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VISIONS

AUGUST 2013



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Reducing Healthcare Queues in Sweden

ULTRASOUND

Xario enters a new level in ultrasound diagnostics

Tumour plus 1cm equals better breast cancer recovery

COMPUTED TOMOGRAPHY

Coronary CT Subtraction: Clinical Results

22

Imprint

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Dear reader,

“A rose by any other name would smell as sweet” is a commonly quoted section of dialogue in William Shakespeare’s play ‘Romeo and Juliet’ (Act II, Scene II), in which, Juliet argues that the names of things do not matter, only what things “are”.¹

That might have been the case when the play was written and first published, back in the 1500s, but nowadays, company-, product-, or technology names are of paramount importance. They are assets that require heavy investment and form a crucial and integral part of modern business.

The same applies to VISIONS magazine. Published consistently for over a decade, VISIONS has a well-established name, which is recognized and valued within our industry. Its good name survives the test of time unchanged, but importantly, in my opinion, the way that information in the magazine was communicated and presented required refreshing to ensure that it still delivers the best to today’s readers. You might have noticed the sometimes subtle-, sometimes big changes in this 22nd edition. Alterations in lay-out, the use of fonts and colors and the way in which imagery is used to deliver information to reader are modifications that reflect contemporary magazine publishing, combined with graphic influences that steer us towards a new and enhanced corporate identity. Also new is VISIONS’ increased integration with the digital world by means of ‘Tiny urls’, added where more information on the subject is available on the internet or Social Media channels.

I felt strongly that these changes were required in all the ways that we communicate with you, our readers, not just in the paper-based VISIONS magazine.. Therefore, the dedicated LinkedIn VISIONS Magazine Group has been moved to an all-new Customer Magazines Group². Being a member of this group ensures you are informed first about newly published articles and provides the opportunity to share your opinions, influence the future direction and contents of the magazine and discuss a variety of other related topics. I encourage everyone to explore and share any of the posts in this forum and ‘spread the word’ via your own Social Media channels.

Please be assured that what you are about to read is still your trusted VISIONS magazine, however ‘the smell’ is enriched with a new, fresh design, improved lay-out and functional cross-over to our digital platforms.

I am confident that you will appreciate and benefit from the improvements that have been made and hope to ‘see you soon’ at LinkedIn, or better still, in real life at some point in time.

Kind regards,

Jack Hoogendoorn

Sr. Manager Marketing Communications
Toshiba Medical Systems Europe BV

¹ <http://tinyurl.com/2dan3p>

² <http://tinyurl.com/kmdrkl>

AGENDA

Meet us at...

- 31/08-04/09
Amsterdam, Netherlands → ESC - European Society of Cardiology
- 02/09-06/02
Uppsala, Sweden → Röntgenveckan
- 14/09-18/09
Barcelona, Spain → CIRSE - Cardiovascular and Interventional Radiological Society of Europe
- 3/10-5/10
Toulouse, France → ESMRMB - European Society for Magnetic Resonance in Medicine and Biology
- 9/10-12/10
Stuttgart, Germany → Dreiländertreffen/EUROSON
- 12/10-16/10
Berlin, Germany → UEGW - United European Gastroenterology week
- 18/10-22/10
Paris, France → JFR - Journées Françaises de la Radiologie
- 22/10-25/10
Kiev, Ukraine → Public Health
- 24/10-26/10
London, United Kingdom → ESCR - European Society of Cardiac Radiology
- 20/11-23/11
Dusseldorf, Germany → Medica
- 01/12-06/12
Chicago, USA → RSNA - Radiological Society of North America
- 09/12-13/12
Moscow, Russia → Zdravookhraneniye
- 1/12-14/12
Istanbul, Turkey → EuroEcho - Imaging
- 06/03-10/03
Vienna, Austria → ECR - European Congress of Radiology

Workshops:

Neurological Imaging Workshop,
Leiden University
Myocardial CT Perfusion Workshop (2 days),
Rigshospitalet Copenhagen
Myocardial CT Perfusion Advanced Course (3 days),
Rigshospitalet Copenhagen

User meeting:

Wide Detector CT User Meeting (2 days), Leiden university] ▶ See **backpage**

<http://www.toshiba-medical.eu/en/Our-Product-Range/CT/Training/>



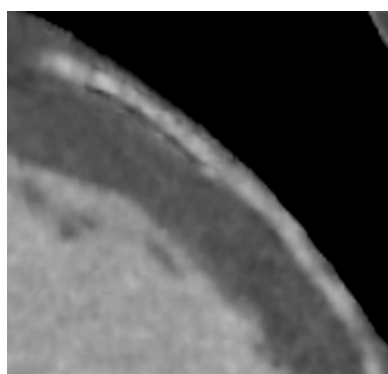
13 VISIONS discussed intraoperative ultrasound-guided breast surgery with Dr. M.P. van den Tol



20 On Saturday, 31 August, Toshiba will present its Lunch Satellite Symposium at ESC.



22 Smaller, smarter, simpler, lighter and more agile, the new Xario 200 from Toshiba.



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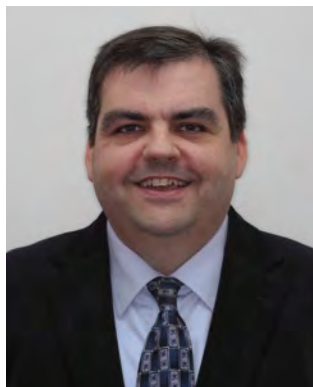
Opening Ceremony of Toshiba Medical Systems Korea.

The opening ceremony to officially announce the establishment of Toshiba Medical Systems Korea (TMSK) as a subsidiary of Toshiba Medical Systems Corporation (TMSC) has successfully been finished on June 7 in the Conrad hotel, Seoul.

To celebrate it, there were more than 150 attendees from medical societies, Toshiba subsidiaries, Embassy of Japan and domestic suppliers. Also, many people from TMSC attended this ceremony including Mr. Satoshi Tsunakawa, President and CEO of TMSC, Mr. Yasuo Nobuta, Vice president of TMSC and general managers of main business units.



From left to right: Mr. Naoto Watanabe (TMSC); Mr. Robert Micer (TMSC); Tadakazu Kurakake (TMSC); Yuji Hamada (TMSC); Mr. Charles Ju, President (TMSK); Mr. Akira Ifuku (TMSC); Prof. Yang-Soo Jang, Yonsei University Hospital; Mr. Yasuo Nobuta (TMSC); Dr. Gham Hur, Radiologist, Korea Teleradiology Reading Center; Ms. Kelly Kang (TMSK); Mr. Satoshi Tsunakawa, President (TMSC); Prof. Tae-Hwan Lim, President (Korean Society of Radiology); Mr. Kazufumi Ishiyama (TMSC); Mr. Akihiro Sano (TMSC); Mr. Toshio Takiguchi (TMSC)



Toshiba names **Ken Sutherland** President of Toshiba Medical Visualization Systems Europe

Toshiba Medical Systems Corporation has named Ken Sutherland president of Toshiba Medical Visualization Systems Europe Ltd. (TMVS). As president, Dr. Sutherland has complete responsibility for all TMVS's activities.

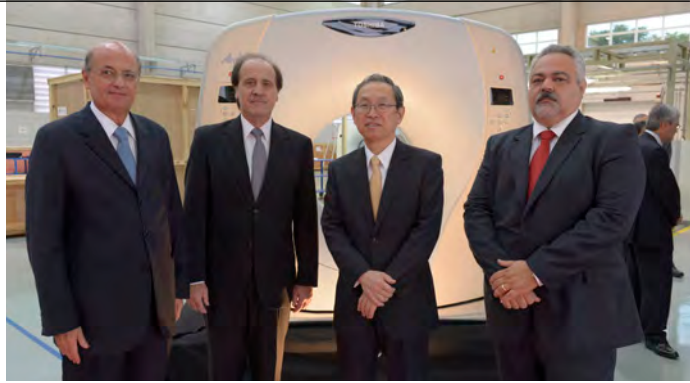
TMVS, based in Edinburgh, designs advanced medical imaging software that takes the output from CT, MRI, X-ray and Ultrasound scanners to produce 3D images for use by clinicians, to aid diagnosis and treatment. These cutting edge medical imaging solutions improve the quality of treatment for patients and reduce the cost of providing that treatment.

Medical Equipment Production Facility in Brazil

Toshiba Medical Systems Corporation (TMSC) has recently started operation of a newly established medical equipment production facility in Campinas, São Paulo State, Brazil.

TMSC established Toshiba Medical do Brasil Ltda back in 1974 and has been involved in the sales and service of Toshiba medical equipment in the South American region through this subsidiary. The healthcare market in South America, centered around Brazil, is expected to undergo steady expansion due to continuing advances in healthcare technology and improvements in healthcare infrastructure. For this reason, Toshiba has launched the new production facility.

The facility will receive PPB (Processo Produtivo Básico) approval from the Brazilian government and will begin the manufacture of CT systems and diagnostic ultrasound systems as Brazilian domestic products. Toshiba will be the first international manufacturer to receive the PPB approval for the domestic production of ultrasound systems.



From left to right: Prof. Dr. Giovanni Guido Cerri (Secretary of Health of São Paulo State), Mr. Gerardo Schattenhofer (President Toshiba Medical do Brasil Ltda), Mr. Satoshi Tsunakawa (President and CEO Toshiba Medical Systems Corporation), Mr. Flávio Martins (General Manager, Commercial Department, Toshiba Medical do Brasil Ltda)

At the new production facility, Toshiba will promote the local procurement of parts within Brazil and will manufacture medical equipment under the highest quality control standards comparable to those in Japan. Toshiba is committed to producing safe and reliable medical equipment with excellent cost-performance to satisfy growing demand not only within Brazil but also throughout the entire South American region.

Toshiba supports international myocardial CT Perfusion workshop

Toshiba Medical Systems recently supported the third CT Perfusion workshop held at Rigshospitalet University Hospital, Copenhagen, Denmark. Since its inception in January 2012, the Myocardial CT Perfusion workshop has proved to be a great success, with increased numbers attending each year.

The workshop is organised by the departments of Cardiology and Radiology. Rigshospitalet, since the installation of a Toshiba Aquilion ONE, has performed a large number of myocardial CT Perfusion scans, participated in the Core320 trial, and is one of the European experts in myocardial perfusion. Fourteen participants from the Netherlands, Austria, Belgium, Switzerland, Denmark, Turkey, Russia and the UK attended this 'hands on' course.

The workshop provides state-of-the-art lectures on the basics of current 320-row (Aquilion ONE) technology, as well as dedicated applications for myocardial perfusion. Participants were able to improve their understanding of scan procedures and protocols for myocardial CT Perfusion imaging, as well as the interpretation of studies using the latest Vitrea fX software.

<http://tinyurl.com/o4vzhzx>



CT Scanners Used in Shark Conservation

During weekdays, the CT scanners at Leiden University Medical Center (LUMC), one of the Netherlands top academic hospitals, are in constant use until late in the night to help patients. At the weekends, they are used to examine a very different range of subjects. Peppijn Kamminga, biologist at Naturalis Biodiversity Center¹, Leiden, has developed a collaboration with the hospital and uses the CT scanners to carry out important research into sharks.

A wide range of shark species are included in Kamminga's research program: from Wobbegong Sharks, Cat Sharks to Horn Sharks. The diagnostic equipment is used in research that focuses on exploring the jaws of the shark to better understand how they have evolved. The investigation will determine if there is a connection between the shape of sharks' heads and what they eat, why they differ so much, and how they have developed over time. The information gathered will contribute towards better shark protection.



Peppijn Kamminga, PhD Candidate, preparing the shark for a CT scan

LUMC's CT scanners provide opportunities to look inside the shark, without having to dissect the specimen. New imaging capabilities, flexibility and maneuverability of the hospital's modern CT systems, combined with their advanced software for image processing has made this kind of research feasible.

DECLINING POPULATIONS

An estimated 100 million sharks are captured and killed for their meat and fins annually. International trade in sharks is not currently regulated and as a result, populations of sharks including endangered species, such as the Porbeagle shark, are declining rapidly. The population of Porbeagle Sharks in the Northern Eastern Atlantic, for example, is estimated to have decreased by 94% since the last Century.

In March this year, CITES² (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) agreed to put in place better protection for endangered Porbeagle-, Oceanic Whitetip- and Hammerhead Shark species. They may be exported from today only with a permit. Authorization is only granted if small numbers of animals of the species are exported.

Source: NATURALIS BIODIVERSITY CENTER/LUMC/WWF/VARA



3D galeorhinus galeus image reconstruction

¹ <http://tinyurl.com/8m6vyop>

² <http://tinyurl.com/648ndu>

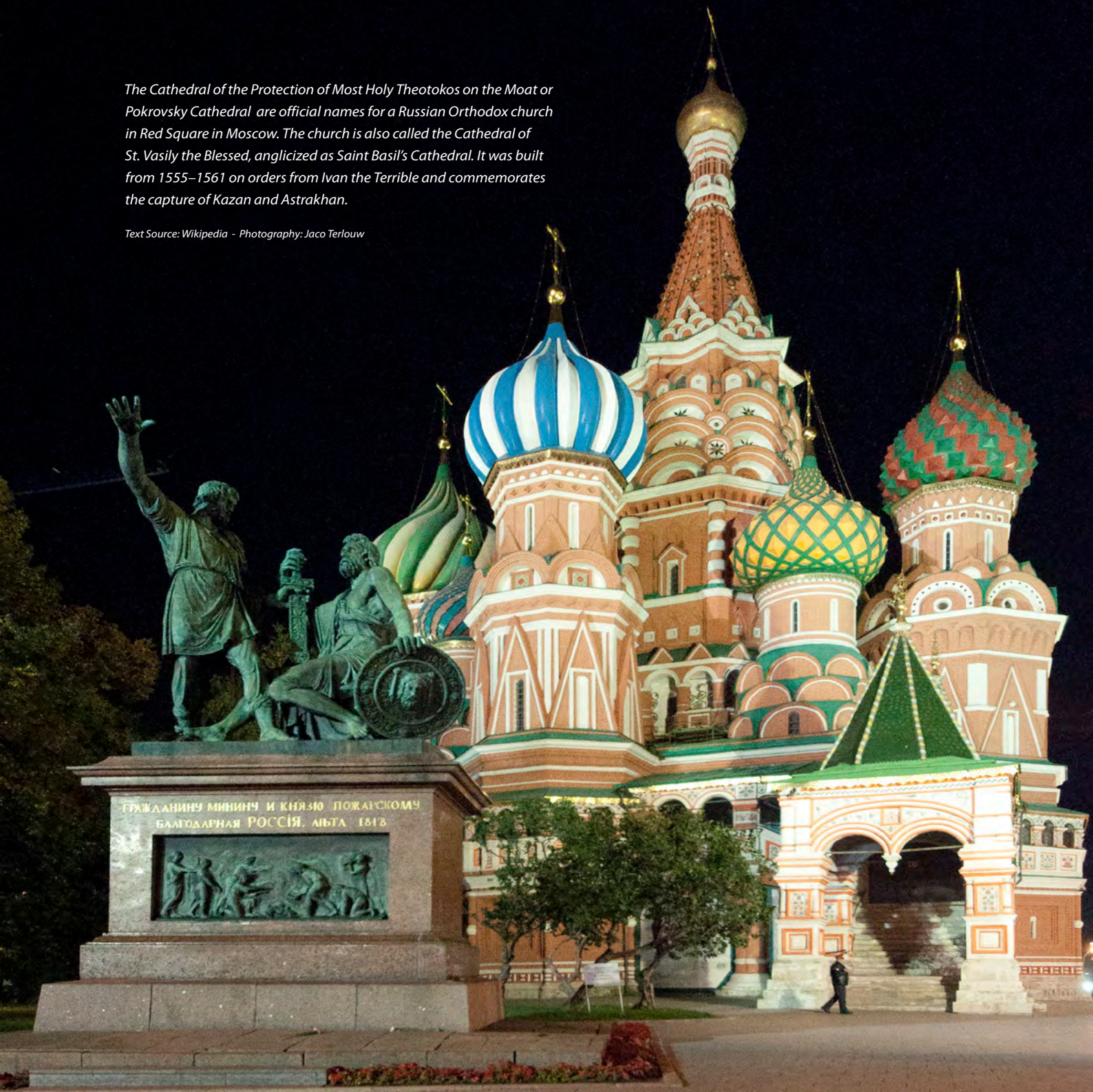
The page on the right is part of the VISIONS Photo Page Series reflecting an eye for the beauty of our planet, the environment and the direct surroundings where Toshiba's systems are installed by Toshiba and its customers. Not the actual imaging products but photos of sceneries, cities, countries or other cultural aspects are highlighted on this photo page. The Photo Page is based upon an idea of Prof. Edwin van Beek.

Every reader of VISIONS can participate and get their picture published. The submitted content should include: high resolution (300dpi) image, photo of the hospital and a brief text, name of photographer and Toshiba system(s) installed. The complete result is shown on the opposite page.

Send your pictures and texts to: jhoogendoorn@tmse.nl, Subject: Photo Page

The Cathedral of the Protection of Most Holy Theotokos on the Moat or Pokrovsky Cathedral are official names for a Russian Orthodox church in Red Square in Moscow. The church is also called the Cathedral of St. Vasily the Blessed, anglicized as Saint Basil's Cathedral. It was built from 1555–1561 on orders from Ivan the Terrible and commemorates the capture of Kazan and Astrakhan.

Text Source: Wikipedia - Photography: Jaco Terlouw



Onkologicheskij Klinicheskij Dispanser №1 (OKD No.1) is located in Moscow, the capital city of the Russian Federation. OKD No.1 annually receives about 140,000 visits of outpatients with various tumor pathologies. Currently, the clinic can accommodate 260 inpatients. Every year the hospital provides treatment for over 6,000 patients. More than 3,000 complex operations are performed annually. OKD No.1 has a Toshiba Raffine digital remote controlled R/F system.

Text source: <http://okd1.ru> - Photography: Jaco Terlouw

Coronary CT Angiography with Aquilion ONE™ /ViSION Edition

Stevenson C MMRS ¹⁾, Schuijf JD PhD ²⁾



Chloe Stevenson



Joanne Schuijf

Recently, the Aquilion ONE /ViSION Edition has been introduced. The combination of full organ coverage with fast rotation time suggests this system to be ideally suited for coronary CT angiography. Two research groups, from Tokyo, Japan and Bethesda, United States, have recently published their initial experiences. Both studies confirm that with the ViSION Edition, excellent image quality can be obtained at low radiation doses across a wide range of patients.

Coronary CT angiography using the Aquilion ONE with its 320 detector rows and 16cm z-axis coverage has been shown to have good diagnostic accuracy to detect significant coronary stenoses compared to invasive catheter angiography¹⁻². In patients with a heart rate of less than 65bpm the entire heart can be acquired in a single heartbeat for a low radiation dose³. The use of prospective gating, where only a portion of the heart cycle is imaged, SUREExposure and the novel iterative reconstruction algorithm AIDR 3D all assist in lowering the radiation dose as much as possible. In patients with higher heart rates (>65bpm) the temporal resolution of 175ms is not fast enough to freeze cardiac motion, thus multi-segment reconstruction is necessary to improve temporal resolution. As multiple beats need to be scanned, the radiation dose is increased.

In 2012 Toshiba introduced the Aquilion ONE /ViSION Edition. In this system the gantry speed is increased from 350ms to 275ms and thus the temporal resolution of a scan acquired in a single heart beat has improved to 137ms. As a result, this second generation 320-row scanner is expected to allow excellent coronary imaging across a wider range of heart rates as compared to the first generation scanner. To date two papers have been published comparing the two systems.

In the study by Chen et al.⁴ coronary CT angiography was performed in 107 consecutive and unselected patients, who were enrolled regardless of heart rate, cardiac rhythm, body size, previous cardiac history (such as coronary bypass grafting) or clinical indication. The only contraindications were pregnancy or poor renal function. This cohort was compared with a similar consecutive cohort imaged with the Aquilion ONE in 2010. The scans performed on the Aquilion ONE did not use AIDR 3D or SUREExposure.

In this study the mean radiation dose was reduced from 2.67mSv with Aquilion ONE to 0.93mSv with the ViSION Edition, representing a 65% dose reduction.

This significant reduction is due to the implementation of many dose saving features such as AIDR 3D and SUREExposure in addition to the increased gantry rotation speed.

Tomizawa et al.⁵ sought to compare the radiation dose reduction for coronary CT angiography between the Aquilion ONE and Aquilion ONE /ViSION Edition systems with the only variable being rotation speed. 96 patients were retrospectively studied, 48 were imaged with Aquilion ONE and 48 imaged with the ViSION Edition. Other parameters such as iterative reconstruction and SUREExposure parameters were the same for both groups. Patients with arrhythmia, shunts, and scans performed for bypass or aorta evaluation were excluded. The mean radiation dose was reduced from 3.3mSv with Aquilion ONE to 2.5mSv with the ViSION Edition, representing a 24% dose reduction⁵.

The improved temporal resolution has important implications for the number of patients that can be imaged in a single heart beat. Whereas the previous generation scanner allowed single-heartbeat scanning with heart rates of up to approximately 65 bpm, with the ViSION Edition patients with heart rates up to 75bpm can be imaged in a single heart beat. As shown in Figure 1, the proportion of one beat scans increased from 81% with the Aquilion ONE to 93.4% with the ViSION Edition⁴ and from 67% to 85% respectively⁵. Thus, both studies confirm that even in unselected populations, almost all patients can now be successfully imaged within a single heart beat (Figure 1). Case examples of single beat acquisitions can be seen in Figures 2 and 3.

In both studies the image quality metrics were either the same or significantly improved with the ViSION Edition system indicating that despite significant radiation dose reduction image quality is maintained. Importantly, diagnostic image quality at low radiation dose could be achieved consistently across a wide range of heart rates and body sizes.

¹⁾ Toshiba Medical Systems Corporation, Otawara, Japan

²⁾ Toshiba Medical Systems Europe, Zoetermeer, The Netherlands

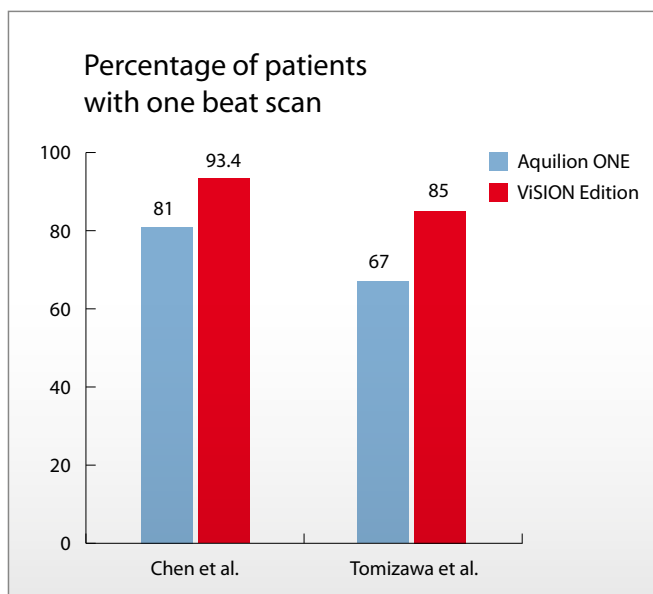


Figure 1: The percentage of patients imaged with a single beat acquisition.

The ViSION system is equipped with a 90kW generator to provide sufficient exposures required for the 0.275s gantry rotation speed. The larger generator enables larger patients to be scanned at 100kV. The advantage of 100kV imaging is improved visualization of iodinated contrast. In the study by Chen 90% of patients were imaged at 100kV despite an average patient BMI of 27kg/m². Importantly, all these patients had diagnostic image quality. Increasing the

Differences between the two studies included the more frequent use of beta blockade, including IV administration, to reduce heart rate in the study by Chen and colleagues. The average heart rate in the study by Dr Tomizawa was 63bpm for Aquilion ONE and 65bpm for the ViSION Edition compared to 58bpm and 57bpm respectively for the study by Dr Chen. The exposure windows selected also differed between the two studies and in both cases the exposure window was adjusted between the two scanners. In the Japanese study by Tomizawa et al. the exposure window included both systole and diastole when the heart rate was over 70bpm whereas in the American study by Chen et al. a systolic phase only was selected when the heart rate was over 75bpm. The average scan range also differed between the two studies. In the study by Chen the average scan range was 117mm while the average range in the Tomizawa study was 127mm. These differences may also account for the significantly lower dose seen in the latter study (Table 1).

percentage of patients imaged at 100kV has allowed a significant reduction in IV contrast volumes administered from 63mls with the Aquilion ONE to 55mls with the ViSION Edition⁴. This has benefits in cost savings and most importantly patient safety.

CONCLUSION

Aquilion ONE has proved to be an exceptionally robust scanner for performing Cardiac CTA on a wide range of patients with varying heart rates and rhythms. The ViSION Edition further extends this strength by providing low dose coronary CT angiography for patients with higher heart rates. Recent investigations confirm that with the ViSION Edition, excellent image quality can be obtained at low radiation doses across a wide range of patients. Importantly, even in unselected populations, the majority of patients can now be scanned within a single heart beat, providing important advantages both for patients and imaging providers.

Table 1: This table describes the differences in exposure parameters between the two studies for the ViSION Edition.

Tomizawa et al			Chen et al		
Heart Rate (bpm)	Number of Beats	Exposure Window	Heart Rate (bpm)	Number of Beats	Exposure Window
<70	1	70%-85%	<55	1	73%-77%
70-75	1	30%-80%	55-75	1	70%-80%
75-80	2	30%-80%	75-100	2	35%-55%
>90	3	30%-80%	>100	3	35%-55%

COMPUTED TOMOGRAPHY



Figure 2: A 44 year-old female patient with a heart rate of 54bpm. The scan was performed in one heart beat. DLP was 25.9mGy.cm equating to an effective dose of 0.36mSv.

Images Courtesy Dr M Chen, NHLBI, National Institutes of Health, USA



Figure 3: 45 year-old male patient with a BMI of 28kg/m² and a heart rate of 94bpm. The scan was performed in 2 heart beats at 100kV with a DLP of 193.8 mGy.cm equating to an effective dose of 2.71mSv.

Images Courtesy Dr M Chen, NHLBI, National Institutes of Health, USA

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5. Tomizawa N, Maeda E, Akahane M, Torigoe R, Kiryu S, Ohtomo K. Coronary CT angiography using the second-generation 320-detector row CT: assessment of image quality and radiation dose in various heart rates compared with the first-generation scanner, *Int J Cardiovascular Imaging*, 2013, e-pub ahead of print May 17

Tumour plus 1cm equals better breast cancer recovery

Toshiba ultrasound equipment is helping provide a better oncological and cosmetic outcome for women recovering from breast cancer treatment and surgery. VISIONS discussed the intraoperative ultrasound-guided breast surgery with Dutch surgeon Dr Monique Petrousjka van den Tol.

Being diagnosed with breast cancer is a traumatic experience for any woman. While survival rates are high, there are other factors that make the prospect of recovery and treatment a daunting experience. Surgery and radiotherapy effects are important factors but for many women it is the real-life concerns of the cosmetic impact on a part of the body that is central to their identity.

Breast conserving surgery is the treatment of choice for early-stage breast cancer with the aim to achieve tumour-free resection margins and a satisfactory cosmetic appearance. However, the accuracy of the margins impacts on the risk of local recurrence, the need for re-excision, mastectomy and additional boost radiotherapy, which all have a cosmetic impact.

The findings of the COBALT (Cosmetic Outcome of the Breast After Lumpectomy Treatment) trial, which was conducted in The Netherlands and examined the benefits of intraoperative ultrasound guidance for palpable breast cancer excision, focussed on this issue.

Central to the study, published in *The Lancet*, was the Toshiba portable ultrasound system, VIAMO and the 14 MHz ultrasonography probe.

The study builds on the dissertation of Dr Nicole Krekel¹ from VU University Medical Center (VUMc), Amsterdam, which attracted much attention - not only because of its findings but also the debate over the use of a powerful photograph of a naked woman with shaved hair and a striking gesture with a breast marked for incision for the cover of the work. After seeking expert advice (legal and at VUMC senior executive level), it was felt the image was relevant, appropriate and portrayed the gravity of the subject matter.

ULTRASOUND VERSUS PALPATION-GUIDED SURGERY

With the hypothesis that ultrasound-guided surgery has the potential to improve surgical accuracy for palpable breast cancer, the study compared ultrasound-guided surgery with palpation-guided surgery with respect to margin status and extent of healthy breast tissue resection.

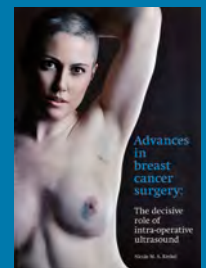
At present, standard practice for the excision of palpable breast carcinoma is guided by pre-operative diagnostic images and the touch of the surgeon but that can be less accurate. Figures suggest positive resection margins in up to 41% of patients and surgeons tend to over-excite healthy breast tissue to attain negative margins.



Dr. M.P. van den Tol
Department of Surgical oncology,
VU University Medical Center, Amsterdam,
Netherlands



Dr Krekel defending her dissertation assisted by Dr Max H. Haloua (left)



The debated cover of Dr Krekel's dissertation. Read more about it at the end of this article (page 16).



“Ultrasound imaging helps making the tumour and the margins very visible.”

“Ultrasound imaging helps making the tumour and the margins for palpable breast cancer very visible. We can even lower the ratio below 1cm for some patients,” she said.

Dr Monique Petrousjka van den Tol from the Department of Surgical Oncology at VUMC played a leading role in the COBALT study.

She said: “We looked at patients that had a breast sparing operation and we saw that the main reason for bad cosmetic results was the volume of tissue that had been taken away. We started thinking about why so much tissue was taken away when we operated small tumours.

“We did a study of 780 pathology reports and looked at the size of the tumour. We made a mathematical formula and said that when we take out the tumour we would take out 1cm of healthy tissue - that was our goal, so we designed a ratio of ‘tumour-plus-1cm’.

Dr van den Tol and the team believe ultrasound offers an effective alternative guidance technique during surgery over needle localisation, though they acknowledge that studies in this area are limited.

ULTRASOUND OFFERS GREATER ACCURACY

For the study – building on the work of Dr Krekel who works with Dr van den Tol at VUMC - 132 patients with palpable T1-T2 invasive breast cancer from VUMC; the Red Cross Hospital, Beverwijk; Medical Center Alkmaar; Waterland Hospital, Purmerend; and Gelderse Vallei Hospital, Ede were asked to participate in the study.

Participants were randomly assigned to either ultrasound-guided surgery or palpation-guided surgery. For those in the ultrasound-guided group, Dr van den Tol explained how the surgeon located the tumour by palpation and ultrasonography and compared the findings with digital images from the preoperative ultrasonography. The tumour diameter was measured and marked on the skin.

She said that during the ultrasound-guided surgery, a surgeon and an assistant focused on the incision purely on ultrasound images compared to palpation-guided surgery where surgeons used their fingers to guide the dissection and constantly checked from the ultrasound to the pathology to measure the amount of healthy tissue, to avoid removing any more than necessary.

COBALT STUDY ANALYSIS

Analysis of resection margins showed a reduced proportion of invasive tumour involvement with intraoperative ultrasonography, with tumour-free margins in 63 (97%) of 65 patients who underwent ultrasound-guided surgery compared to 57 (83%) of 69 individuals in the palpation guided surgery group. Seven (11%) patients who received ultrasound-guided surgery and 19 (28%) of those who received palpation-guided surgery required additional treatment.

Ultrasound-guided surgery also resulted in smaller excision volumes, reduced unnecessary resection of healthy breast tissue and could contribute to improved cosmetic results and quality of life for the patient. The improvement of margin status also saw less additional treatment.

An additional boost of radiotherapy was deemed sufficient for six women in the ultrasound-guided surgery group and re-excision in one patient because extensive DCIS was present at the surgical margin. In the palpation-guided surgery group, 11 women received an additional boost of radiotherapy, three underwent re-excisions and five had a mastectomy.

Dr van den Tol said: “We know radiotherapy is another important fact to cosmetic outcome, we know it should be done in every breast sparing operation so we need to do it but we need to have as low dose as possible and operate radically so do not have to boost radiation.”

Overall, the results of the COBALT trial show that intraoperative use of ultrasonography significantly increases the surgical accuracy of palpable breast cancer compared to palpation-guided surgery.

“Surgery performs better, we are more radical in a higher percentage of patients and that leads to less reoperation,” she added. “We did not have to perform any ablation therapy in patients in the ultrasound group but we did have patients we needed to ablate in the other group.”

They do, however, acknowledge that ultrasound has its limitations with lobular carcinoma as the tumour is less rounded and harder to see.



"Dr. Nicole M.A. Krekel (right) and Dr. Monique P. van den Tol (left) working with the Viamo, portable ultrasound system"

SPREADING THE WORD

There are critics of the approach; concerns it will change demands on surgeons and limit the role of radiologists, but Dr van den Tol said at VUMC surgeons worked closely with radiologists over the study and also compared the results on more expensive ultrasound equipment to the Toshiba portable VIAMO and found that the image quality was comparable for breast cancer surgery.

"We could always make the lesion visible with a basic ultrasound machine and did not need expensive equipment and we saw a learning curve where surgeons could adapt to this procedure within 10 patients," she said. Dr van den Tol has been training surgeons at other centres in the technique, carrying her portable VIAMO machine with her. Researchers maintain that intraoperative ultrasonography can improve a surgeon's performance and that surgeons should gain competence in the use of ultrasonography guide their surgery to avoid the need for a radiologist to be present during surgery. In case of surgery of non-palpable breast cancer the preoperative use of ultrasound will of course need further assistance of the radiologist.

COSMETIC ADVANTAGES

Ultrasound guided surgery has clear advantages from a cosmetic perspective and reduced the need for further treatment, as well as reducing psychological distress in the patient and health costs.

While a strict cost-effectiveness study has not been conducted, Dr van den Tol said the team looked at reoperation, boost radiation and cause of death. They found that if 30 patients or more a year are operated



"We have proved that ultrasound-guided surgery is better for palpable breast cancer."

on in a hospital, it is cheaper to use ultrasound than palpation-guided surgery.

The team is enthusiastic for the technique to be implemented and will continue the COBALT study to further assess cosmetic results.

"We have proved that ultrasound-guided surgery is better for palpable breast cancer²," she said, "and if we do have better cosmetic results we have that extra motivation."

¹ <http://tinyurl.com/o64xfyu>

² <http://tinyurl.com/lpae7fk> (YouTube)

The cover photograph

- ▶ Publishing the photograph on our cover was a conscious decision. The image was chosen to attract your attention, alert you and stimulate your thoughts on the consequences of breast cancer.

The penetrating way in which the woman in the photograph looks at you, gives a face to the dreadful disease that creates infinite scars. The photograph communicates the dilemma of the disease and its consequences, clearly in one glance. The long term struggle with the horrible after effects of the disease and its treatment – scarring, exhaustion and the fear of this serious illness returning, forms a lifelong burden for the women who have experienced breast cancer. This was for us the driving force behind this research.

The woman on the cover agreed to pose as a model for this publication. She had the courage to show the world the consequences of the disease. She and the photographer are pleased that they can make a contribution towards raising awareness of the disease and ongoing developments within scientific research in this way. Actually, this woman was not a participant in the study, neither was she a patient of ours. During the postoperative chemotherapy, her disease unfortunately returned and she had to undergo a mastectomy. This emphasizes, once again, the importance of our research. On the back cover, the woman and the photographer have written a small note especially for this publication.

Nicole Krekel

More information can be found on:
www.jutinpaget.com or
www.corbisimages.com



▶ On the back cover, the woman and the photographer have written a small note:

"In July 2011, at the age of 33, I was diagnosed with breast cancer. With no family near by and no partner to support me, I dealt with treatment all alone. Just as I was due to finish chemo I was given the devastating news that the cancer had returned. This was the moment that I thought I might die and the only option left was a mastectomy. I wanted to record my journey so that other women could appreciate both the dark side of cancer and the beauty beyond scars and asked my friend and photographer Justin Paget to do this for me. I am now recovered and working as an ambassador for Breakthrough Breast Cancer so that I can help raise funds for research."

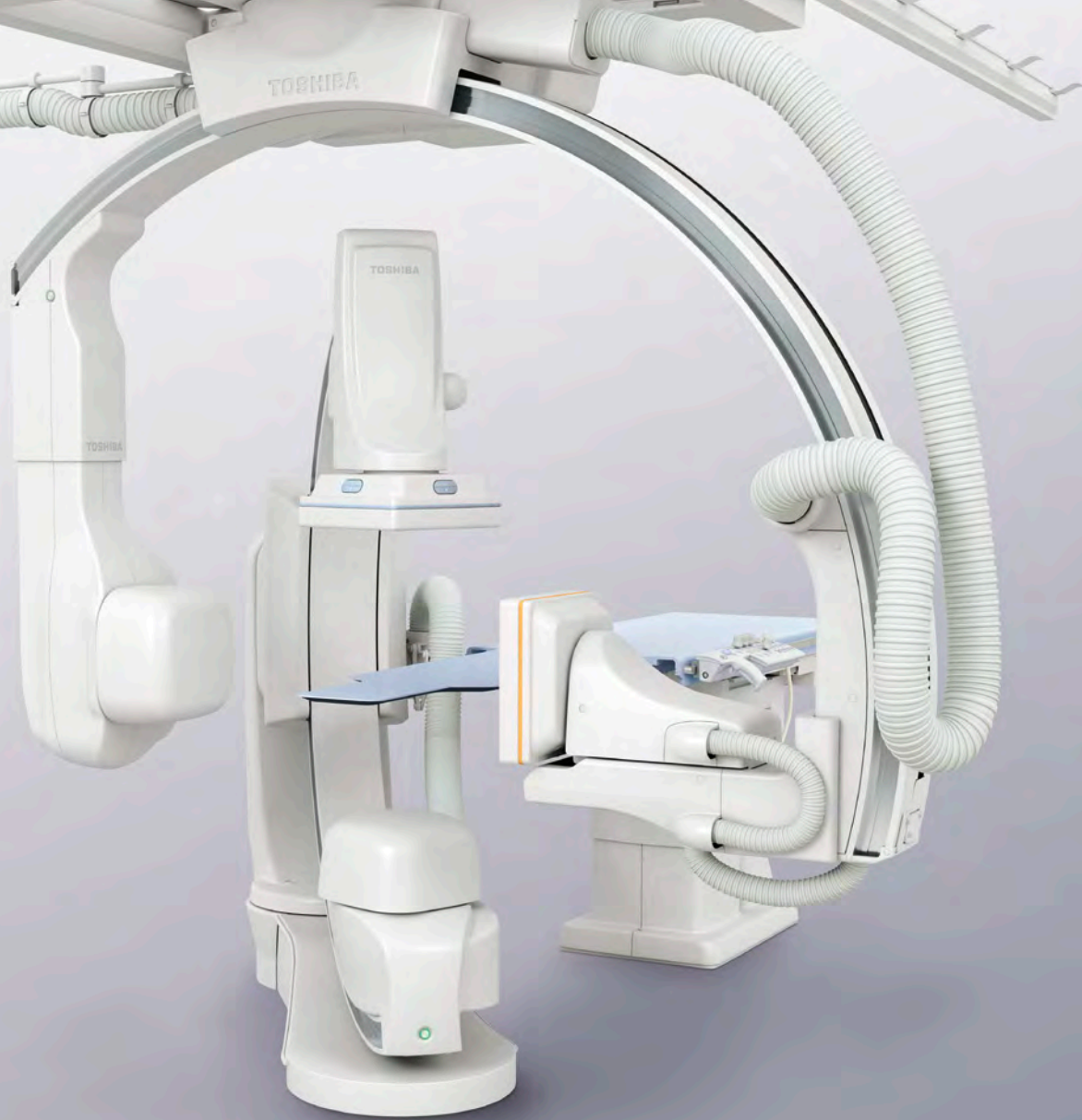
Best wishes, Hannah Foxley

I first met Hannah in her professional capacity as a Financial Planner around four years ago. We had been trying to organise a photo shoot for some time, and shortly after we had finally got a date in the diary, she brokw the news that she had just been diagnosed with breast cancer. She was just 33 years old.

It was then that Hannah asked if I would help document het journey through her cancer treatment. Over the course of the next few months, I photographed Hannah undergoing her chemotherapy treatment, the scars from the lumpectomy and studio based shots of her showing her positivity and beauty throughout the treatment. She was about two thirds of the way through her chemotherapy treatment when the doctors detected a new lump in the same breast. It was at this point that the decision to have a mastectomy was taken. Hannah wanted me to photograph her as a she removed the bandages from the mastectomy - a powerful moment.

Hannah is now in remission. Being able to witness and capture some of her strength and courage throughout her cancer journey has been an honour.

Many thanks, Justin Paget



Reducing Healthcare Queues in Sweden

Toshiba Infinix VF™-i Vascular X-Ray

Uppsala is the only county council in Sweden that does not qualify for the Swedish Government's financial incentive designed to reduce hospital waiting-times. This is because it was not able to provide patients with healthcare within the 90 days stipulated by the incentive. Despite this, the Medical Imaging Center (MIC) at Uppsala University Hospital has succeeded in both improving efficiency and reducing waiting times. A major reorganization and adoption of new technology were key to its success. Installation of Toshiba's Infinix VF-i Vascular X-Ray suite in the unit has contributed towards increasing the range, capacity and speed of examinations and improving patient safety and throughflow. Staff using the MIC explain more.



*Dr. Adel Shalabi,
Head of Department,
Centre for Medical Imaging,
Uppsala University Hospital*

The MIC has become more efficient after reorganizing its operations according to the organ involved in examination, rather than the method, or technology used. Now, it is divided into four organ-specific sections: musculoskeletal and children; abdominal; neuroradiology, molecular and thorax. A total of 350 staff now work at the Center, which is operational around the clock. The new organization enables definite results for acute analyses to be generated within 24-hours, and results for elective studies within five working days.

"The new approach improves patient flow and reduces response time," said Adel Shalabi, Head of Department. "Advanced technology also makes a major contribution towards improving our capacity to deliver results fast. We like to keep up-to-date and have the latest technology in all X-Ray modalities."

SAFER TREATMENT FOR PATIENTS

The Toshiba Infinix VF-i, installed at the neuroradiology section two years ago, has facilitated work for the staff and provided safer treatment for patients. Adel notices a big difference between the older and the newer equipment.

"The newer equipment delivers images quicker with better quality," he remarked. "The techniques applied not only show how an organ looks, but also how parts of it are functioning, with respect to blood flow and metabolic activity. This is useful in, for instance, tumour diagnosis and neuro-intervention."

The neuro-angiography laboratory treats bleeding in the brain or spinal cord caused by aneurysm, or vascular malformation. The method used involves inserting catheters through the groin and further to the aneurysm, or vascular malformation, guided by imaging. Aneurysms are then closed using coiled platinum wires inserted through the catheter. This stops the blood flow and reduces the risk of re-bleeding. Injecting various types of adhesive via the catheters closes vascular malformations. The same equipment is also used for patients with acute stroke caused by thrombosis. With endovascular thrombectomy, the blood clot is pulled out through a catheter introduced via the groin. Successful results of such sophisticated and complex treatments are highly dependent on high quality angiography equipment,



excellent image quality and appropriate post-processing of the images obtained. Neuro-intervention work also requires a rapid equipment response. The hemodynamics display of the Toshiba's Infinix VF-i has been significantly improved, facilitating both intervention and diagnosis.

"The time factor plays a very important role in our work," said Ljubisa Borota, Senior Physician responsible for interventions at the neuro-angiography lab. "Thanks to this system, and the image quality it provides, we can perform our interventions with the speed they require."

SHARPER IMAGE QUALITY

Since better images enable more definitive diagnoses, Dr. Borota cites good image quality, and the feature that sharpens the X-ray images, as key attributes of Toshiba's Infinix VF-i.

SIGNIFICANTLY LOWERED DOSAGE

Thanks to the Infinix-VF- i's better image quality, several series of images are no longer required. This significantly lowers radiation doses and also saves on contrast agents.

MORE USER-FRIENDLY

In addition, those who have worked with the equipment greatly appreciate its ability to video an intervention sequence.

Ljubisa Borota finds the system very easy to use, with logically designed menus and balanced mechanical and electronic control components. The new lab is characterized by modern solutions, such as adjustable lighting, ergonomic placement of shelves and medical equipment cabinets, and improved workspaces. Altogether, this has led to improved patient flow with shorter waiting times.

Dr. Elna-Marie Larsson, Professor of Neuroradiology, also praises the new lab and the opportunities that it offers:

"In Uppsala, we have very advanced equipment, highly competent personnel, and very skilled clinicians and researchers," she adds. "One must remember, however, that everything we do must ultimately benefit the patient. This is why integration and collaboration is so important. Vascular imaging is not just plumbing! We must always consider the end organ, which is the brain. The new angiography lab gives us very high-quality images, but we also have other methods for looking at blood vessels and vascular malformations. An optimal combination and utilization of our methods – neuro-angiography, MR, CT and PET – will also be optimal for the patient."

Toshiba Group's 22nd Environmental Exhibition

Toshiba works hard on the realization of 'Toshiba Group Environmental Vision 2050', a vision of a future where people enjoy richer lifestyles in harmony with the Earth. In achieving this, Toshiba aims to become one of the world's foremost eco-companies, to incorporate an awareness of the environment into all aspects of its business management, and to create value through innovations that support sustainable lifestyles.

Once a year and Environmental Exhibition is organised at Toshiba's Tokyo headquarters. The exhibition is open to the public and organized into four sections, each reflecting an aspect of Toshiba's strategic approach to becoming a leading eco-company: Greening of Products focuses on environmentally conscious products; Greening by Technology covers energy and environmental technology; Greening of Process, introduces environmentally conscious manufacturing; and Green Management spotlights the foundations of Toshiba's approach to environmental management. Toshiba aims to contribute to the realization of a sustainable society through the integration of business management and environmental management, as it accelerates the pace of business expansion to become a global leader.

Highlights of the 2013 Exhibition

1. INTRODUCING TOSHIBA'S APPROACH TO THE ENVIRONMENT

Environmental Vision 2050, Toshiba's corporate vision of affluent lifestyles lived in harmony with the Earth, envisages the ideal situation for mankind in 2050. This grand design incorporates Toshiba's strategies and index of achievement for securing a position as one of the world's foremost eco-companies. The four "Green" concepts and their foundations are introduced, as are key environmental activities over the past 25 years. Looking to the near future, Toshiba also showcases its initiatives toward realizing the smart community concept.

2. GREENING BY TECHNOLOGY

The emphasis here is on Toshiba Group's total energy innovations for realizing highly efficient, stable energy supply and featured exhibits included a photovoltaic demonstration project for Japan's Ministry of Environment; renewable energy sources, such as small-class hydro power which are easy to install and maintain; baseload energy technologies, such as combined cycle; super critical CO2 cycle thermal power; along with social infrastructure and energy solutions that promote the development of dispersed power systems.

3. GREENING OF PRODUCTS

A showcase of highly environmentally conscious products that support social infrastructure and essential systems in homes and buildings. Among the displays are home IT systems and NAND flash memories; storage products, including solid state drives, hard disk drives; **cutting-edge low-dose X-ray CT**; and low power, power saving escalators

4. GREENING OF PROCESS

This section illustrates how Toshiba Group reduces environmental burdens through mitigation of climate change, management of chemicals and efficient use of resources. Examples of activities include power reduction by utilizing water heat pumps for industrial applications; efforts to reduce CO2 emissions; 3R (reduce, reuse, recycling) activities at Oita Operation; and power saving activities in operations in China.

5. GREEN MANAGEMENT

Environmental awareness informs all aspects of Toshiba Group's activities, and this section shows what this means in practice. Through participation in a biodiversity protection network, Toshiba is securing the coexistence of business operations and natural habitats in Japan, China and the Philippines. Through 'eco style leader' it is training people to take the lead in protecting the environment, and by promoting TOSHIBA BATON encouraging people around the world to participate in environmental actions. This section also shows environmental advertising related to LED lighting projects at the Louvre in Paris and Chusonji temple in Japan, home-use photovoltaic power for housing, and **320-detector-row CT technologies**.

TOSHIBA
eco style



ESC 2013 Lunch Symposium

Abstracts lectures

From 31 August to 4 September 2013 the European Society of Cardiology will meet for its annual congress in Amsterdam, the Netherlands. The ESC Congress is the world's premier conference on the science, management and prevention of cardiovascular disease. More than ever the largest gathering of cardiovascular professionals worldwide is a highly sought-after forum for researchers to present their work.

*Solutions
that inspire
clinical
confidence*

On **Saturday, 31 August, from 13:00-14:30** Toshiba Medical Systems will present its Lunch Satellite Symposium entitled "State of the Art and Future Directions in Advanced Cardiac Imaging". It will take place in the Ljubljana Room, Village 8 "Cardiac Imaging & Cardiac Anatomy". The program consist out of lectures concerning; 2D Wall Motion Tracking in non-STEMI, Coronary subtraction on 2nd generation 320 row detector CT, CORE320 in clinical practice and Real-time Fusion of Ultrasound and CT.

2D Wall Motion Tracking in non-ST Elevation Acute Coronary Syndrom



*Dr Sebastian Sarvari,
Department of Cardiology
and Institute for Surgical
Research, Oslo University
Hospital, Rikshospitalet,
Norway*

Coronary artery disease (CAD) may present as silent ischemia, stable angina pectoris, acute coronary syndrome (ACS) or death. ACS includes non-ST elevation (NSTEMI)-ACS and ST-elevation myocardial infarction (STEMI). The presence of ST-elevation on the ECG typically indicates coronary artery occlusion requiring acute revascularization therapy. On the other hand, patients with suspected NSTEMI ACS are more heterogeneous. In these patients coronary artery occlusion and/or significant coronary artery stenosis may or may not be present. Nevertheless, revascularization therapy is required in as many as two thirds of NSTEMI-ACS patients. Importantly, patients with coronary artery occlusion and NSTEMI-ACS share the same pathophysiology as STEMI and should therefore be identified early and treated acutely just as STEMI patients in order to improve prognosis. ECG lacks the necessary sensitivity, however, echocardiography might be a useful tool in the identification of these patients.

Echocardiographic techniques allow the assessment of strain, a measure of myocardial deformation, an intrinsic mechanical property that measures myocardial systolic function more directly compared to conventional

cavity-based echocardiographic parameters such as ejection fraction. It is a semi-automated quantitative technique for assessment of cardiac function based on gray-scale images. Strain (relative tissue deformation) is evaluated on a frame-by-frame basis by tracking of acoustic markers (speckles) throughout the cardiac cycle and is calculated for each LV segment as the average relative deformation in longitudinal, circumferential, or radial directions. Strain analysis enables the objective quantification of global and regional myocardial deformation and might help to identify NSTEMI-ACS patients with coronary artery occlusion.

Furthermore, improvements in two-dimensional (2D) echocardiographic image resolution have enabled analysis of layer-specific deformation. Until recently, most imaging techniques considered the complete myocardial wall thickness in the analysis of myocardial function without additional distinction between the different layers of the myocardium. Importantly, the left ventricular wall of the heart comprises 3 myocardial layers and the endocardial layer is most susceptible to ischemic injury. Careful evaluation of myocardial layers might further increase the diagnostic accuracy in CAD.

CORE320 in Clinical Practice

The CORE320 International Multicenter study investigated the diagnostic accuracy of CT Angiography and CT Perfusion compared to the gold standard of SPECT and ICA. The primary results were presented at ESC 2012. These results show the incremental benefit of adding a CTP examination to CTA.

This presentation will discuss how CTP can be implemented into clinical practice. Using the results of CORE320 we will discuss which patients will benefit most from the addition of CTP and in which patients CTA alone

is able to accurately diagnose CAD. Where the combined CTA/CTP examination fits into the current diagnostic algorithm for CAD alongside other imaging techniques will also be discussed.

Other insights from some of the CORE320 secondary endpoints will also be presented, including the comparative effectiveness of SPECT and CTA for the diagnosis of CAD and the assessment of lesion severity by CTA for detecting CAD associated with ischemia detected by SPECT.



Dr Joao Lima, Johns Hopkins University, Baltimore, USA

Coronary artery subtraction for improved diagnostic accuracy of Coronary CT angiography

In recent years Coronary CT Angiography (CCTA) has been established as a method to evaluate suspected coronary artery disease. The method is suitable to exclude coronary atherosclerosis, but has shown poorer diagnostic accuracy in the presence of calcification in the coronary vessel wall in addition to the presence of high density structures such as coronary artery stents. This

may cause false positive results and thus more unnecessary downstream diagnostic testing.

Recently a new method has been developed in order to reduce this problem – the Coronary artery subtraction algorithm for CCTA. The principle of this new technique will be reviewed and our initial clinical experience in addition to preliminary research results will be presented.



Dr Klaus Fuglsang Kofoed, Department of Cardiology, Rigshospitalet, University of Copenhagen, Denmark

Initial experience of hybrid imaging featuring 3D strain rendering from speckle-tracking echocardiography and coronary tomography

BACKGROUND

Multislice Coronary Tomography (MCT) and 3D Strain Speckle-tracking rendered imaging (3DS) are two of the greatest advances in cardiology imaging in the recent years. One of the main challenges of both technologies is the integration of the information that they give separately, as MCT provides only anatomical data, and 3DS contributes mainly functional information. A promising technology to improve the clinical benefit of these methods is a merged display of morphology and functionality.

OBJECTIVE

We suggest that a new system featuring at the same time coronary anatomy and myocardial mechanics would be an extraordinary advance in the integration of the imaging information provided by both techniques. In order to verify the feasibility of this idea, we tested an hybrid system capable of managing at the same time volume rendered series of images of both MCT and 3DS, and displaying them as a single series of images containing both features at the same time.

We selected from patients undergoing 64-slice coronary tomography. Several of them underwent 3D Strain Speckle-Tracking Echocardiography (3D Wall Motion Tracking) from apical volume acquisition within a triggered acquisition resulting in full 4D volume of one cardiac cycle. 3D Rendered Images were obtained from both MCT and 3DS data and merged into hybrid images using a newly developed research software. The resulting images display the coronary arteries and branches on a colour-coded myocardial volume, making it possible to correlate the degree of coronary stenosis with the information from myocardial strain in the surrounding myocardial territory.

CONCLUSION

Hybrid imaging including coronary tomography plus 3D myocardial mechanics is feasible from 3D data obtained with both techniques separately and processed with a new software. This new technology provides a promising tool for research and clinical routine for a better understanding of myocardial mechanics and its relationship with coronary ischaemia.



Dr. Jose Zamorano, Hospital Ramon y Cajal, Madrid, Spain

From Toshiba with love

Xario Enters a New Level in Ultrasound Diagnostics

VISIONS focuses on how Toshiba has given one of its best-selling products - the Xario - a technological makeover.



The system's compact and mobile design enables you to create an ergonomic work environment in virtually any clinical setting.



Satoshi Tsunakawa, President and CEO, Toshiba Medical System Corporation, Japan, welcomed guests in Prague for the introduction of the Xario 200.

Smaller, smarter, simpler, lighter and more agile, the new Xario 200 from Toshiba offers high-performance ultrasound in a new compact format.

The design was first launched in 2004 and instantly became a best-seller in its class for Toshiba, but for 2013 the Xario has been newly built from scratch.

The technological makeover has seen the critical elements of the premium Aplio systems cascaded into the new Xario 200 and presented in a mobile and innovative style of ultrasound machine. The system has been newly developed to provide enhanced and easier operability for clinical staff and physicians.

Unveiled earlier this year in Prague, the Xario 200 is smaller and lighter but eminently more sophisticated and powerful. Heralding the launch of the Xario 200, President and Chief Executive Officer of Toshiba Medical Systems Corporation, Satoshi Tsunakawa, said: "I am confident that the new product, the Xario 200, is going to be widely accepted by our European customers and stimulate strong growth of the company."

Toshiba's Ultrasound Business Manager in Europe, Dr Christoph Simm, said the company has seen dramatic growth between 2007 and 2011 in the premium and high-end segment. In 2012 it significantly gained in overall market share and aims to continue that growth rate through the coming years. With a strong success in the premium and high-end market, the target to expand now also to the higher mid-sector – with the Xario 200 spearheading that drive – with a strategy to enter the market from the top down, yet keeping the core concepts and product positioning while expanding and migrating the technology.

The company, he said, would work even closer with customers to boost competence, confidence, efficiencies, and skills with better customer training and system ease-of-use to improve performance.

Dr Jörg Schlegel, Senior Manager Product Marketing, said that new look was a very important step for the new ultrasound machine. 44% lighter than the original, the

**IT'S
HERE**



ULTRASOUND

body volume has been trimmed back to make the new Xario 200 more mobile but it is also more energy efficient, consuming approximately 40% less power than the previous Xario model.

When launched almost a decade ago, the Xario opened a completely new market sector for Toshiba as a premium workhorse with uncompromised image quality and workflow. "It had a very compact design and a very affordable price tag," Schlegel stated. "All of these are points that are still valid today but we just needed to take them to the next level and that is what we are doing with the Xario 200."



QuickScan automatically optimises the image with the simple push of a button allowing you to achieve greater consistency in your exams in less time.

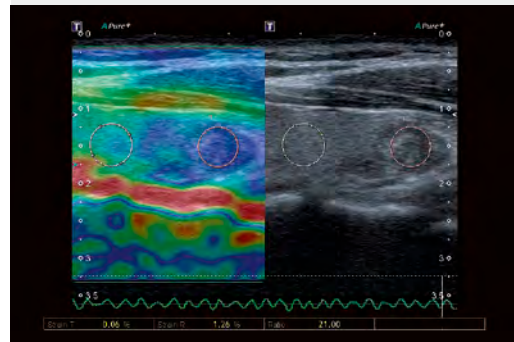
Toshiba has migrated workflow from the Aplio series to enable customers to take advantage of most of the functionality that is available in Aplio with the Xario.

With increased versatility, the Xario 200 is the first system to be equipped with a 19-inch LCD monitor, the largest in its class, with an operating panel that can be easily positioned and swivelled to specific user requirements.

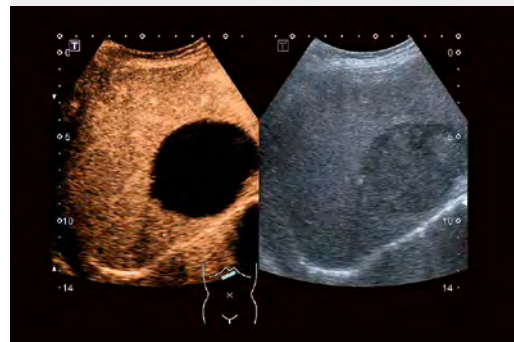
In addition the system features Quick Scan for optimizing B-mode image quality and spectral Doppler waveforms with one-touch operation. It also offers user presets for optimizing with one button a range of parameters related to the patient's body size or an examination region, enabling optimal image quality to be achieved immediately and efficiently. Required peripheral equipment such as printer, video recording device, optional transducers, or electrocardiogram cables can be easily mounted and the system offers an extensive line-up of newly developed premium performance transducers. This enables the Xario 200 to be used for a wide range of clinical applications including examinations of the abdominal and superficial organs, blood vessels and for cardiovascular and obstetric diagnostics.



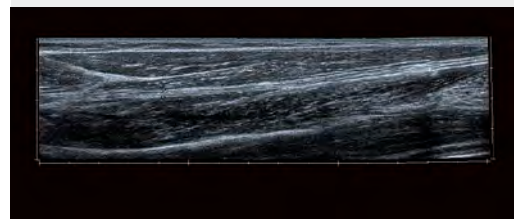
Volume imaging suite - A full-fledged solution featuring a comprehensive set of imaging modes including surface rendering, MultiView and MPR.



Realtime elastography - Assists in localizing and assessing palpable masses with high accuracy, sensitivity and reproducibility.



Contrast-Enhanced Ultrasound (CEUS) - Allows to assess and quantify perfusion dynamics in a wide range of clinical settings including specialized exams.



Panoramic view - Helps to visualize widespread areas and anatomical relationships by creating wide-view images of a region of interest.



**IT'S
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**THE NEW
XARIO 200**

Smaller. Smarter. Simpler.



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ULTRASOUND

Dr Schlegel stressed that the Xario 200 is targeted to a more performance-driven, rather than feature-driven, market with a focus on the product in terms of imaging, workflow, connectivity and mobility. "Versatility has always been one of our best selling points in Toshiba," he added. "No other company has such excellent image quality across all different clinical applications, especially in the higher mid-range sector." Toshiba's products not only deliver the same consistent quality across the different specialties but also carry the company's excellent reputation for after sale service and care.



Toshiba's revolutionary High Density Architecture forms the foundation of the superb imaging capabilities and breakthrough technologies that enable you to see more and do more with Xario 200.

A workhorse with thoroughbred qualities

But what remains paramount is the view of the clinicians, those who interface with the patient through Toshiba's technology.



Dr Silke Jacob, Germany

GYNAECOLOGIST DR SILKE JACOB

Gynaecologist Dr Silke Jacob from the Clinic for Gynaecology, Leverkusen, Germany, explained how the Xario 200 performed extremely well during fetal screening, even showing clearly the minute detail from the first trimester.

She stated that the Xario 200 performed almost as well as the Aplio 500 in many cases and had the resolution to detect potential abnormalities at an early stage. Later during the pregnancy, the Xario 200 system showed detail of the bowels, spinal cord and skin and was also able to distinguish all the important vessels to the heart – often an area of fetal defects – and even the tracheai. She said that one of the most incredible images was one from a Xario 200 of a fetus at 13 weeks, which picked out the detail of all five toes.

Dr Jacob found that the Xario 200 performed well even when compared to the Aplio 500, adding that the B-mode was "very good" and the colour Doppler was "astonishing."



Dr Angel Bueno, Spain

RADIOLOGIST DR ANGEL BUENO

Radiologist Dr Angel Bueno from the Department of Imaging Diagnosis, Fundación Hospital Alcorcon, Madrid, Spain, is a musculoskeletal specialist.

He explained: "In the musculoskeletal field it is most important to have a very high quality image. Of course, the B-mode is the most important thing but it is also important to have a high quality colour Doppler. The Xario 200 is a surprisingly good machine because it is smaller, it is smart and it is portable. If you work in a big hospital, you always use your machine in the same room, so the size is not important but if you need to transport your system to a small clinic or hospital then size and portability become very important."



"I almost feel like being kissed by the Xario 200."

**ABDOMINAL ULTRASOUND EXPERT
DR HORST KINKEL**

Abdominal ultrasound expert Dr Horst Kinkel is a specialist in Internal Medicine and Deputy Chief of the Clinic for Gastroenterology, Hepatology and Diabetology, Düren Hospital, Germany. He spoke of the versatility and flexibility of the Xario 200 for abdominal imaging and the quality of images provided by the equipment.

During his first clinical studies, he said, the Xario 200 performs very well with excellent resolution and accuracy in the way it can show the tumour and the area around the tumour very clearly.

"Ultrasound is the only modality that can make these things visible without using any contrast," he said, "and I think with the Xario for clinical use and for daily work you can do everything with this machine. To phrase it quite personally, I almost feel like being kissed by the Xario 200."



Dr Horst Kinkel, Germany

**ECHOCARDIOGRAPHY SPECIALIST
DR REGINA STERINGER-MASCHERBAUER**

Dr Regina Steringer-Mascherbauer, head of the Pulmonal Hypertension Department, Clinic for Cardiology, Angiology and Intensive Care at the Elisabethinen Hospital in Linz, Austria, is a specialist in echocardiography.

She outlined how Xario 200 performs strongly for cardiology, where there are specific challenges, not least that the heart is a constantly moving organ.

What impressed her most was the image quality, which she described as "outstanding" for such a small system, with excellent spectral Doppler and no loss of image quality even in twin view.

One of the strong features of the Xario 200 from Dr Steringer-Mascherbauer's perspective is in its colour performance and the way images are presented. She explained that the excellent sensitivity from the Xario is a strong feature for cardiac examinations where, for example, the pulmonary vein or detail of a regurgitation of the aorta can be clearly seen, enhanced with the strong colour performance of the equipment.

On-board reporting aligns with the Aplio, which makes it useful if customers have both systems, and the Quick Scan facility helped with saving time and offering rapid assessment of the patient's condition.



Dr Regina Steringer-Mascherbauer, Austria

Find out more about Xario 200 at xario200.com

Coronary CT Subtraction: Clinical Results

Andreas Fuchs, MD ¹⁾, Jørgen Tobias Kuhl, MD ¹⁾, Klaus Fuglsang Kofoed, MD Ph.D. DM.Sc ^{1,2)}



Dr Andreas Fuchs



Dr Tobias Kuhl



Dr Klaus Fuglsang Kofoed

Using Coronary CT Angiography to rule out significant luminal stenosis is a challenge in the presence of calcium. The new Coronary Subtraction method may provide an improved reader confidence when evaluating calcified arteries.

In recent years Coronary CT Angiography (CCTA) has been established as a method to evaluate suspected coronary artery disease. The method is suitable to exclude coronary atherosclerosis, but has shown less diagnostic accuracy in the presence of calcification in the coronary vessel wall. High density structures, like calcium or stents, appear larger on a CT scan than they truly are due to blooming artifacts, which leads to an overestimation of the amount of calcium and of the present coronary stenosis. This may cause more false positive results and more unnecessary diagnostic tests downstream with risks by e.g. invasive procedure.

Recently a method has been developed in order to solve this problem – the Coronary Subtraction CCTA (subCCTA)¹⁻². The basic concept behind this method is that image-voxels representing calcified plaques on a non-contrast scan are subtracted from the corresponding voxels of a contrast scan in the same patient (Fig. 1 & 2). This “removes” calcium in the contrast image, which takes away the blooming and thus provides better images for the evaluation of the vessel lumen size potentially increasing the diagnostic accuracy and reader confidence. We tested if the new subCCTA method was feasible in clinical patients by adding to conventional CCTA (conCCTA) the information from the subCCTA and evaluating the change in reader confidence.

Twenty-seven patients that were scheduled for invasive coronary angiography were scanned with a 320-detector row CT (Aquilion One, Toshiba, Japan) prior to invasive testing. Reader confidence was assessed on a 3 point scale and concordance with CAG (conventional coronary angiography) for identification of >50% stenoses were recorded. We defined study lesions on conCCTA as motion free coronary segments with calcified plaque, and low reader confidence due to coronary calcium or stents. The impact of coronary calcium image subtraction was assessed in these coronary segments.

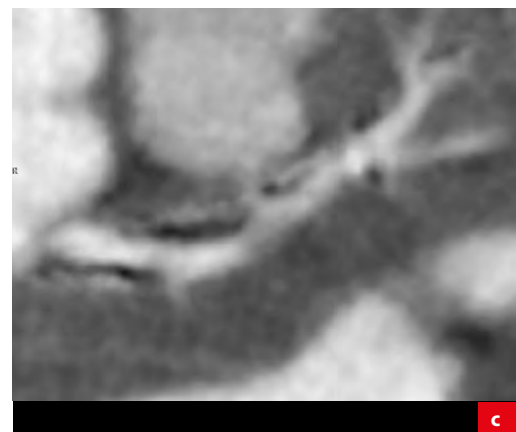
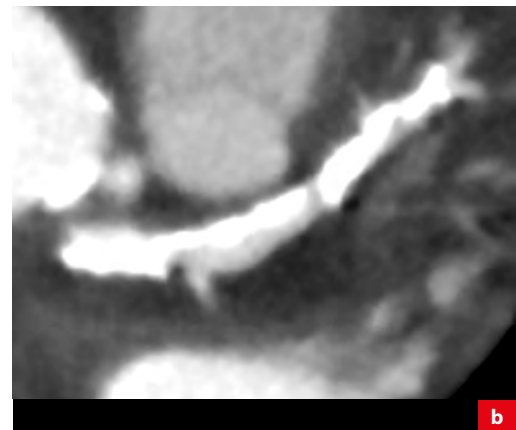
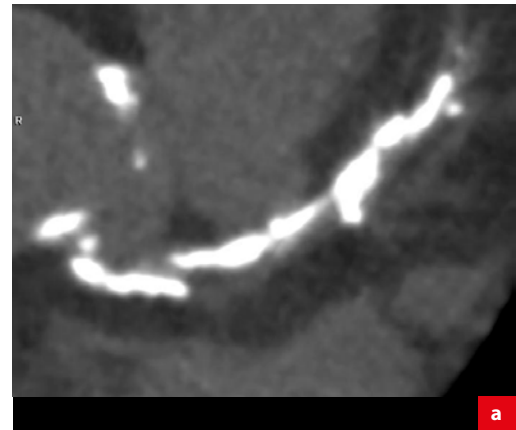


Figure 1: Calcified lesion. The non-contrast image (a) is subtracted from the contrast image (b), resulting in the subtracted image (c), which leads to better reader confidence and lower false positive rate in this study.

¹⁾ Department of Cardiology, The Heart Centre, Rigshospitalet, University of Copenhagen, Denmark

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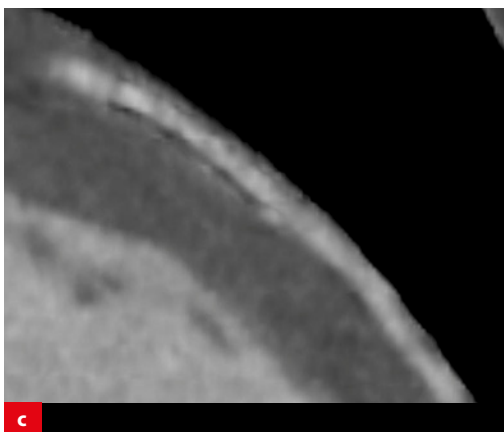
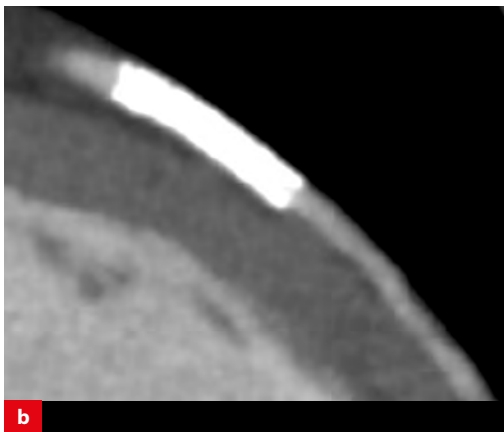
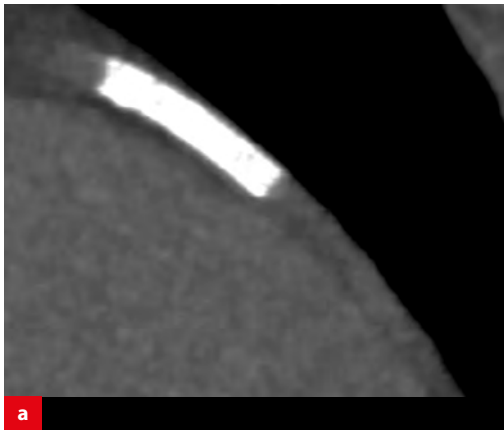


Figure 2: Stent lesion. Non-contrast (a), contrast (b), and subtracted image (c).

In a total of 32 identified coronary artery study lesions, 16 (16/32=50%) had improved reader confidence, and 16 (50%) had no improvement in reader confidence. In 3/3 (100%) stent study lesions the reader confidence was improved. In 13/29 (45%) calcified study lesions the reader confidence was improved. The false positive rate in coronary study lesions declined with subCCTA from 64% to 40% compared to conventional CCTA.

CONCLUSION

Our initial experience with coronary calcium image subtraction suggests that it is feasible in a subgroup of coronary lesions corresponding to the study lesions in this study, including both severely calcified lesions and coronary stents. If reproduced in a large scale prospective study, this new method could lead to an improvement in reader confidence for identification of significant coronary artery disease and lower the false positive rate, thereby avoiding unnecessary invasive procedures.

References

1. Yoshioka K, Tanaka R, Muranaka K. Subtraction coronary CT angiography for calcified lesions. *Cardiol Clin.* 2012 Feb;30(1):93-102.
2. Tanaka R, Yoshioka K, Muranaka K, Chiba T, Ueda T, Sasaki T, Fusazaki T, Ehara S. Improved evaluation of calcified segments on Coronary CT Angiography: a feasibility study of coronary calcium subtraction. *Int J Cardiovasc Imaging*, In Press.

Taking Clinical Imaging to the Next Level

The revolutionary Aplio systems from Toshiba have taken diagnostic imaging with ultrasound on to a whole new level.



Harnessing innovative new technologies to produce even better image quality and improved workflow, Aplio has earned a global reputation as a market leader in the advancement of ultrasound. Yet throughout 2013, that progress has moved on significantly... Aplio just got even better.

Toshiba's ultrasound family Aplio 300, 400 and 500 was originally launched at the World Congress of Ultrasound in Medicine and Biology in Vienna in 2011, offering an extensive range of clinical innovations that deliver world-beating clinical precision and offer improved diagnostic confidence.

Now, the Innovation 2013 upgrade has built upon that with greater clinical detail, new diagnostic tools and the ability to be even faster and more efficient.

In terms of clinical details, the new generation offers advanced triple focus high frame rate technology, higher definition spot zoom and a more sensitive colour Doppler and CEUS (contrast-enhanced ultrasound) package.

It also has photo-realistic surface rendering (Fig. 1) with LUMINANCE which offers more natural visualization of the human skin and adjustable light position that helps identify pathological changes and skin defects; an enhanced fusion imaging package; and a new on-board reporting tool.

The advanced systems now have new premium performance transducers for enhanced clinical detail:

The PVT-781VT (Fig. 6) endocavitary transducer has a 180 degree wide field of view providing a high frame rate image with spot and HD zoom while the PLT-1005BT high frequency transducer offers a 58 mm extra wide field of view and triple focus technology for improved homogeneity at high frame rates.

Both probes deliver higher resolution, more penetration, improved handling and improved versatility with advanced imaging including CEUS and elastography.

Smart Fusion imaging, available in the PVT-781VT endocavitary transducer, has an extended range of clinical applications now that includes prostate and supports advanced modes such as CEUS and real-time elastography as well as enhanced CT and MR Fusion compatibility with sagittal and coronal image registration.

The CEUS application allows the clinician to assess perfusion dynamics of ultrasonic contrast agents in an array of clinical settings, with the enhanced Innovation 2013 CEUS package offering greater depth and detail to provide new insights for the clinician.

Features include improved near field resolution and enhanced penetration (especially in high frequency applications), optimized settings for contrast media (Fig. 2),



Figure 1: Fetal face and early pregnancy: the natural skin rendering shows more detail than ever before.

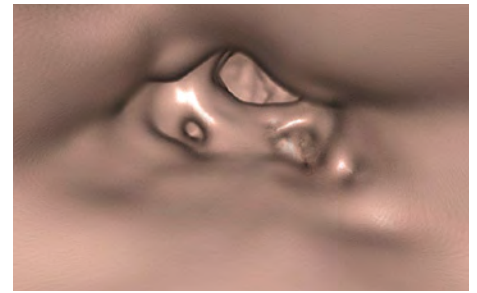


Figure 5: Fly Thru inverse mode of a veno-arterial anastomosis.

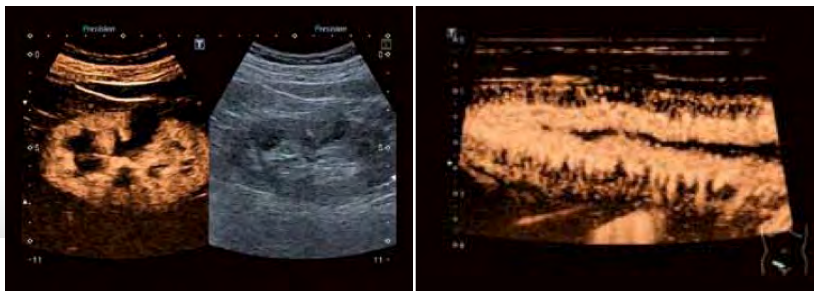


Figure 2: Kidney lesion and Crohn's disease: contrast-enhanced ultrasound leads to more depth and detail.



Figure 6: Higher resolution, more penetration and improved handling are realized with the PVT-781VT endocavitary transducer.

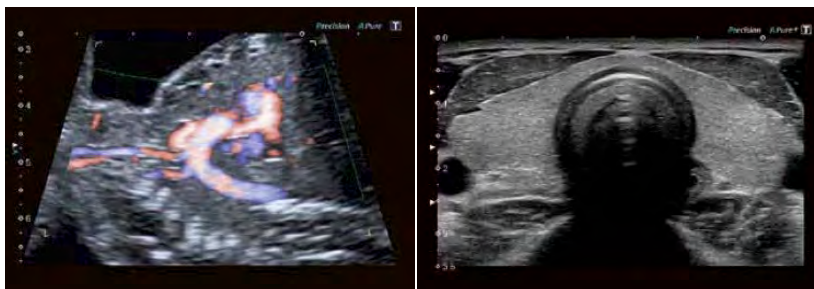


Figure 3: Fetal chest and neck: faster access to the point of interest will be gained with HD spot zoom and Advanced Dynamic Flow (ADF).

Figure 4: Thyroid imaging: The advanced focusing technology Triple Focus has been added to ApliPure+.

and Fly Thru inversion mode for volumetric vascular assessment. Fly Thru (Fig. 5) uses perspective projection to display a given structure, emphasizing the near over the far field which means that proximal objects appear bigger than distal objects, much like in optical endoscopy.

A key advantage of the HD spot zoom (Fig. 3) is that it provides faster access to the point of interest and a high resolution, high frame rate image in zoom mode. There is also the benefit of a reference image which facilitates easy navigation within the region of interest. It is also compatible with colour Doppler modes.

The Triple Focus facility (Fig. 4), with the PLT-1005BT high frequency transducer, helps maintain a high imaging frame rate while also improving image uniformity and penetration. Furthermore it enhances lateral resolution

and contrast as well. This advanced focussing technology is added to ApliPure+.

From a productivity perspective there are substantial workflow enhancements in the new Aplio. It offers faster access to patient and image data and has an on-board reporting solution with PC printer connectivity.

There is a new and improved Quick Assist workflow protocol tool which has the ability to offer a faster start of a new examination with pre-registered reference data.

The additional innovation and technology of the 2013 Aplio generation offer a new dimension in imaging which will deliver clearer, quicker, and more accurate diagnosis that will be efficient and cost effective for health providers, thus leading to better patient experience and outcomes.

Find out more about the Innovation 2013 upgrade at myaplio.com

Ultralow-dose comprehensive assessment of coronary anatomy and myocardial perfusion with 320-row Computed Tomography

Gerhard Bosse, MD ¹⁾, Jeroen Tijhaar ²⁾, Anne Günther, MD ¹⁾

A 63-year old female with hypertension presented for evaluation of atypical chest pain since several months. Her electro-cardiogram (ECG) revealed T-wave inversions in the anteroseptal leads. Bicycle exercise stress testing was inconclusive. Since the patient refused invasive evaluation, non-invasive imaging was ordered using 320-row Computed Tomography (CT) (Aquilion ONE, Toshiba, Japan).

Three imaging sequences were performed: coronary calcium scan followed by coronary CT angiography (coronary CTA) and adenosine stress myocardial CT perfusion (myocardial CTP) (Fig. 1). All scans were acquired within a single heartbeat using prospective ECG-triggering. Effective radiation dose for coronary CTA and myocardial CTP acquired with adaptive iterative dose reduction was 1.01 mSv (Table 1).

Total Agatston score was 157. Coronary CTA showed a right dominant system with atherosclerosis but no evidence of significant stenosis. However the distal segment of the left anterior descending artery (LAD) was very small (Figure 2). Evaluation of myocardial perfusion in rest and

stress demonstrated a fixed apical defect (Figure 3). These observations were deemed suggestive of previous apical infarction related to the distal LAD. Due to the absence of residual ischemia, the patient was considered unlikely to benefit from revascularization. The decision for conservative management was supported by invasive coronary angiography (Fig. 4).

The use of CT has been criticized due to the associated radiation dose, as well as lack of hemodynamic information. However, the current case shows the feasibility to evaluate anatomy and function in a single examination at an ultralow radiation dose of 1 mSv using 320-row CT.

Imaging sequence	Dose Length Product	Effective radiation dose
Coronary calcium scan	61.4 mGy.cm	0.86 mSv
Planning and bolus tracking sequences	11.2 mGy.cm	0.16 mSv
Coronary CTA	34.3 mGy.cm	0.48 mSv
Stress myocardial CTP	26.2 mGy.cm	0.37 mSv

Effective radiation dose was calculated using the conversion factor $k=0.014 \text{ mSv.mGy}^{-1}.\text{cm}^{-1}$.

Table 1. Radiation dose

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References

1. Valentin J et al. Managing patient dose in multi-detector computed tomography (MDCT). ICRP Publication 102. Ann ICRP. 2007;37(1):1-79, iii.

Acknowledgements

Joanne Schuijf (Toshiba Medical Systems Europe, Zoetermeer, The Netherlands) is gratefully acknowledged for her assistance in the preparation of the manuscript.

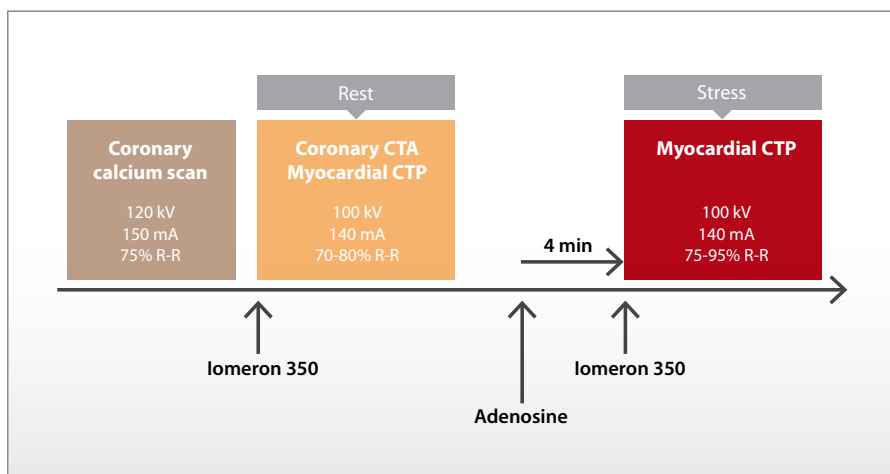


Figure 1. Outline of the comprehensive Computed Tomography (CT) protocol. First, coronary calcium scan was performed at 120kV and 150mA with prospective ECG-triggering at 75%, followed by coronary CT angiography (coronary CTA)/myocardial CT perfusion (myocardial CTP).

This scan, which served for coronary angiography as well as rest perfusion, was performed with prospective ECG-triggering at 70-80% of the R-R interval, during the infusion of 50 ml iodinated

contrast (lomon 350, Bracco, Italy) followed by a 50 ml saline flush. Finally, after 4 minutes of adenosine infusion (140 µg/kg/min), infusion of 50 ml of contrast was started and stress myocardial CTP was performed with prospective ECG-triggering at 75-95% of the R-R interval. Both the rest and stress CT scans were performed at 100 kV and 140 mA. To minimize radiation dose, automatic exposure control (^{SURE}Exposure 3D) and adaptive iterative reconstruction mode (AIDR 3D) was used. Moreover, for the stress scan, scan length was reduced from 12 cm to 10 cm, nonetheless still allowing full coverage of the myocardium in a single rotation. Body mass index of the patient was 20 kg/m². Heart rate was 52 bpm during rest and 62 during stress imaging, respectively.

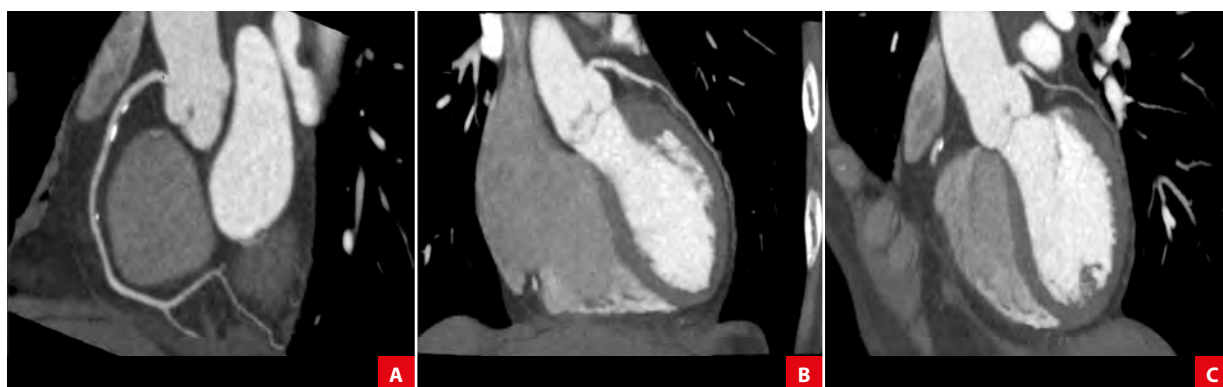


Figure 1: Coronary CT angiography showing a dominant right coronary artery (A), left anterior descending coronary artery (LAD) (B) and left circumflex (C). Although no evidence of significant stenosis was observed, several atherosclerotic plaques were identified. In addition, the distal part of the LAD was relatively small and difficult to evaluate.

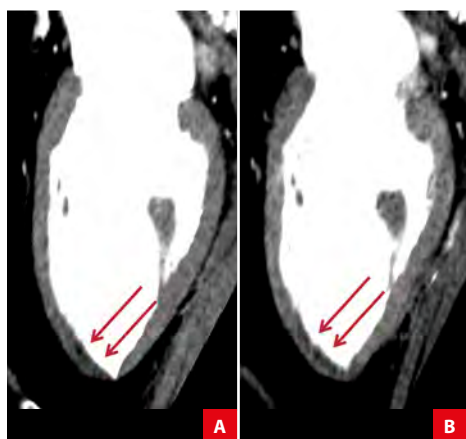


Figure 3. Rest and stress myocardial CT perfusion. Long-axis slices in rest (A) and stress (B) show an apical defect (arrows).

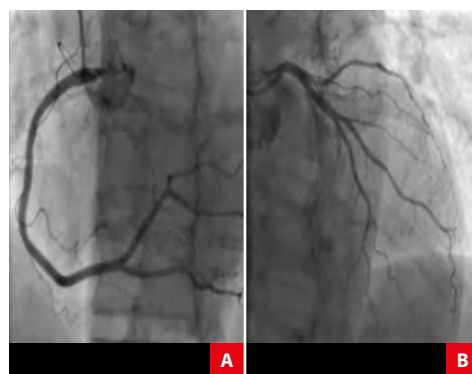


Figure 4. Invasive coronary angiography confirmed the absence of significant disease eligible for revascularization. (A); right coronary artery, (B); left coronary artery.

Unique Imaging Combination Delivers a Winning Result On and Off the Pitch

With a unique imaging partnership firmly in place between Toshiba Medical Systems and Manchester United, team physician Steve McNally offers an insight into how cutting-edge scanning equipment is already making a difference on and off the pitch.

Manchester United's team doctor Steve McNally sees a winning combination in the partnership with Toshiba.



Manchester United's Team Physician and Head of Football Medicine Steve McNally explains how the Toshiba equipment installed at the AON Training Complex five miles away from United's Old Trafford stadium – a 3T MRI scanner, CT scanner and six ultrasound machines – has a whole gambit of benefits.

For the medical staff, and the club's new manager David Moyes who took over from the legendary Sir Alex Ferguson on July 1, the on-site scanning equipment helps keep current players needing treatment and potential new signings away from the glare of cameras, and particularly those attending a medical ahead of a transfer.

Dr McNally, recognising that new signings are big news, said: "The first place that these players often get spotted is at the local private hospital. We have always had an excellent relationship with local hospitals...but we have to get our players there without being seen by the paparazzi.

It is also the same with injuries. If a player is seen walking into hospital with an air cast boot on his ankle and is assumed to be out of the next game that is big news and affects our competitive advantage."

Events have moved swiftly since thoughts first turned three years ago to redesigning the training facility and the potential to significantly enhance the on-site medical facilities.

The medical centre, which will serve around 80 full-time professional players and youth scholars together with approximately 170 academic schoolboys, is now nearing completion; the MRI and CT equipment is set to become operational shortly, and the ultrasound facility has been in place since January for musculoskeletal examinations and is being configured for cardiac screening.

Cardiac screening, which has long been high on the club's agenda, took on greater relevance and profile in recent months following the dramatic scenes last season when Bolton Wanderers player Fabrice Muamba collapsed during a league game.

Such occurrences are extremely rare – only about one in 200,000 athletes will have an unexplained death usually due to cardiac causes – but Dr McNally says it is vital for Manchester United as a Club employing and developing players to do everything possible to ensure detectable causes for such incidents are identified and he aims to work closely with Toshiba to help further improve detection and diagnosis in this area.

Musculoskeletal screening and looking for intrinsic defects or deficiencies in tendons, joint cartilage, lower back and hip joint development are areas which lend themselves well to imaging in all forms, predominantly ultrasound and MRI but also CT in certain situations where health benefits significantly outweigh the risks of ionising radiation exposure. There is also potential for using imaging to assess body composition and body fat levels.



“Toshiba has the same ‘can do’ attitude as Premier League Champions Manchester United.”

“Managers and coaches have long held body fat as an important factor in assessing a player’s fitness but we are still quite rudimentary in the way we measure that”, he said. “If we can develop an image where there is a body map with body fat highlighted in areas we can work on with specific exercises I think that sends a strong message to a player and coach. We can then work on it with specific exercises and nutritional strategies.”

Similarly, with many young players on the club’s books, the development and growth of those in their early teens or even younger is important both from the individual’s well-being perspective and the club’s commercial investment in terms of coaching and contractual agreements. Any predictors of physical development for a young player are invaluable to a coach but Dr McNally stressed the importance of using non-ionising modalities in this respect, wherever possible.

As Team Physician, he also believes there will be an evolving role through the new medical suite – and the equipment it contains – in terms of injury management and prevention.

The game is getting faster each year – the club’s statistics from the 2012-13 season show the team had 37% more sprints per game than four seasons ago with more of those being high-intensity sprints – leading to greater injury potential.

Injuries to key players, he explains, can have a “domino effect” on other squad members who may be required to play, even when they may not be totally ready.

For example a long term injury to an experienced player in a key position not only reduces the chances of competition success but may lead indirectly

to several other players sustaining injury. Having the latest equipment available means rapid diagnosis of an injury, prompt direction to appropriate rehabilitation or specialist advice, and then monitoring the effects of the treatment interventions.

One of the early benefits will be to continue the improvements in secondary (or re-injury) prevention that have taken place over the past 10 years.

“If a player gets injured now he tends to come back and stay back and also we do not have that knock-on effect on others,” said Dr McNally. “I think the decline in secondary injury rates was aided by club doctors using scanning to monitor things on a daily basis because it added another level of confidence to our diagnostic decisions and the advice we could give to physiotherapists and rehabilitation experts.”

Dr McNally stressed the importance of not rushing players back after injury, but of also not being over-cautious in their return to playing.

“We have to try to pick the right time for the player and the right time for the club and hopefully those two things will continue to improve with the facilities that we have at our fingertips,” he added.

With patient safety paramount, Manchester United is also set to become the first club to set up a ‘radiology passport’ for players, which would record their scans as they move from one club to another.

Dr McNally explained that Toshiba was the ideal partner for the club because the equipment specification was exactly what was required; Toshiba has the same ‘can do’ attitude as Premier League Champions Manchester United; has an extensive network of expertise within the company from clinical levels to engineering and technology; offers learning opportunities for Dr McNally and his staff; and the partnership has longevity with a commitment over five years.

But what has been satisfying for both club and manufacturer, at such an early stage of the agreement, is that the partnership is already having a significant impact.

Dr McNally stated that using Toshiba’s Aplio 500 system had already made a difference in the latter half of last season

and he has been impressed with the resolution and the ability to see things he was not seeing before.

Citing an example of a player who was having problems flat-out sprinting and experiencing local-

ised hamstring pain, he described how ultrasound revealed a focal muscle tear, which was bridging well but was a likely cause of dysfunction in the muscle, so the player was rested for the following game.

“He came back the next week with no problems so hopefully we may have prevented exposure to a potential six to eight week injury by taking a player out and managing him differently,” Dr McNally concluded.

In another example a player had soreness in a calf muscle and a similar small lesion was noted. A treatment regime was implemented on the basis of that early detection, which resulted in the player being available thereafter throughout the season.

The unique initiative – under the strapline “Delivering Premier Clinical Performance” – is already proving a winning combination for Manchester United and Toshiba as together they harness the potential of medical imaging to help keep the world’s best footballers at the top of their game.



19 - 20 September 2013

Wide Detector CT User Meeting

From 3D to 4D CT imaging with lowest dose

PROGRAM

Day one - 19 September 2013

- 10:00 - 10:50 Registration
- 11:00 - 11:15 Welcome/introduction by Dr. A. de Roos (LUMC Leiden, The Netherlands)
- 11:15 - 11:45 Plenary session by Dr. M. Dewey (Charité, Berlin, Germany)
- 11:45 - 12:45 Lunch
- 12:45 - 13:15 Start program
- 18:00 - 23:00 Dinner

Day two - 20 September 2013

- 09:00 - 09:30 Start program
- 11:15 - 12:15 Plenary session by Dr. H. Lamb (LUMC Leiden, The Netherlands)
- 12:15 - 12:45 Lunch

TOPICS PROGRAM

Cardiac CT hands-on workshop

Dr. L. Kroft (LUMC Leiden, The Netherlands)

Ultra low dose CTA with AIDR 3D

Dr. R. Bull (Bournemouth Hospital, UK)

Myocard perfusion CT versus MR

Dr. G. Pons-Llado (De La Santa Breu I Sant Pau, Barcelona, Spain)

Bone subtraction and MSK

Dr. P. Teixeira (University Hospital Nancy, France)

Brain perfusion

Dr. M. van Walderveen (LUMC Leiden, The Netherlands)

Liver perfusion

Dr. H. Schöllnast (University Hospital Graz, Austria)

Dose optimization in clinical practice

Dr. J. Geleijns (LUMC Leiden, The Netherlands)

The physics of Wide Detector CT technology

Dr. F. de Lange (Radboud University Hospital, Nijmegen, The Netherlands)

CNR improvement with AIDR 3D

Dr. E. Smit (Radboud University Hospital, Nijmegen, The Netherlands)



A comprehensive intensive 2-day program will allow participants to share their experiences and update their knowledge concerning the use of Wide Detector CT scanners. An internationally renowned faculty, consisting of both clinicians and physicists with extensive Wide Detector CT, has been invited. The program covers a wide range of clinical topics from low dose acquisition techniques to various advanced applications. Importantly, the state-of-the-art lectures will be alternated with hands-on sessions to enhance interaction between faculty and participants.

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