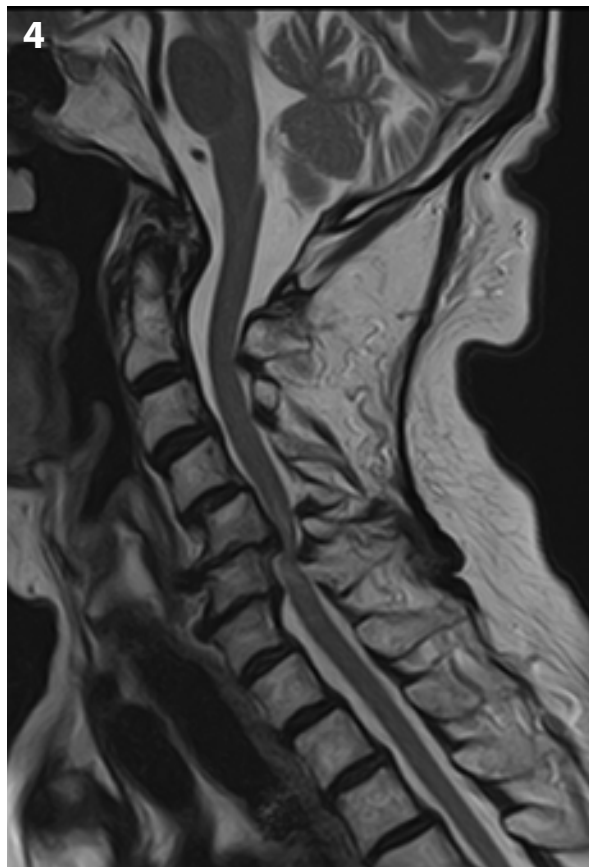


Jukka Mäntylä (Radiographer), Martti Kuusisto (Radiographer), Tommi Jauhiainen (Radiologist).

Tommi Jauhiainen, owner and chief radiologist at Helsingin Magneettikuvaus, closely followed the initializing phase and is excited about new methods like WFS and 3D mVox imaging, but especially he likes the flexibility in the scan environment.

He has achieved good understanding of Canon Medical MRI functions and he often tunes the protocols to get full potential out from the system. So the protocols are well validated.

“Thanks to new possibilities in scan environment and new coils the general image quality is better than before using approximately the same scan time. While overall image quality is excellent, the Knee/Foot SPEEDER coil gave us best improvement in image quality compared to the old system. Foot, ankle and knee images are excellent”, said Tommi Jauhiainen. With the new software we were also able to start abdominal scans. Water Fat Separation (Dixon, WFS) helps when fat saturation is for some reason difficult”, he concluded. //



3

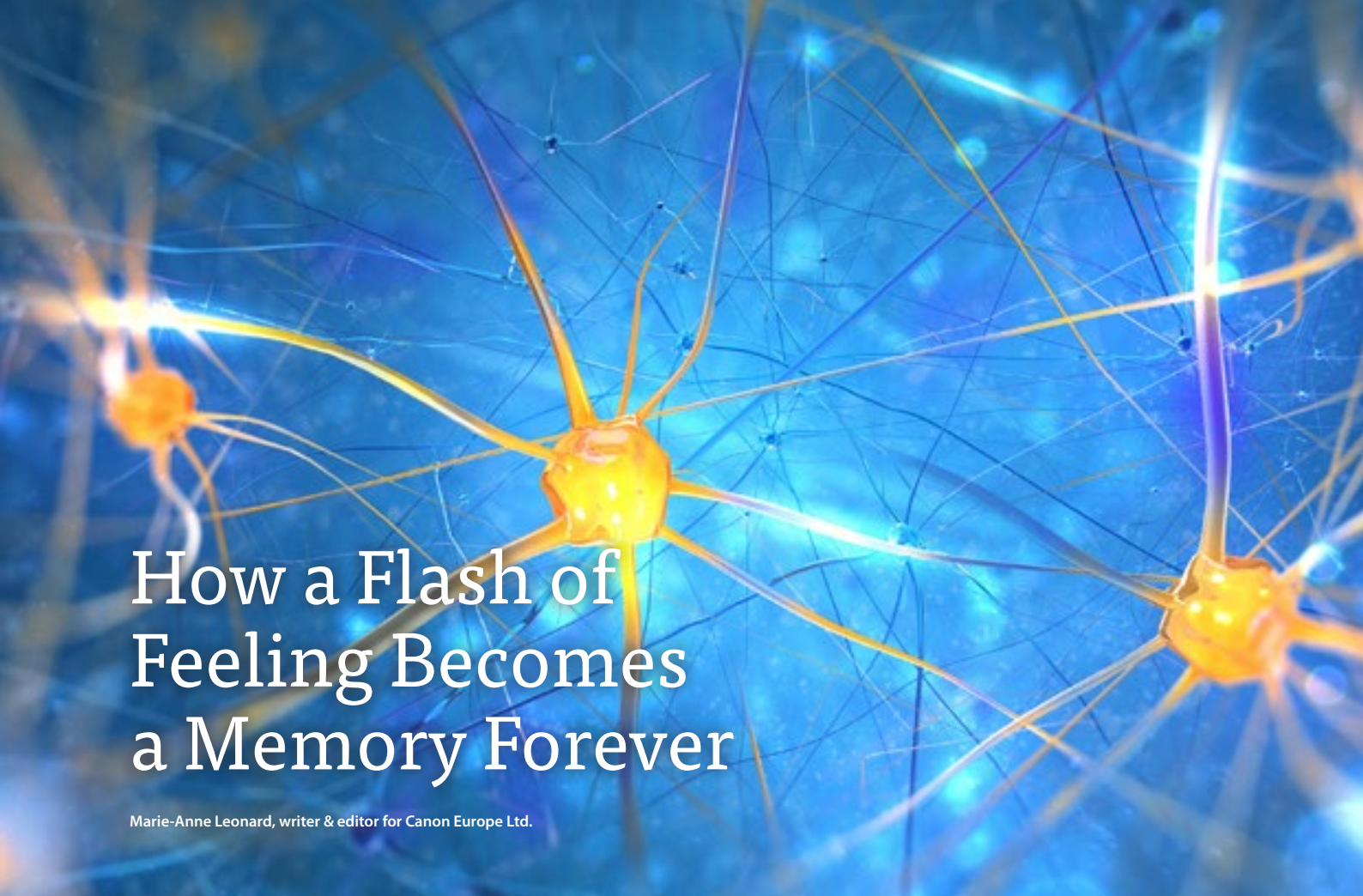
Lumbar Spine

- Sagittal T2
- Resolution: 1.0 x 1.0 mm
- Slice Thickness: 3.5 mm

4

Cervical Spine

- Sagittal T2
- Resolution: 0.9 x 0.9 mm
- Slice Thickness: 3.0 mm



How a Flash of Feeling Becomes a Memory Forever

Marie-Anne Leonard, writer & editor for Canon Europe Ltd.

In Roman times ‘genius’ took the form of a god or spirit which travelled with humans throughout their lives and channelled great acts through their ‘owners’. No human was a genius, but they had the services of a genius. Imagine that today – perhaps reading this on a supercomputer the size of your palm in the knowledge that someone’s personal divine entity put it there. Sound ludicrous doesn’t it?

In today’s world we own our own smarts. The things we create, the places we find and the stories we tell to share them are the result of less philosophy and theology (although they influence our day-to-day lives), and more creativity, economics and science. As we discover new things, we want to share them. Often, we do this as a way to monetise them. And our incredible brains – not those of a borrowed genius – hold the keys to do it all.

To this end, our genius for storytelling has always been with us – from cave drawings to the great oral tradition and the first written words to the Gutenberg press. Throughout the ages, stories have played an important part of life. They function as great moral

tales or warnings for children, they share historical events through generations and commemorate the loved. Every family has their own and every day we accumulate more. Today there are more stories in the world than people. More to share. More knowledge. More world. How do we stop our own stories from getting lost?

There’s no map or instructions for getting an idea inside people’s heads and keeping it there, but we now

“The human brain can process an entire image in as little as 13 milliseconds”

know enough about psychology and neuroscience to understand what happens in the human brain when it forms attachments to stories. Creating the initial hook that turns the human ‘attentional spotlight’ to your story is one thing – but what does the human brain need to turn that quick flash of attention into a meaningful attachment? And it truly is a quick flash: the human brain can process an entire image in as little as 13 milliseconds. Are you selling something?

Reporting news? Raising awareness for a cause? Asking for donations? Whatever you're using your story to do, then this is the sequence responsible for turning feelings into actions:

The hook

A sense of tension that can hold the attention for more than a couple of seconds can effectively connect the brain to the subject for long enough to kickstart the process of arousal – the brain is readying a response and that could be physical (increased heart rate, sweaty palms, a sense of alertness) or emotional. And off our brains go, taking what we've seen and transforming it into something we feel through a complex flurry of neural activity.

The reward

Of all the neurotransmitters (chemicals that pass messages through the nervous system), Dopamine is the fun one and makes us feel good. It's the way our brain rewards us and is released when we eat, take exercise or engage in a pleasurable activity. And because of this it also helps us hold our attention, engage our memories and process the information in front of us. When we see something exciting, appealing or intriguing, dopamine tells us so – and makes us want more of it.

The bond

Have you ever seen someone yawn and then yawned too? That'll be mirror neurons. Humans learn by mimicking and these neurons play a big part in our development – including the learning of deeper emotional functions, like empathy. When we build high emotion into our storytelling, it can create an almost contagious effect as these mirror neurons kick in to teach us how to respond to it.

The sense of belonging

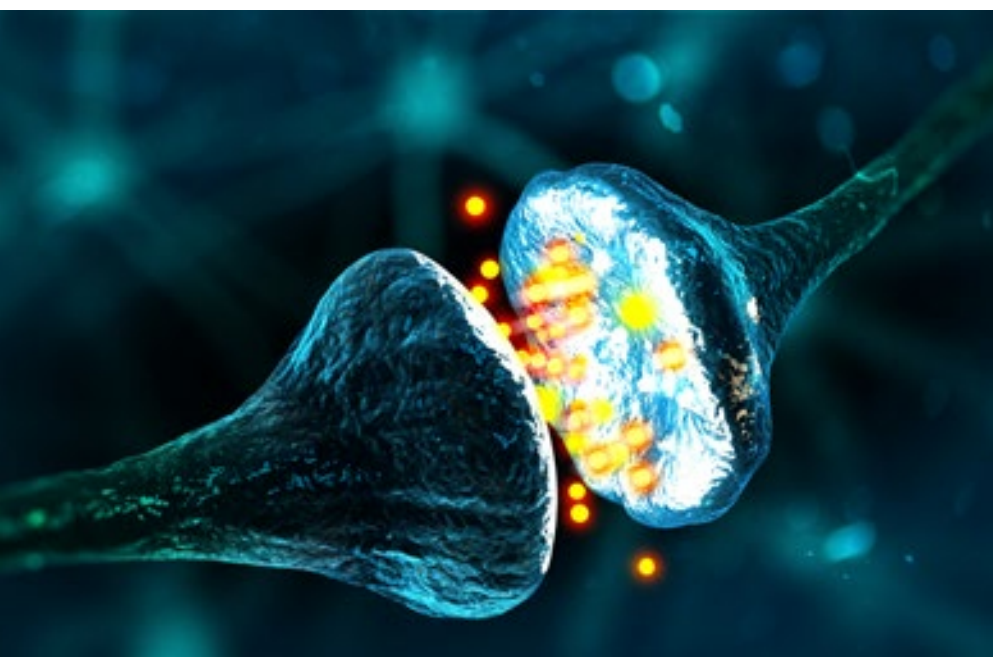
A neuropeptide, Oxytocin is best known as the 'cuddle hormone' because of its role in childbirth and maternal bonding, but it's far from being a female-only neurochemical. Its release signifies a willingness to trust and readiness to belong, which

“Why do we remember some stories and not others? What happens in our brains when our attention is piqued?”

sounds largely abstract in the context of storytelling, but its presence is a vital step towards your ultimate goal – ‘transportation’: the process of mentally ‘losing yourself’ in the story.

However, it's important to remember that different people will respond differently depending on their own experiences, so if you're telling a story for commercial purposes, then it's absolutely necessary to know who you want to appeal to in order to create a narrative that resonates with them. But it seems that some elements are consistently more successful than others. Massachusetts Institute of Technology conducted a study on memorable images and found that the most successful photos, in terms of recall, contain people, followed by static indoor scenes and then human-scale objects. Landscapes, although pleasing to the eye, were largely forgettable.

It may be a huge over-simplification, but the stories that stick with us should – at least chemically – be the ones that intrigue and reward in the short-term, but also provide a deep sense of empathy, involvement and belonging as they play out. Whether it's spoken word, a film, commercial, novel or single image, successful stories share a chemical balance that makes them last. //





VISIONS spoke with Dr. Jung
from the Human Medical
Imaging & Intervention Center
about their experiences with
Canon Medical's Angio-CT system
the Infinix-i 4D CT.

The Largest Radiology Center in Korea Increases the Success Rate of Prostate Artery Embolization (PAE)

Human Medical Imaging & Intervention Center is the largest radiology center in Korea that covers various intervention care from prostatic hyperplasia, uterine myoma, varicose vein and dialysis access to medical checkup and professional clinic. About 150 radiologists work at Human Medical Imaging & Intervention Center and more than 5 million diagnoses have been made and about 5,000 procedures have been conducted for the past 10 years.

Background of Prostate Artery Embolization

Prostate Artery Embolization (PAE) has been first performed in 2000 for a patient with a prostate size of about 300cc who complained of persistent hematuria. Clinical studies started based on the findings that the prostate size decreased by 40% and the lower urinary tract symptoms have been improved after the procedure. According to the "Results of 10-year Observational Research" published recently, the procedure is clinically effective for about 89% of patients in short-term and about 78% patients in long-term.

There are many reasons behind the increase for PAE. First, the number of patients complaining about prostatic hypertrophy has increased with the increasing number of elderly patients. However, patients were less willing to seek for a treatment due to postoperative sequelae, long recovery period and concerns about the treatment in a sensitive area. PAE is recently grabbing the attention as it has few complications and fast recovery unlike surgery. In fact, patients feel less time pressure as hospitalization, treatment and discharge from the hospital can be done on the same day.



“Canon’s Angio-CT system reduces the burden of contrast media and time for patients and increases the level of procedure completion for interventionalists.”

Dr. Jung, Chief of Intervention Center at the Human Medical Imaging & Intervention Center, Korea.

In the meantime, the treatment success rate has improved further as the skills of interventionalists have improved significantly. Recently a new device was introduced.

As of May 1st, 2019, PAE is covered by the Health insurance in Korea. Since then, Human Medical Imaging & Intervention Center has performed about 150 procedures and currently, about 20 procedures a months are being performed. The number of procedures is quite big compared to hospitals around Asia and even university hospitals in Europe.

Outstanding Performance

Canon Medical’s Infinix-i 4D CT is an angiography system combined with an integrated CT gantry on rails. It is a hybrid system designed to obtain and utilize necessary anatomical information accurately during interventional procedures as it is possible to carry out interventional procedure and CT scanning in the same room without the need to move the patient.

Before the availability of this system, the patient needed to be transferred after the CT scan to the Interventional room in case the CT data was neces-

sary for the intervention. In addition, if it was necessary to identify the changes of blood vessel position and/or progress of the procedure during the intervention, Cone-Beam CT (CBCT) using the C-arm needed to be used as the patient could not be moved to CT room. If CBCT scanning is acquired, the efficiency of finding the prostate artery and identifying dangerous collateral arteries becomes low. The patient exposure dose increases and CBCT is causing considerable artifacts.

Using only DSA has limitations in finding the prostate artery and reducing the possibility of non-target embolization as the prostate artery has various arterial origins and is sometimes accompanied by dangerous collateral arteries. However, it is possible to conduct intra-arterial CT scanning during the procedure as needed, using the Infinix-i 4D CT, which enables the identification of the structure and location of blood vessels accurately and reduces the possibility of non-target embolization to 0%. Eventually, the system makes it possible to improve both the consistency and success rate of the procedure.

It took some time to get used to the system after it was first introduced. However, interventionalists have become familiar with a lot of experience to the extent that they can conduct CT during angiography within 3 minutes.



Canon Medical’s Infinix-i 4D CT.



The Interventional Team at the Human Medical Imaging & Intervention Center in Korea, with Canon Medical's Angio-CT system the Infinix-i 4D CT.

We are convinced that this system will be particularly useful for PAE but also for embolization of other fine blood vessels.

Result of PAE with Angio-CT system

When the blood vessel shape is complex or overlapped in case of PAE, the desired procedure position can be identified using 3D volume rendered images. Of course, it is possible to make a 3D image using the angio system CBCT, but more accurate images could be obtained when 3D image is made by using a CT-scan. In addition, it has been useful because 3D images obtained from CT can be utilized as a roadmap during fluoroscopy. These great features help the user to conduct procedures easy and accurately.

According to Dr. Jung, Chief of Intervention Center at the Human Medical Imaging & Intervention Center in Korea, they were able to identify the prostate artery in all patients (100%) when intra-arterial CT was conducted during a PAE procedure. Based on

this, it is possible to perform bilateral prostate artery embolization for 96.5% patients and perform unilateral prostate artery embolization for 3.5% patients, maintaining technical failure at 0%. In addition, they were able to identify rectal artery and accessory internal pudendal artery, branching from prostate artery which could cause non-target embolization. Through this, they have maintained major complication and non-target embolization at 0%. In addition, it is possible to check whether the procedure has been successful or not immediately after the procedure by checking the contrast pooling of the prostate, conducting non-enhanced CT after prostate artery embolization. With this information, they could explain whether the procedure was successful or not to the patient. All patients were treated and discharged on the same day of the procedure.

Future of PAE

In the past, patients felt great burden regarding the procedure because there was a perception that angiography was mainly used for emergency patients

with cardiovascular and cerebrovascular issue. However, the number of patients choosing angiography is expected to increase as people are becoming aware of the fact that it is not surgery but a procedure that is safer, cheaper and faster.

In particular, the number of patients undergoing PAE is expected to grow further because the duration of hospitalization is short and the patients can return to their daily life rapidly reducing burden related to time. In terms of cost, surgical treatment is cheaper in Korea. However, as most of the patients are economically active people (workers or businessmen), return of investment is high because they can return to work faster. Therefore, PAE cost is cheaper given the overall context.

As such, PAE is clinically and economically more efficient than existing surgical treatment and we will achieve more progress in our procedure with the help of the Infinix-i 4D CT and Canon Medical Systems. //

The Aplio i800 Takes Exotic Animals Imaging to the Next Level

Ardiaca García, María; Bonvehí Nadeu, Cristina; Montesinos Barceló, Andrés.

The Aplio i800 is a considerable advance in ultrasound technology, offering high-resolution images and high frequency transducers that are valuable in any clinical setting. The system's wide range of transducers and Superb Micro-vascular Imaging (SMI) modality have convinced a leading Spanish veterinarian to chose Canon Medical to carry out her ultrasound examinations. Dr. Maria Ardiaca, director of a veterinary centre specialising in exotic pets in Madrid, told VISIONS how she uses the Aplio i800 to diagnose and perform biopsies in her surprising patients.

Pythons, bearded dragons and cockatiels are not the traditional fauna in Spain, but they are typical patients at Los Sauces Veterinary Centre, a leading pet clinic located in the heart of Madrid. The facility has been caring for exotic pets since 1995, when it was launched by Dr. Andrés Montesinos, a pioneer in exotic animals medicine. The centre's nine veterinarians and seven nurses attend around 3,500 patients per year, from small mammals, birds, reptiles, amphibians, fish and even invertebrates.

Exotic animals medicine: a growing and challenging field

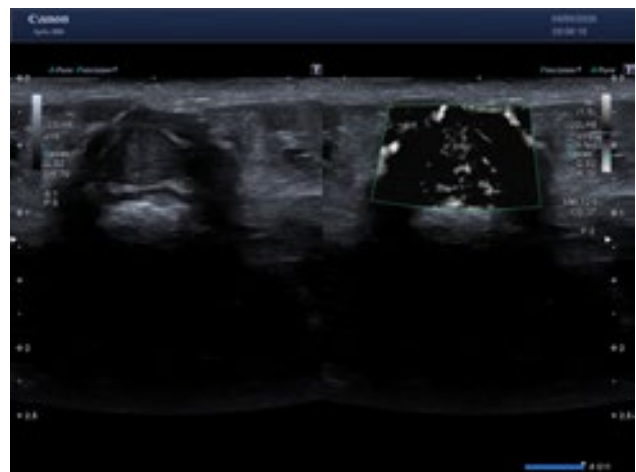
Exotic veterinary medicine is experiencing a vertiginous development and this requires a considerable effort from the professionals to keep up to date with the latest medical advances, according to Dr. Maria Ardiaca, who has been working at the centre since November 2003. "All of us actively participate in national and international conferences to improve our training and present our scientific contributions.

Our goal is to actively contribute to the development of the field and promote information, and thereby contribute to animal welfare and the reduction of illegal trade and capture of exotic and wild animals. Throughout the year, we receive dozens of Spanish and foreign veterinarians and students who want to improve their knowledge and skills in exotic animal medicine," she explained.

Specialising in exotic pets creates various challenges, starting with the vast diversity in the anatomic and physiologic particularities of patients. Dr. Ardiaca and her team attend a wide variety of species. Her avian patients include African grey parrots, budgerigars, cockatiels, lovebirds and other parrots, as well as canary finches and pigeons. Other regular patients comprise of rabbits, guinea pigs, chinchillas, degus, rats, hamsters, ferrets and minipigs, "the stars of mammalian visitors". In the reptile group, the team most commonly attends turtles and tortoises, bearded dragons, geckos, boas, pythons, milk and corn snakes.



Nephrocalcinosis in a domestic rabbit.



Inflammatory colitis with nodular mucosal hyperplasia in a rat.



Axolotls, goldfish, betta fish, frogs and toads are also frequent patients in the fish and amphibians hospital. The centre provides a comprehensive service of exotic animal medicine 24/7, offering consultation, diagnosis, hospitalisation, surgery and anaesthesia. The centre also has an internal laboratory where blood work, cytological or coprological analyses are performed.

As for diagnostic imaging, most examinations are performed in-house, but the team also works with specialists and advisors in different fields to offer the best option for patients.

Pushing ultrasound's capacities in diagnostic imaging and image-guided biopsies

Los Sauces veterinarians perform direct digital radiology, endoscopy and ultrasound examinations. For CT and MR studies, the team collaborates with a specialised veterinary imaging centre - Diez Bru Diagnostico por Imagen Veterinario - and with the Nuclear Magnetic Resonance Unit of the Multidisciplinary Institute (UCM) in Madrid.

To complete their diagnostic imaging capacities, Dr. Ardiaca and her team recently incorporated the new Aplio i800. The system will help perform abdominal and thoracic examinations, ultrasound-guided biopsies and nerve blocks, as well as echocardiography scans.

Biography

Dr. Maria Ardiaca is Director of the Los Sauces Veterinary Centre in Madrid. She received her veterinary degree at Madrid Universidad Complutense in 2002 and completed her university degree at wildlife recovery centres and at the Los Sauces Veterinary Centre in Madrid. She volunteered at the GREFA Wild Fauna Hospital and was an active member and president of the Veterinary Students' Association for Exotic and Wild Animals Medicine in Madrid. She worked as a veterinarian in wild fauna rehabilitation at the O Campiño Animal Rescue Centre during the Prestige oil spill in Galicia, Spain in 2002.

Dr. Ardiaca is an accredited veterinary specialist in exotic pets (New Companion Animals) at the Association of Small Animals Veterinarians of Spain (AVEPA). She is also president and scientific committee member of the Exotic Vets Association of Spain (GMCAE-AVEPA).

She regularly speaks in Continuing education courses and masters for veterinarians who are interested in exotic animal medicine. She has presented at several national and international conferences and published scientific papers on exotic animals medicine.

Besides high resolution images, one of Canon Medical's iconic trademarks, the wide range of transducers available with the Aplio i800 has been a determining factor in the decision to buy the equipment.

"The wide choice of transducers is suitable for all patients, from the largest to smallest companion animals, and this makes the Aplio i800 well suited for a veterinarian clinic or hospital," she said.

Dr. Ardiaca uses three configurations of probes: a 'Sector Probe' 3.5-12 MHz., a 'Linear Array Transducer' 4.0-18.3 MHz (intelligent Dynamic Micro-Slice - iDMS) and a 'Linear Probe for small superficial parts', ranging from 8.8-22 MHz, which offer high quality images. The 22 MHz hockey stick transducer is particularly useful with small pets, which constitute the vast majority of her patients. "Most of them weight less than one kilogram and many are thinner than 2-3 cm. I really appreciate resolution over penetration and need to work with high frequency linear transducers with good near field detail. This equipment offers outstanding resolution," she said.

Echocardiography is difficult to perform in small animals but the sector probe 12 MHz transducer of the Aplio i800 is up to the task and better suited than other equipment. "It is a significant improvement over my old 7 MHz transducer in obtaining images of my patients' small hearts at high frame rate," she said.

Aplio i800's ultra-wideband i-series transducers cover the same bandwidth as two conventional transducers, offering superior sensitivity and resolution for both near and far field. This groundbreaking transducer design helps provide better imaging regardless of the patient condition and helps to reduce costs.

"The Aplio i800's SMI expands the range of visible blood flow to visualise low-velocity microvascular flow in an unprecedented way."

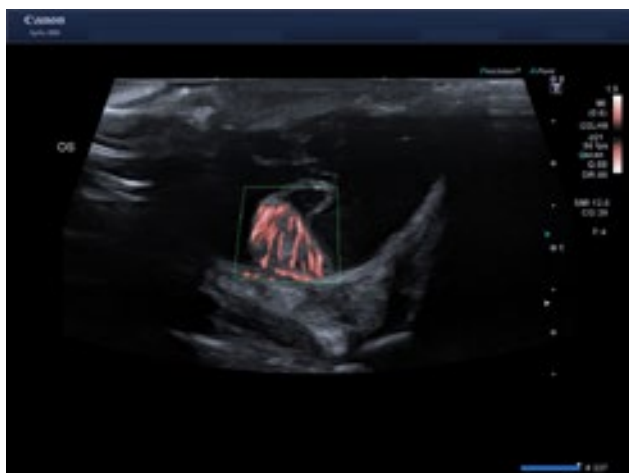
Dr. Maria Ardiaca, Director of the Los Sauces Veterinary Centre in Madrid

The system's Superb Micro-vascular Imaging (SMI), an unique technology on the market, helps expand the range of visible blood flow to visualise low-velocity microvascular flow in an unprecedented way. The SMI software can be used in a wide range of settings, from liver and kidney tumours to ophthalmology, enabling detailed view of the pecten in both reptiles and birds' eyes. This technology is gaining momentum in many other areas of pet imaging.

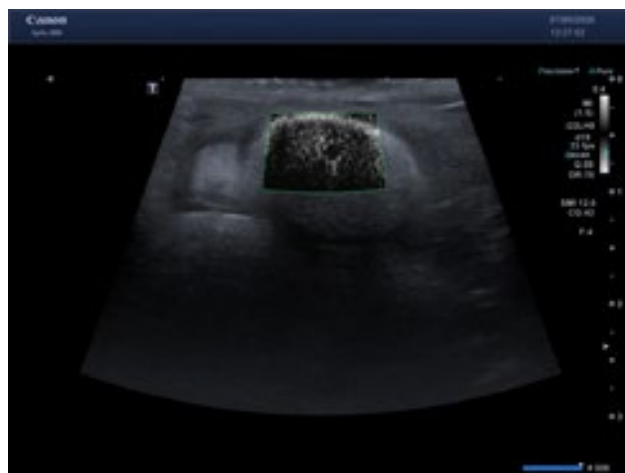
"SMI enables to evaluate perfusion in smallest body parts such as intestines of small rodents, adrenal gland or lymph nodes of ferrets, among others, with really subtle low blood flow," Dr. Ardiaca said.

Last but not least, the Aplio i800 is robust and long lasting, two qualities that are essential in the context of pet imaging, as patients are not always cooperative.

Dr. Ardiaca expects to perform around 600 ultrasound examinations per year with the new equipment, and this activity is set to grow, as more and more people chose to adopt exotic pets. She is also planning on future collaboration with Canon Medical for projects in research and continuing education.



Pecten oculi of an orange winged amazon (Amazona amazonica).



Normally perfused mature ovarian follicle in a mississippi map turtle. A small immature follicle is visible as a blood flow pattern disruption.

Clinical Case: Metastatic Osteosarcoma in a Blue-Fronted Amazon Parrot (*Amazona aestiva*)

Dr. Maria Ardiaca, Los Sauces Veterinary Centre in Madrid, Spain

A blue-fronted Amazon parrot of unknown age (at least 36 years) was presented due to apathy, anorexia and lameness. The clinical history of this patient included bilateral chronic stifle arthritis and a diaphyseal fracture of the right femur 3 months ago that was treated surgically.

The clinical examination showed mild dehydration, poor body condition (body score 2/5), weakness, alert mental

status and bilateral paraparesis. (Figure 1) The bird exhibited signs of pain during the palpation of the rear extremities and it was not possible to elicit a complete extension of the legs, especially the right leg.

Complete blood analysis revealed mild anemia (PCV 36%; reference range 42-53%), severely elevated alkaline phosphatase (2249 U/l, reference range 20-108 U/l) and mildly elevated bile acids (59 $\mu\text{mol/l}$).¹



Radiographs in laterolateral and ventrodorsal projections showed proliferative alterations in the right femur compatible with exuberant callus and misalignment in the diaphysis of the right femur and osteolysis in the distal epiphyseal region; cortical irregularities on the distal diaphysis and epiphysis of the left femur; irregular radiodense lesions on the vertebral column; calcification of the aorta and pulmonary arteries and moderate hepatomegaly. (Figures 2 and 3)

Figure 1: The patient, an Blue-fronted amazon parrot (*Amazona aestiva*) showing bilateral paraparesis.



Figures 2 and 3: Radiograph in ventrodorsal and laterolateral projections showing proliferative alterations in the right femur compatible with exuberant callus (arrow); osteolysis in the distal epiphyseal region (arrowhead) and irregular hyperdense lesions on the vertebral column (*) and calcification of the aorta and pulmonary arteries (notched arrowhead) among other findings. Positioning was suboptimal due to patient inability to extend the legs.

Ultrasonographic examination with the aid of a 22 MHz hockey stick transducer and Aplio i800 equipment (Canon Medical Systems) evidenced several space occupying lesions of mixed echogenicity that varied from 2.6 to 3.7 mm in diameter within the hepatic parenchyma. These lesions presented an uncommon coffee-bean appearance as they were roundish predominantly hypoechoic with a slightly hyperechoic periphery and central area. The perfusion evaluation with the SMI (Superb Micro-vascular Imaging) consistently revealed mild signal in the central area of the lesion. (Figures 4, 5 and 6)

Based on clinical and diagnostic findings, particularly the coffee-bean-shaped lesions in the hepatic parenchyma, a presumed diagnosis of metastatic neoplasia was made. The differential diagnosis included multifocal osteomyelitis and abscesses in the liver. Bilateral paraparesis was attributed to medullar lesion, probably related to the vertebral lesions. Supportive and analgesic therapy was initiated in order to stabilize the patient and evaluate further diagnostic plan, but the bird died approximately 24 hours after presentation.

The necropsy revealed hard whitish masses in the cranial area of both lungs; atheromatosis, arteriosclerosis and calcification of aorta and pulmonary arteries; several whitish firm nodular lesions in the liver and kidneys, right adrenal gland; large proliferative cortical lesion in the right femur and several smaller proliferative lesions on the ribs and dorsal thoracic wall. (Figure 7)

The histopathological study of the tissue samples concluded that pulmonary atelectasis and acute shock associated with severe atheromatosis, a metastatic osteosarcoma involving several organs, particularly the liver, and hemorrhagic lesions in the spinal cord contributed to the clinical picture and death of this parrot.

It was not possible to determine the location of the primary neoplasm or to rule out a primary poliostic involvement. Osteosarcoma may have contributed to pulmonary atelectasis from local compression and the metastatic malignancy was complicated by a catabolic process and dehydration that contributed to the shock in this patient.

Fractures in elderly parrots must always include the differentials for pathological fractures, such as neoplastic disease and a thorough diagnostic approach is advisable.² In this case, the recent femoral fracture was most probably due to the osteosarcoma that was not detected.

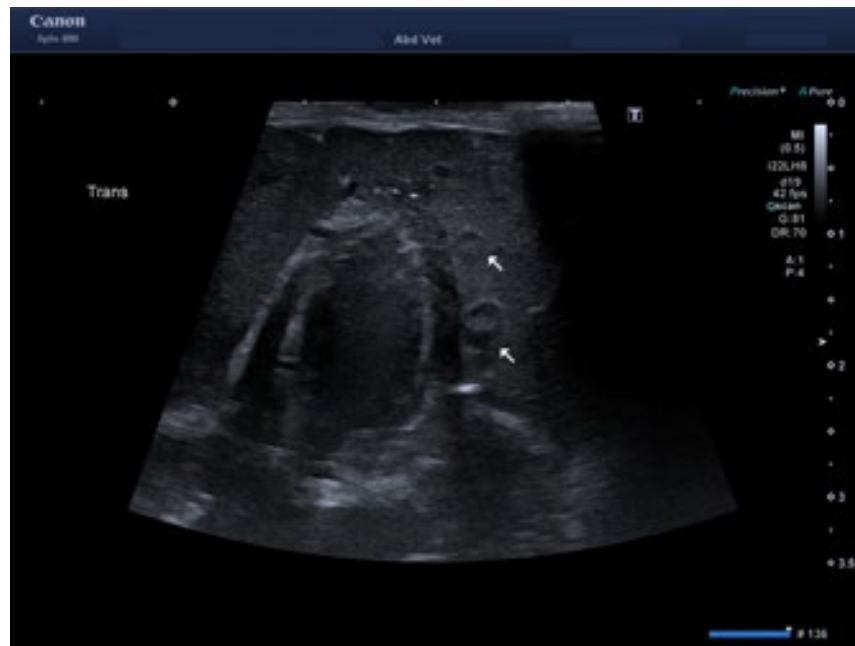


Figure 4: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.

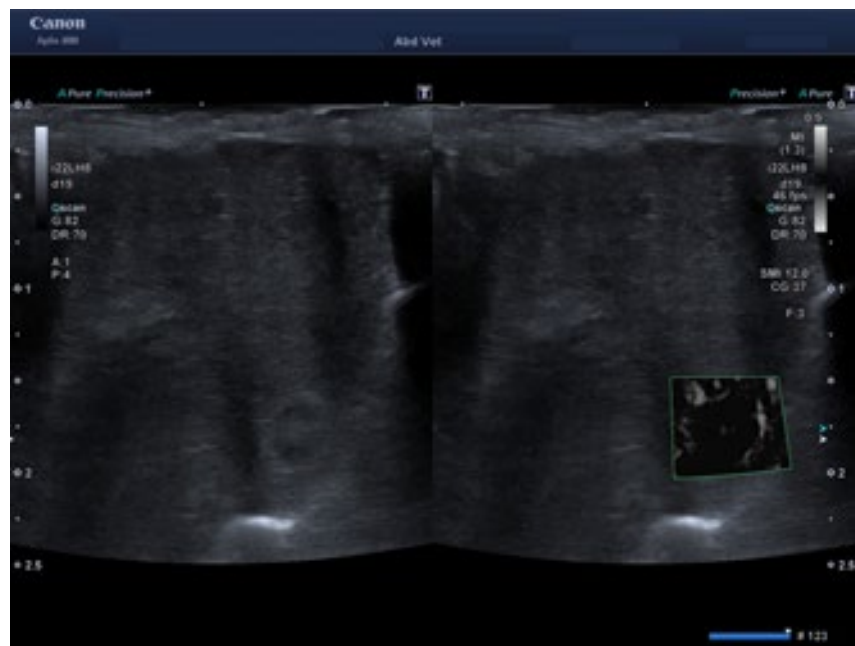


Figure 5: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.

Osteosarcomas are sporadically described in the scientific literature in different avian species, most often appendicular osteosarcomas.¹⁻⁵ Particularly in the blue-fronted Amazon parrot (*Amazona aestiva*) osteosarcoma, osteoma and chondrosarcoma are described.^{2,6,7}

Osteosarcomas are locally aggressive tumors that cause osteolysis and local invasion and they metastasize frequently, while chondrosarcoma tends to be only locally invasive with low metastatic potential in birds.^{1-4,7} Several attempts of chemotherapy for osteosarcoma in birds were made without success.⁵

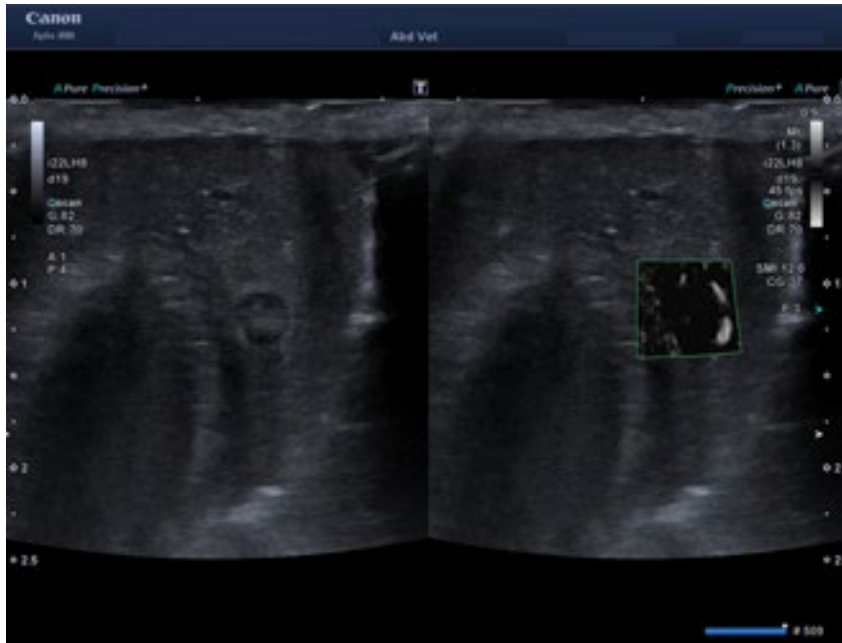


Figure 6: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.



Figure 7: Macroscopic appearance of the metastatic osteosarcoma lesions in the liver.

The differential diagnosis for the coffee-bean shaped lesions (sometimes also called bull's eye or target-shaped) in the human liver ultrasonography includes abscess (particularly due to *Candida* sp. or *Acinetobacter* sp. Infection) and metastatic disease, considered the latest most probable.⁸⁻¹¹

There are no scientific descriptions of this lesion in avian liver. In this case, the use of the novel SMI technique was particularly relevant as it allowed detection of very low flow perfusion that suggested neoplastic origin of the lesion, rather than an abscess. //

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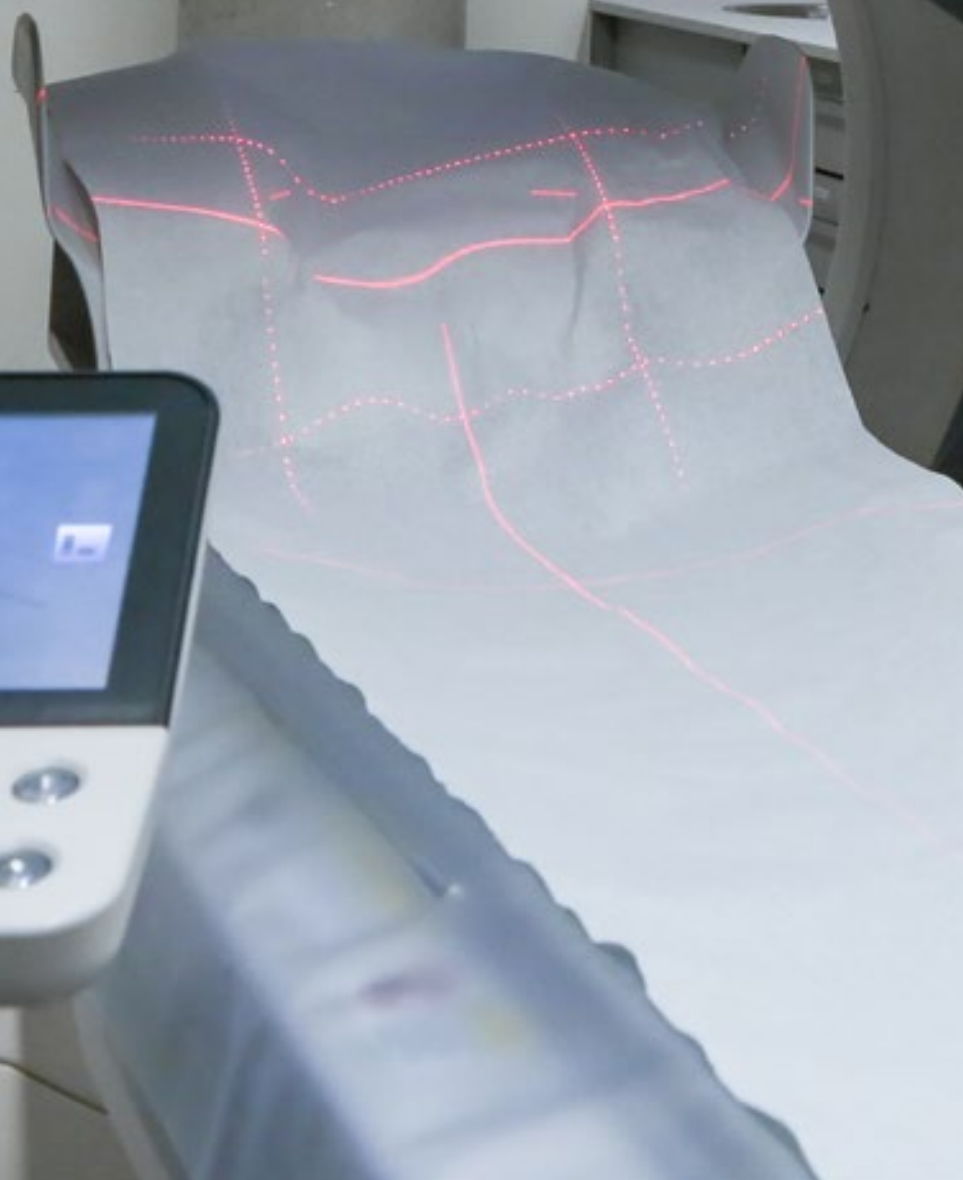
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ONE
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VISIONS spoke with interventional radiologist Dr. Jasper Florie and CEO Frank de Reij about the Aquilion ONE / PRISM Edition scanner that Meander Medical Center Amersfoort started using in February. The scanner was festively inaugurated during a Japanese Sake Ceremony.

The first Aquilion ONE / PRISM Edition in Europe*

“Meander has the European exclusive in advanced CT scanners”, read the media headlines. The hospital in the Dutch city of Amersfoort has the first commercial release in Europe of the Aquilion ONE / PRISM Edition. Interventional radiologist Dr. Jasper Florie and CEO Frank de Reij are keeping a cool head though. “It’s really good for our hospital, of course, all that attention from the media. But first and foremost, this simply was the best deal.”

During Dr. Florie’s work at Amsterdam University Medical Center, Leiden University Medical Center, Erasmus Medical Center and now Meander Medical Center, he has seen a multitude of CT scanners come and go – all of undoubtedly high quality. “If, like me, you have had the privilege to work in leading medical centres, you’ve obviously always had the best equipment at your disposal.

The same applies to Meander, where we had some scanners I was very happy with. But when the time comes to replace them and expand your arsenal, you explore whether you can get a better return, financially as well as in terms of features. And that turned out to be possible, as became clear from the conversations with Canon Medical Systems.”

Unanimous verdict

And this is how Canon Medical Systems won the tender for the new CT systems – of course after extensive consultations between all the important stakeholders and users at Meander, such as lab technicians, radiologists, tech personnel and financial specialists. “For all these parties at Meander, Canon’s package deal was so good that we just couldn’t say no to it. So now we have two new high-end scanners that massively expand our planning options: one Aquilion ONE / PRISM Edition and one Aquilion ONE / Genesis Edition,” tells Dr. Florie.

The two older scanners, which Meander used before purchasing the two Aquilions, were constantly occupied. One of them was even in use evenings and nights. Because of this, there was simply no room for urgent interventions, which needless to say tend to be more time-consuming.

*First commercial release



During the Kagami Biraki (sake ceremony), Lo Wuite, Director of Canon Medical Systems The Netherlands, gives the Daruma doll to Frank de Reij, CEO of Meander Medical Center. The Daruma doll is a lucky charm that symbolises resilience and perseverance.

For example, a biopsy of an intervertebral disc to assess which bacteria was the causative agent of an infection, could be accomplished only with great difficulty.

That is not such a desirable situation for a hospital that has set the goal for itself to operate as efficiently as possible and therefore wishes to be able to screen any patient on any CT system.

CEO Frank de Reij, supporting Dr. Florie: “Hospitals like ours, which are considered to be the very best, are at the forefront of healthcare by combining patient-oriented care with solid train-

ing and extensive scientific research. This also necessitates equipment that not only can operate at that level, but that can also help raise that level. As far as I’m concerned, in addition to the technical and financial aspects, the current and future innovation strengths of Canon played a major role in our choice for the Aquilion ONE / PRISM Edition system.”

Speed and efficiency

Before the acquisition of the new Canon equipment, the situation at Meander was such that per definition, no interventions were performed on one of the two scanners.

With the new setup, interventions can be performed in both new CT scanners. Acute care and oncology overlap, with a speed and efficiency that was previously unattainable.

That has a lot to do with the distinguishing wider detector of the Aquilion ONE / PRISM Edition, which offers the advantageous ability to scan a large area in one go, as is the case for a dynamic scan of the heart or the head. This makes for the best possible image quality.

Another major advantage mentioned by Dr. Florie is the possibility to perform very precise dynamic tests.



Dr. Jasper Florie is an interventional radiologist at Meander Medical Center and is specialised in vascular and non-vascular interventions and abdominal radiology.

Before coming to Meander Medical Center, he worked at Amsterdam University Medical Center, Leiden University Medical Center, Haga Hospital and Erasmus Medical Center.



CEO Frank de Reij started his career as managing director for Transport Management International bv. After 10 years he went to work for KLM, where he held a variety of positions, including that of Executive Vice President and head of the division of Ground Services KLM and Chief Procurement Officer. In 2011 he was chosen CPO of the year. By 2010 he was already a member of the supervisory board of Tergooi Hospitals, and was introduced to the hospital world. Presently Frank de Reij is CEO of Meander Medical Center Amersfoort, chairman of the supervisory board of the Foundation for Dental Care in 's-Hertogenbosch and member of the supervisory board of homecare services HappyNurse Thuiszorg in The Hague.

For example, when screening the wrist it is in fact crucial to be able to image the movements of the wrist joint. Together with features such as Advanced intelligent Clear-IQ Engine (AiCE), Single Energy Metal Artifact Reduction (SEMAR) and image reconstruction, the possibility of dynamic testing makes the Aquilion ONE / PRISM Edition what it is: a high-end solution for the hospital of the future.

Artefact reduction and deep learning

AiCE is the first Deep Learning Reconstruction method that uses Artificial Intelligence (AI) to produce very detailed images with the extremely low noise you can expect from these deep-learning algorithms of the future. With its eight advance video cards, the AI application of the Aquilion ONE / PRISM Edition approaches the calculating power of IBM's Watson. For example, thanks to AiCE, the Aquilion really displays the various soft parts distinctively, even with low radiation as well as with less or even no contrast fluid.

SEMAR is a reconstruction technique with which the Aquilion reduces metal artefacts in the scan, thus removing artefacts from implants, clips, pacemakers or prostheses from the scan and optimising the imaging of adjoining or underlying soft tissues.

The Aquilion user can include SEMAR in the scanning protocol so that a fully automated reconstruction takes place, without further intervention of the user.

The human touch

All the wonderful technologies notwithstanding, Dr. Florie is still attached to the human side of his profession. "The artefact reduction and the AI possibilities are of course marvellous, but the nice pictures shown by the various suppliers' salespeople who came to see us during the tendering process only tell one side of the story. I am as interested in the functional side of things. The best possible collaboration between man and machine doesn't happen by itself, it needs good coordination and a solid dose of expertise."

"AiCE, for instance, works fantastically for analysing and visualising organs and soft tissue. Thanks to this feature, we can reduce the radiation dosage as well as the amount of contrast fluid. Still, as far as I'm concerned, human expertise is crucial for an optimal result; sometimes one cannot avoid having to modify a dosage because the standard settings don't allow you to get it just the way you want it," explains Dr. Florie.

He promptly adds that this is mainly a question of getting used to it. "With all its technical ingenuity, the Aquilion has served our patients outstandingly,

and I absolutely don't see why that should change. Even taking into account options and imaging results that we still have to get used to, or which need a tweak here and there, patient flow has become more efficient. By now we have installed the abdominal, pelvic and leg protocol on all scanners, allowing us to run all protocols everywhere. Now we can really scan every possible patient on every CT scanner."

The future

In addition, Meander benefits enormously from the large detector of the two new scanners, allowing scanning of large volumes in short periods of time, which yields the best possible image quality. Dr. Florie also has high expectations from the spectral feature, with which a physician gets more information than with conventional CT; this technology not only visualises the morphology of tissues and substances, but also their chemical composition, such as uric acid and calcium. The Aquilion does that through material-specific differences in weakening of X-rays in the patient, enabling more accurate diagnoses. "But in this area, Canon Medical Systems is clearly a step ahead of us," Dr. Florie acknowledges. "I suspect that spectral CT will work excellently with perfusion, but we have yet to test this extensively."



Pascal Lo-A-Njoe, radiology staff, with the Aquilion ONE / PRISM Edition.

Frank de Reij, who has examined the entire Aquilion trajectory at Meander from angles other than a predominantly medical one, which points to the major role of Canon as a collaborative partner for the hospital. “Indeed, Canon is a leader with some technologies. But conversely, I also know that our doctors encounter issues in their practice or identify desired applications for which those behind the drawing board have not yet devised a feature. So I would dare claim that Canon is keeping our medics sharp, and that in turn we offer Canon an incubator for off-label ideas – to keep things in healthcare lingo.”

When asked which developments they would like to see coming for scanners, both Frank de Reij and Dr. Florie resolutely name “data exchange”. Dr. Florie immediately inserts that this is not the core business of Canon Medical Systems, but is something about which Meander would like to receive input, opinions or concrete action from Canon. “Honestly, at the moment, trying to share data is a cumbersome endeavour despite the advanced technologies. Exchanging tests between different scanning modalities is not yet evident: for instance, it is not yet possible to read a PET-CT in our ultrasound equipment to merge it with live ultrasound images when you want to do a biopsy of a suspected abnormality.

Meander Medical Center is a top-tier hospital in Amersfoort, employing more than 3,000 professional staff, 200 medical specialists and dozens of volunteers. Jointly they provide care to over 320,000 residents of the Amersfoort, Baarn, Barneveld, Bunschoten, Leusden, Nijkerk and Soest region.

And if you take it a step further: data exchange between radiologists of different Dutch hospitals would also be quite a welcome development. Many hospitals are already working with platforms, offline or in the cloud, but we haven’t yet found the optimal environment,” says Dr. Florie.

“Ideally, software suppliers step away from the innovation-constraining, ‘not-invented-here’ syndrome,” adds de Reij. “The longer the current predicament lasts, the clearer it is becoming that a lot can fail or succeed depending on collaboration, certainly in healthcare. Although with my commercial background I am very understanding of proprietary solutions, my gut feeling now that I am part of the healthcare system says that shared innovations give businesses a much longer life than protected new technologies. Plus it gives their clients a much more solid basis for modernisation and optimal care.”

For now, the interventional radiologist and the general director consider these to remain “important secondary issues”. All users are extremely satisfied with the new systems that Canon Medical Systems has installed at Meander Medical Center. Frank de Reij, Dr. Florie and their team all consider that Canon was on top of things and that those responsible were involved, accessible and very service-oriented, which resulted in a top-of-the-line system with a small footprint.

One of the lab technicians gave a broad smile when asked to describe his favourite feature. For him, the extremely advanced software features AiCE, SEMAR and spectral CT were a deal breaker against good-old lateral table-shifting. This enables lab technicians to easily place their patients in the middle of the gantry and scan them. //

General guidelines for authors

Works are generally classified into two categories: Full length articles (e.g. clinical added value of new/special applications & technologies) and Short contributions (e.g. system testimonials, case reports, technical notes).

All articles should be double-spaced.

Full length articles

Full length articles should generally include the following:

- Author's full name and highest academic degree, employer medical institution
- Author's biography (150 words)
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The article should be saved in Microsoft Word (PC format) if possible, and, if not, in text only.

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Journal example

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Book example

Welch KMA, Barkley GL. Biochemistry and pharmacology of cerebral ischemia. In: Barnett JHM, Stein BM, Mohr JP, Yatsu FM, eds. *Stroke: pathophysiology, diagnosis and management*. New York: Churchill Livingstone, 1986:75-90.



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