

AXIOM Innovations

The Magazine for Interventional Radiology, Cardiology, Surgery,
Radiography and Fluoroscopy

Issue Number 12 | November 2010

SIEMENS

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Pioneering in Dose Reduction

Low-dose Acquisition with
up to 67% dose reduction

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“Saving dose and keeping image quality at very high standards during all essential fluoroscopic procedures is one of the most important things we promise and deliver to our customers.”

Dr. Heinrich Kolem,
CEO of the Angiography Division (AX)
at Siemens Healthcare

Dear Reader,

As a pioneer and leader in healthcare innovation, we always strive to develop the best possible products in medical imaging. We focus on anticipating the needs of the market and deliver solutions that are just the right fit for our customers.

With an eye on recent market trends and topics in the medical community, we are aware that radiation dose reduction and protection from radiation dose has recently triggered many public discussions, predominantly in the U.S. but also in other countries around the world. Siemens has a strong legacy in dose-reducing technologies. As you know, a fundamental focus of our R&D has been to reduce dose without com-

promising image quality. This is especially relevant in interventional imaging where dose reduction for clinical personnel and the patient during procedures is of great importance. We are therefore happy that our well-known CARE package (Combined Applications to Reduce Exposure) is now standard with every Artis zee interventional imaging system delivered. Together with an extensive update to the Artis zee installed base, we are now making dose-saving a standard in the market. The built-in features help our customers to reduce radiation dose for the patient and themselves during the procedure, but also to monitor applied dose and to report those values after the intervention is finished.



Dr. Heinrich Kolem
CEO AX Division

While saving dose on the one hand, we do keep image quality at a very high level to ensure diagnostic and therapeutic confidence. The new CLEAR program, including a new X-ray tube, greatly enhances fluoroscopy and acquisition image quality by reducing noise and motion artefacts. Customers can choose from a gallery of dedicated image presets and determine the image impression they want to see on their system.

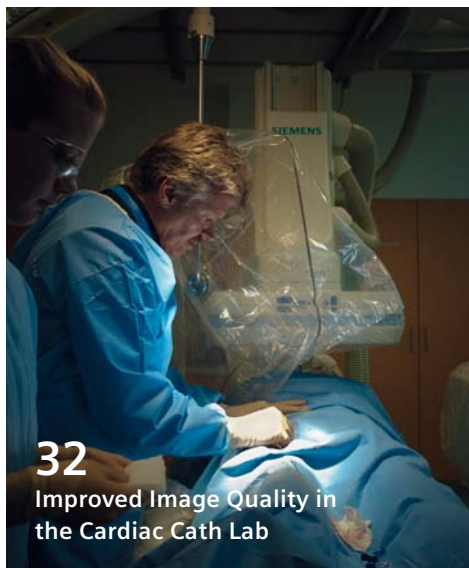
Learn more about our dose-saving features, image quality and many other innovative topics in this issue of AXIOM Innovations. I hope you enjoy reading it.

Dr. Heinrich Kolem

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Leader of the Pack

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Low dose acquisition
image of a peripheral
stent using 67% less dose
compared to a standard
acquisition protocol.

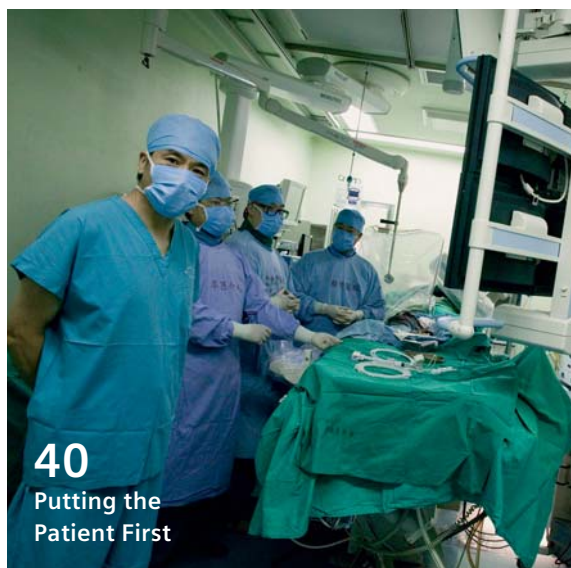
*Courtesy of Prof. D. Hahn,
M.D., Department of
Radiology, University of
Wuerzburg, Germany*

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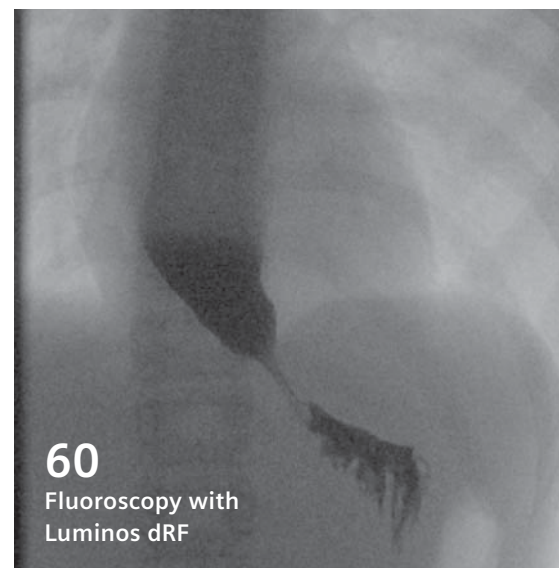
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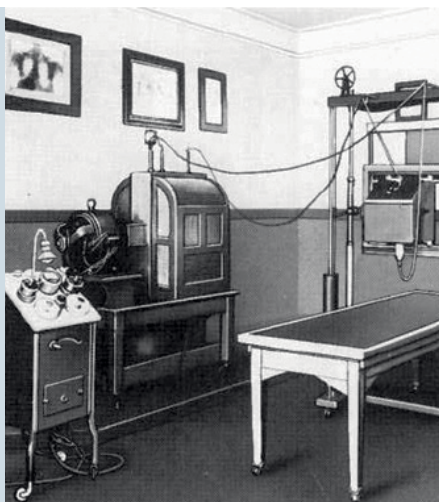
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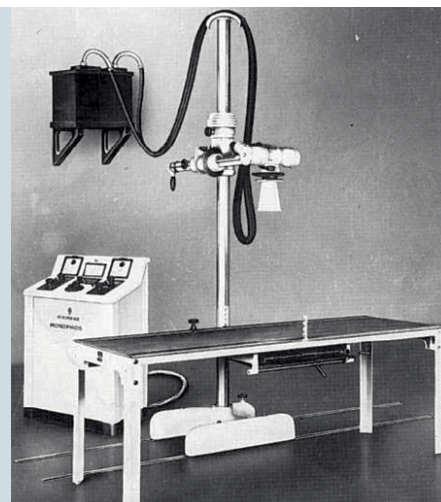
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111 years of Innovation in Healthcare in China

According to the McKinsey Global Institute Analysis done in March 2009, 350 million more people will live in Chinese cities by 2025. The Chinese government emphasizes the importance of healthcare, as Chinese Premier Wen Jia Bao explains, "China will strive to improve the country's healthcare system to make health care more accessible and affordable to urban and rural residents." Different suppliers of medical technology have just begun to focus their activities on this growing market. While this is new territory to many of those suppliers, Siemens Healthcare is able to look back on a long tradition in China. Siemens has supported the sustainable



development of healthcare in China for more than a century. The first Siemens X-ray system in China dates back to 1899 when just four years after Wilhelm Conrad Roentgen's discovery of X-ray, the German Physician Dr. Erich Paulun founded the Tongji Hospital in Shanghai. He brought with him an X-ray machine supplied by Reiniger Gebbert & Schall (RGS), then predecessor of Siemens Healthcare.



The demographic change in China continues to drive demands for high-quality and low-priced healthcare products. In the past 3 years, Siemens Healthcare provided 300 medical systems to more than 110 Hospitals in Shanghai. To further address the needs of China's hospitals at all levels, Siemens strives in innovation and process optimization for high-end and affordable healthcare delivery.

A New Level of Valve Implantation Convenience – syngo Aortic ValveGuide



The new *syngo* Aortic ValveGuide* application simplifies the workflow for minimally invasive heart valve implantations and helps cardiologists and cardiac surgeons prepare and perform transcatheter aortic valve implantations (TAVI) with more ease and confidence. The new software automatically recon-

structs a 3D representation of the aortic root from CT-like cross-sectional images acquired with a Siemens angiography system. For the TAVI procedure, the software automatically overlays this 3D image with two-dimensional images acquired during live fluoroscopy. This provides real-time, three-dimensional guidance in the patient's body while the physician navigates the new valve to its intended location. *syngo* Aortic ValveGuide automatically segments the aortic root in three-dimensional mode from *syngo* DynaCT Cardiac images. With the aid of anatomical landmarks in the 3D representation of the vessel, it calculates the exact perpendicular view on the aortic root. The C-arm can subsequently be adjusted to the corresponding angulations for the live fluo-

roscopy and the physician can place the new valve in the correct position. Until now, the operator had to conduct several manual steps during fluoroscopy to obtain three-dimensional orientation during the intervention. This not only required additional medical staff at the angiographic workstation, but also higher radiation and contrast agent doses for the patient. With the new software, only a short fluoroscopy time is required prior to the procedure; the patient's exposure to radiation and contrast agent can be reduced considerably.

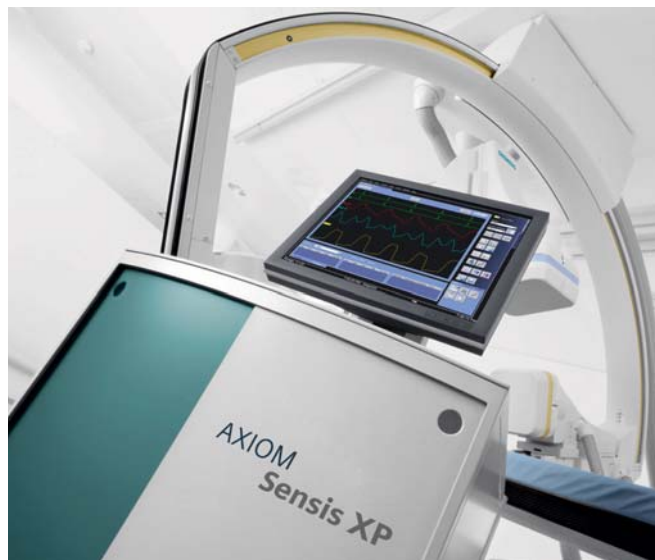
* *syngo* Aortic ValveGuide is a 'work in progress'. The information about this product is preliminary. The product is under development and not commercially available in the U.S., and its future availability cannot be ensured.

Research on Radiation Helping Solve a Big Puzzle

A variety of research groups devote their efforts to discovering the biological harm that may be triggered by exposure to ionizing radiation such as X-ray, gamma rays, alpha and beta particles. During the past few decades, several reports have helped increase our knowledge on how radiation endangers the human organism and what side effects and later developing genomic instabilities can be expected. Until today, valid conclusions could be drawn only at the molecular, cellular or tissue level. The human organism is, however, far more complex and therefore empirical studies, e.g. studies on patients, are essential to our full understanding of these issues.

In May 2010 leading scientists participated in a conference in honor of Victor P. Bond (1919 – 2007) at the Pacific Northwest National Laboratory (PNNL) in Richland (WA) in the USA. The gathering was subsidized in part by Siemens Healthcare.

Thirty-five experts presented the latest substantive results from recent scientific research. The aim of the conference was to review the current state of knowledge about the risks in humans following exposure to low dose rates of ionizing radiation (below about 100 mSv accumulated dose). One conclusion of the conference was expected: there are still many puzzle pieces missing. Patients, however, do seem willing to accept any risks of low-dose radiation in the pursuit of medical diagnosis and treatment. More information on the results will be summarized and published in the Health Physics Journal.



Integrated Fractional Flow Reserve Calculation Saves Space and Time

Fractional Flow Reserve (FFR) calculation is now fully integrated into the AXIOM Sensis XP hemodynamic recording system. Siemens recently signed marketing agreements with St.Jude™ and VOLCANO™ to integrate their products for FFR. The FFR measurement procedure can now be started and controlled from AXIOM Sensis XP. All FFR calculated results and corresponding waveforms will be saved into the AXIOM Sensis XP database and thus being available for embedding into a physician's report.

From now on it is no longer needed to do an extra patient registration, when performing a FFR measurement procedure, as the extra monitor to control and view the FFR results becomes redundant. As the whole FFR procedure is controlled from AXIOM Sensis XP, the corresponding pressure waveforms and calculated FFR results are displayed on AXIOM Sensis XP. With this integration the FFR procedure becomes much easier, and with that improving the interventional cardiologist's workflow.

Cause to Celebrate – 5000 FLUOROSPOT Compact Systems Sold



Siemens Marketing Manager Shane Williams hands over the certificate to Dr. Marie-Line Van Sinoy and her team

The 5000th FLUOROSPOT Compact system was recently installed at the Madeleine Hospital in the Belgian city of Ath. We spoke with three customers, Dr. Marie-Line Van Sinoy, Head of Medical imaging department for the RHMS group of hospitals; Dr. Hanna Salame, Head of the Medical imaging in Ath; and Dr. Bernard Stallenberg, an osteo-articular specialist, to find out the impact the system has had in the department and what they see as the benefits.

Dr. Van Sinoy, can you tell us about the installation of the 5000th FLUOROSPOT Compact system and how it fits in the department?

We have recently installed two AXIOM Luminos dRF systems which are equipped with FLUOROSPOT Compact at two sites. The first at the Louis Caty Clinic in Baudour and the other, which is the 5000th installation here in Ath.

You and your team have had some time to work with the systems; what would you say is the greatest benefit?

After several weeks of use, we noticed that the fully digital workflow and user friendly interface of the system and the FLUOROSPOT Compact allowed 70% of the daily work of the department to be

performed on this one piece of equipment.

So the system is able to handle two-thirds of your workload. That is impressive! What types of exams are performed on the system?

Of course we perform contrast examinations but also chest radiography and most of our skeletal work on the spine, pelvis and extremities.

Can you comment on the image quality?

We specifically noticed that the prostheses, images processed with Diamond-View Plus on the FLUOROSPOT Compact lead to a higher quality image than we have seen in the past. Not only the prosthesis but also the soft tissues, in particular adipose tissue and air. The visualization of calcifications is also significantly better.

How has your staff taken to the system, did it take long to train them?

All technologists from our imaging department prefer to use the AXIOM Luminos dRF and FLUOROSPOT Compact equipment. The night and weekend activities are almost totally performed on the AXIOM Luminos dRF because of its speed and friendly user interface.

What other functions are important to you?

The full spine and leg examination significantly improved the workflow and image quality for orthopedics.

Dr. Salame, what is your initial impression of the system?

Besides the significant increase in the number of examinations generated on one single piece of equipment, image processing with FLUOROSPOT Compact in examinations with contrast appreciably improves the image quality while significantly reducing patient dose.

You mention dose. What aspects of the system do you find most useful in reducing patient dose?

The ability to review dynamic sequences with the Fluoroloop function on the FLUOROSPOT Compact is of significant benefit during a lot of examinations and therefore in reducing patient irradiation. This is extremely important in pediatrics, where it is vital to reduce the patient dose as much as possible.

We have already heard that the system is easy to use. Can you confirm this?

Yes, I also notice that the technologists and radiologists find the system with its intuitive interface easy to use.

Dr. Stallenberg, as an osteo-articular specialist, particular aspects of the system are of benefit to you. Can you explain this?

I can confirm the excellent quality of the image during wrist and other dynamic joint examinations. I almost exclusively use the Fluoroloop function and the CAREvision pulsed fluoroscopy at a frequency of 3 frames/sec., leading to a significant dose reduction.

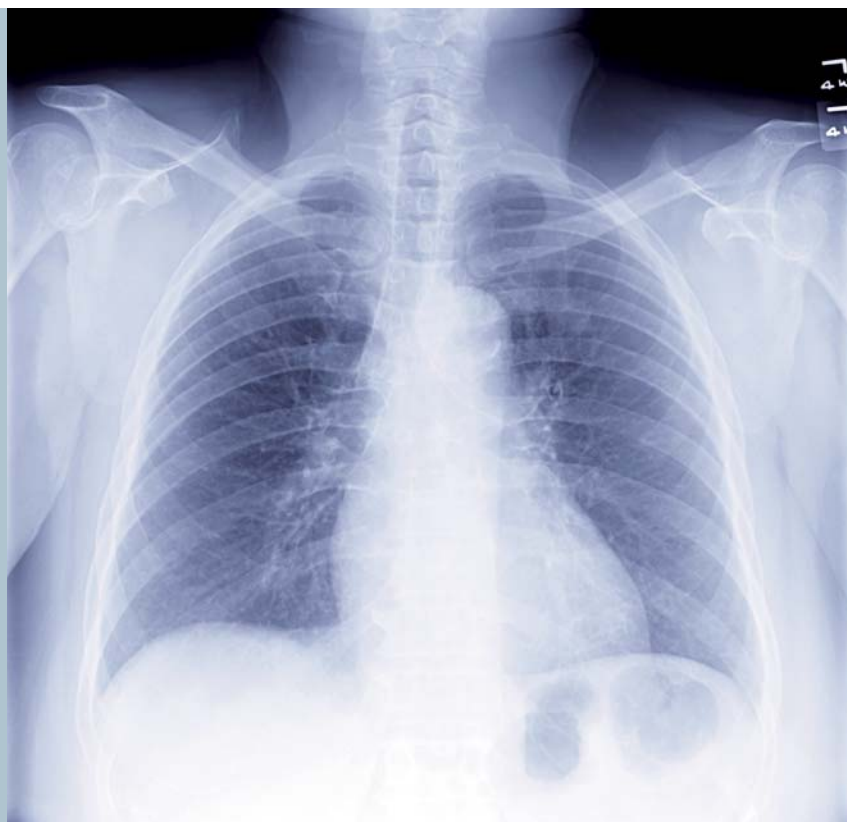
Contact

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Enhanced Soft Tissue Imaging

Ribs and clavicles on a chest X-ray often make it difficult for the physician to obtain a clear evaluation of the lung tissue. Until now, radiologists have used dual energy technology to improve the visibility of the lungs. The technique involves the successive acquisition of two images consisting of a low- and a high-energy spectrum. The physician can then use these two images to visualize the soft tissue in the lung. Siemens is now offering SoftView™ from Riverain Medical as a one-stop solution with the Ysio® digital radiography system and the digital 2-in-1 solution for fluoroscopy and radiography, AXIOM Luminos dRF®.

The software can easily be integrated and requires no adaptation of the clinical protocols for chest X-rays. SoftView enables the physician to obtain a soft tissue image faster and without any additional radiation dose for the patient. "Patient positioning, radiation dose and inspiration can make the interpretation of a chest X-ray challenging. SoftView suppresses the ribs and clavicles on a chest X-ray to improve the clarity of the image, even when image quality is low," explains Dr. Stefan Palmers, Ghent Hospital, Belgium, who is already working with the technology. "Siemens Healthcare's Ysio and Riverain Medical's SoftView technologies together produce optimal image quality."



Original digital chest X-ray image



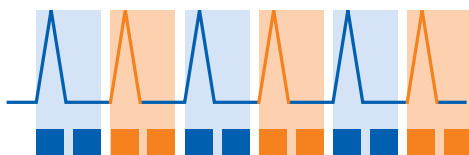
SoftView image

More Information
www.riverainmedical.com

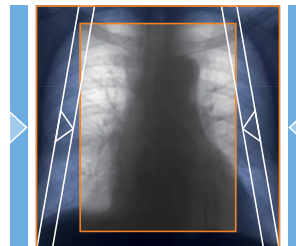
Pioneering in Radiation Dose Savings

'As Low as Reasonably Achievable' – The ALARA principle, known to everybody involved with medical imaging using X-rays to diagnose or treat patients. Easy as it is to understand, keeping radiation dose to a minimum is often a challenge in angiography or other X-ray based modalities. Siemens Healthcare is committed to helping radiologists and cardiologists worldwide maintain the ALARA principle. With standard built-in dose saving features and brilliant image quality, the Artis zee family of C-arm systems enables interventionalists to treat their patients with utmost care and diagnostic confidence.

Pulsed fluoroscopy



Radiation-free collimation



CAREvision

CAREfilter

CAREprofile

CAREposition

1994

1994

1998

2009

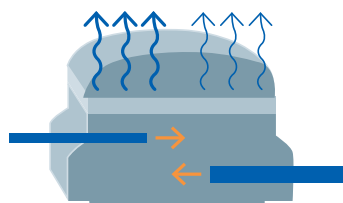
Dose savings
up to ...

75%

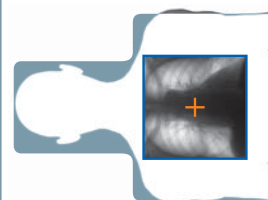
50%

9%

5%



Automatic filtration

Radiation-free patient
positioning

As a provider of medical imaging systems, Siemens always strives to implement all dose saving, dose monitoring and dose reduction methods available on the interventional imaging market today. As a leader and pioneer in the field of dose reduction, Siemens consistently develops new solutions. Siemens was the first company to incorporate a variety of dose saving and monitoring features into the interventional routine, many of them unique on the market. To further develop existing features and improve care for patients during interventional procedures, Siemens closely cooperates with worldwide leading experts in universities and public and private radiology centers to bring research developments into the practical, everyday clinical routine.

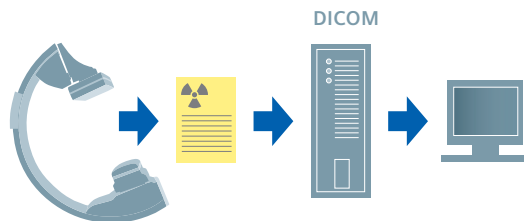
Saving dose during interventional procedures is very important for the patient, but also for the interventionalist and the staff in the room during the examination. Beyond accounting for the procedure itself, it will eventually be necessary to account for the accumulated dose in reports to the hospital or to other public health departments in the country. Siemens is committed to helping physicians work with low radiation dosages during their procedures by providing a broad range of dose saving features integrated into the Artis zee C-arm systems.

Cutting patient dose

One major dose saving feature during live fluoroscopy imaging is CAREvision, which provides variable fluoroscopic

pulse rates ranging from 30 pulses/sec. to 0.5 pulses/sec. During fluoro mode, these pulse rates can be adapted to clinical needs and thus considerably reduce radiation exposure for the patient, e. g. a reduction to half the pulse rate saves about half the dose. Therefore a reduction from 30 pulses/sec. to 7.5 results in a dose savings of up to 75%. In addition to pulsed fluoroscopy, the system automatically reduces the skin dose with the variable beam filtration of CAREfilter. During digital acquisition copper filters varying from 0.0 to 0.9 mm are automatically set depending on patient weight and C-arm angulation. In fluoroscopic mode a change from 0.2 to 0.9 mm saves up to 50% in skin dose. During patient positioning and collimation Siemens provides the ability to do

Radiation-free collimation



Skin dose alert on the touchscreen



Low Dose
syngo DynaCT

CAREreport

Low Dose
Acquisition

CAREguard

2009

2009

2009

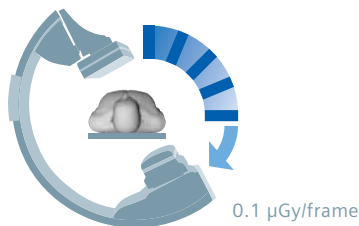
2010

0.3 mSv
Neuro

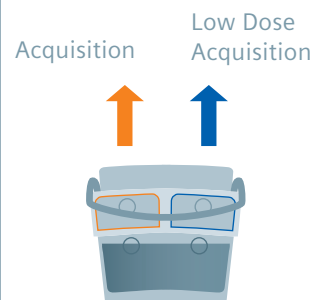
Enhanced
reporting

67%

Enhanced
dose control



Low-dose 3D imaging
for radio-sensitive patients



both radiation-free. CAREprofile and CAREposition help to achieve this and can reduce total fluoroscopy time by up to three minutes during a typical cardiac examination, which can result in a dose saving up to 70 mGy.

CAREprofile provides radiation-free collimation and image filter adjustment using the last image hold as a reference, whereas CAREposition allows for radiation-free patient positioning. A graphical display of the outline of the upcoming

image on the live monitor enables table panning or C-arm movements without using any radiation.

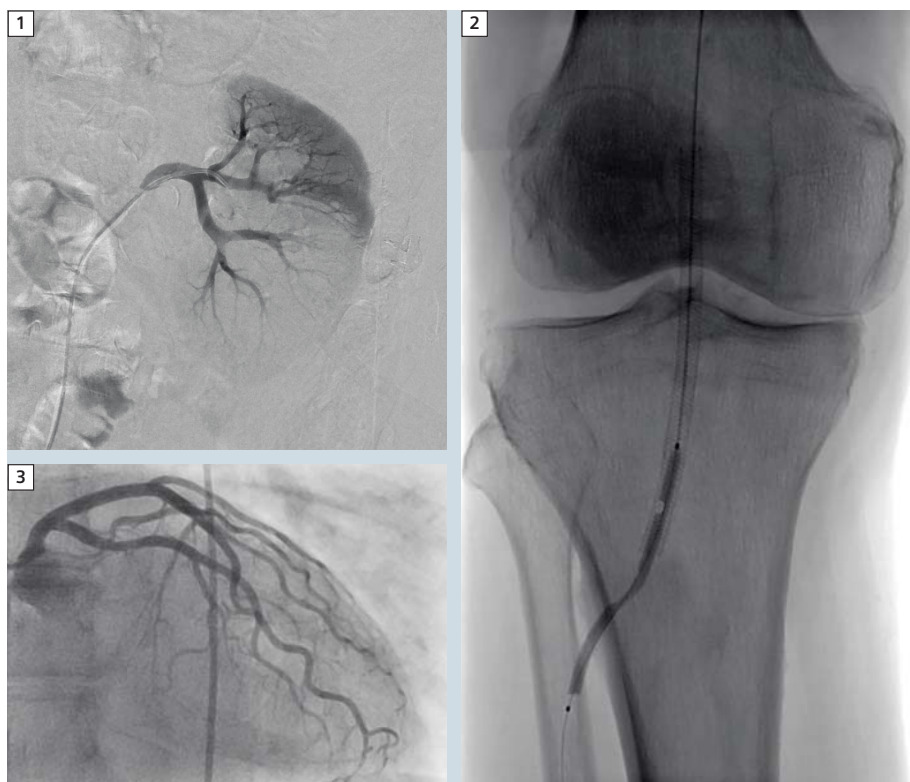
Operators can also change the fluoro modes from medium to low depending on procedure and the patient being examined. For image acquisition, Siemens now provides extra protocols for Low Dose Acquisition: the Artis zee foot-switch can be specifically configured for low-dose acquisition, making system handling easier and helping physicians to save up to 67% dose during acquisition as soon as they step on the foot pedal.

Lower dose in 3D imaging

Especially when treating children, 3D information during complex interventional procedures can be very helpful. Therefore Siemens has developed new dedicated low dose protocols for *syngo DynaCT*, providing 3D imaging at the lowest possible dose values. Low dose *syngo DynaCT* specially designed for radiosensitive patients provides acceptable diagnostic image quality. For the above mentioned prerequisites a high-contrast 5 seconds 3D DR rotational run with 0.36 $\mu\text{G}/\text{f}$ can be reduced to 0.1 $\mu\text{G}/\text{f}$. The reduction from 0.36 $\mu\text{G}/\text{f}$ to 0.1 $\mu\text{G}/\text{f}$ results in a dose saving of 72%. A low dose *syngo DynaCT* neuro image can be acquired with an effective dose of only 0.3 mSv. In combination with *syngo InSpace3D/3D Fusion*, low-dose *syngo DynaCT* results can be fused with diagnostic pre-interventional CT, MR or PET CT results. These fused datasets provide an excellent basis for planning and guidance during interventional procedures.

Keeping an eye on dose with ease

Controlling radiation exposure is becoming more and more important. In order to keep the interventionalist's mind free



- 1** Low dose acquisition image of the kidney with 1.4 $\mu\text{G}/\text{frame}$ radiation dose.
- 2** Up to 67% dose could be saved by acquiring the image above using a special low dose acquisition protocol (0.8 $\mu\text{G}/\text{frame}$) compared to standard acquisition programs.
- 3** Cardiac image acquisition using a special low dose program with only 88 nGy/frame.

during the interventional procedure, the Artis zee system is prepared to monitor patient dose in various ways. This creates more transparency during and after the procedure as to how much radiation was applied. To monitor this constantly while treating patients, the dose values are displayed on the monitors in the examination and the control room. With CAREguard the interventionalist receives a warning on the live display in the examination room as well as a popup message on the table side ECC (Examination Control Console), which indicates that a certain predefined skin dose level has been reached. Three skin dose levels can be defined by the institution. Physicians can treat their patients without constantly worrying about radiation and still meet clinical requirements.

With more and more regulations from state departments, dose reporting on the radiation exposure after each intervention is becoming more important than ever. In order to prepare for future regulations, Artis zee systems already provide the ability to report dose exposure effectively after each interventional case in the department itself, as well as to other external departments that require the information.

At the end of the procedure, an examination or patient protocol is stored together with the acquired images. All information on each run is stored and listed in the protocol with the number of exposures, total fluoro time, total dose area product and total dose at IRP. This protocol can also be sent to a PACS system, printed, stored or sent as a DICOM structured report for further evaluations. CAREreport contains all patient demographics, procedure and dose information. With commercially available or in-house software programs, this information can be filtered for further applications e.g. dose analysis. CAREreport provides consistency for

dose reporting, and prepares for future legal requirements.

Knowledge and Training is Key

In addition to the latest technology, dose reduction during interventions requires training, i.e. familiarity with reduction methods and factors. Not only the patient needs to be protected against radiation dosage but the interventionalist and other medical staff also need to be shielded from unnecessary scattered radiation. Knowledge about other radiation protection devices such as lead aprons, walls and glasses are key for every clinician working in an interventional lab. Siemens is a strong part-

ner in helping radiologists find the right radiation-protection solution for their working environment. Dose saving, monitoring and reporting products need to be transparent and easy to use and understand. In addition physicians and technologists can profit from on-going seminars and printed media and online training courses to learn more about radiation protection and how to use it in their daily routine.

Contact

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Take CARE.

Combined Applications to Reduce Exposure

CAREvision

Flexible pulse rates during fluoroscopy, varying from 30 p/s down to 0.5 p/s

CAREfilter

Automatic filter adaption depending on patient weight

CAREprofile

Radiation-free collimator adjustment

CAREposition

Radiation-free patient positioning

CAREguard

Effective skin dose control

CAREreport

Detailed dose information after each case (e.g. for statistics)

A man with short brown hair and glasses, wearing blue scrubs, stands in front of a Siemens Artis zee interventional radiology system. The system is white with blue accents and the Siemens logo. A clock is visible on the wall behind him.

Cutting Radiation Dose Down to Size

Siemens' Artis zee interventional radiology systems at Children's Hospital of Pittsburgh are allowing doctors to greatly reduce radiation dose while improving imaging for even the smallest patients.

By Ron French



Artis Reference2 B

Carotid VFR
B
WFS
MAYE
D.3175
RAD 92 / CAU 2

Artis Reference2 A

BEBOUT, GAVIN
ANDERSON, KELCI, T
000599726
* 5/26/1992
4/7/2010
6:33:38 AM
1 - 20/23
M 4
8.25 sec

77.0 W DR
101.3 mA 0.01s

A
Proc Line
Fluoro <1 y

25.5 μ Gy/m²
0.011 min

00:00

Review

Carotid VFR
Cn 32
WFS
MAYE
D.3175
RAD 92 / CAU 40



For Kevin M. Baskin, MD, pediatric interventional radiology is all about partnerships and adaptation. At the world-renowned Children's Hospital of Pittsburgh, Baskin is often called to operating rooms to assist transplant surgeons, while those same surgeons are frequent guests at procedures in Baskin's state-of-the-art imaging suites. "One of the reasons we have such a high profile is the integration between interventional radiology and transplant surgery," says Baskin. "It's tight here." For that partnership to be successful, Baskin must be part doctor and part engineer, contorting imaging equipment and tables designed for adults to fit the needs of the sickest and smallest of patients. "If we're not willing to let go of preconceived notions, we'll get nothing done," he explains. "Everything we do is a one-off procedure." For years, that meant wrestling with imaging technology to lower the radiation dose received by his patients during often complex procedures. Today, a new partnership is helping solve that problem. The 50-year-old physician has worked closely with Siemens Healthcare to adapt the latest imaging technology to the needs of pediatrics. The result is greatly reduced dosage with improved imaging. "It's allowing us to do proce-

dures that we would never have attempted before," says Baskin.

Interventional Radiology in Transplants

Baskin's journey to Pittsburgh began on the opposite side of the United States. A native of California, he earned his medical degree at Creighton University. Since then, he has worked at some of the premiere pediatric hospitals in the world, including the Hospital for Sick Children in Toronto and Children's Hospital of Philadelphia. He joined the staff of Children's Hospital of Pittsburgh four years ago as Division Chief of Pediatric Interventional Radiology at the University of Pittsburgh School of Medicine. Children's Hospital Pittsburgh is internationally known for its expertise in transplants, particularly liver transplants. It's not uncommon for Baskin to "treat a patient from Colombia in the morning and a patient from Kuwait in the afternoon," he says. Those liver transplant patients often require years of follow-up procedures, so it's vital that the hospital have the cutting-edge imaging equipment to continue to provide the best care. When Children's Hospital moved to a new, 10-acre campus in 2009, Baskin lobbied to purchase Siemens imaging technology, even though the vast major-

ity of the University of Pittsburgh medical centers used equipment from a different supplier.

Baskin knew that Siemens had been working to reduce dosage levels since the 1990s and continued to be the industry leader. "Dose was a huge challenge," says Baskin. "The earlier units had very limited capability for managing or measuring dose. In order to see small catheters and guidewires, we really had to ramp up the dose for the size of our patients.

We were pushing that older equipment to its limit and were probably using 20 times the dosage we do now. When you're doing hours of fluoroscopy, you can have burns or loss of hair. That's a horrible consequence."

Today, an old biplane system from another vendor has been replaced in Baskin's imaging suite with a Siemens Artis zee biplane system with two large 30 x 40 detectors that enable flexible positioning. The system provides better imaging with vastly lower dose levels for angiography and fluoroscopy. Intelligent noise reduction enhances not just the reference image, but the fluoroscopy image during live fluoro – without an increase in dose. Advanced temporal filtration uses an intelligent motion detection algorithm to separate

moving from non-moving structures in real time.

The system cuts dose in two ways – first by lowering the dose of images, and second by allowing the interventional radiologists to switch off the ionized imaging and switch to ultrasound once an image is produced. "We leverage the limits of our ability to image by using *syngo* DynaCT with our Artis zee system to generate a cross-sectional image to design a pathway to the mass, and then use ultrasound to actually get us there," Baskin explains. "So instead of spending a lot of time scanning under CT for example, where you would be hammering the patient with a lot of radiation to non-target tissue, the *syngo* DynaCT gives us the ability to do some off-line planning. If we can use ultrasound to get there, then we've significantly limited the dose by not using an ionizing radiation modality."

Using a large spectrum of imaging capabilities allows physicians to find the quickest, most efficient solution possible. The 3D imaging capabilities of the Artis zee system have aided reconstruction procedures for liver transplants. "It's all a moving picture – it's such a dynamic environment, and there are a lot of vital structures nearby," says Baskin. "Often, the transplant graft is



upside down and backwards from its normal position. Even when we're literally holding everything in our hands, 3D imaging helps us understand relationships between the bile duct and the small bowel it ought to have been connected to – relationships that we can't see or feel. It's remarkable. You would think that interventional radiology is a way to avoid surgery, but even with a large incision, we still need the tools that imaging brings to the table to understand relationships with organs and structures."

The Children's Hospital of Pittsburgh has a five-year survival rate of 97 percent for liver grafts. "The best of the rest is around 93 percent, and the average internationally is 70 percent," notes

Baskin. "To have a 97-percent graft survival rate means that not only are they doing a fine job in surgery, but also in procedure planning." And that planning is based in no small part on the images

obtained from the Artis zee system. Baskin recalls the case of an 8-year-old girl who had undergone a heart and double-lung transplant. After the surgeries, she developed breath-

“Due to its reduced dose our Artis zee is allowing us to do procedures that we would never have attempted before.”

Kevin M. Baskin, MD, Pediatric Interventional Radiology,
Children's Hospital of Pittsburgh, PA, USA

ing problems. Imaging revealed that a pseudo-aneurysm was pushing against her airway, narrowing it dangerously. Surgery was too risky. Utilizing the Artis zee system, Baskin was able through fluoroscopy to design a pathway to the trouble spot. Baskin then switched to ultrasound to complete the procedure. It was a complicated case, but one Baskin was able to accomplish with only low dose levels to the patient. “When you put really high-quality imaging equipment in the hands of people who have a vision,” Baskin says, “it’s a nice marriage.”

Still, he adds, pediatric interventional radiologists must be creative and forceful to “bend the will of the machine to what we want to accomplish. We will always

have to adapt equipment to our needs.”

A Vision – and a Plan – for the Future

Siemens has been an enthusiastic partner in that adaptation. Baskin has traveled to Germany to meet with Siemens officials to discuss the needs of pediatric interventional radiologists, as part of a special advisory panel. “We met with many Siemens employees, from engineers to salespeople to marketing to strategic planners,” he recalls. “They listened in a very dynamic, interactive way to our vision for the future and what kind of help we need to get there. They questioned us closely and thoughtfully. This wasn’t them telling us how great they are; they were all there

because they were genuinely interested in figuring out how to adapt their equipment. We had these great give and take discussions where people didn’t hold back. I’ve seldom been in so rich a setting.”

The meeting was valuable to both Siemens officials and doctors. “They understand our special needs and have helped us modify our equipment,” says Baskin. “And while they know we’re never going to make them wealthy, they believe that children are a special population. You may not make your largest volume of sales, but the work that is done is important. At the end of the day, if the equipment just sits there, it’s not very valuable. But if it helps us solve problems, we can all progress together.”

Partnership and adaptation go hand in hand. Baskin is still working with Siemens on the next generation of adaptations. He’d like to see a ring of LED lights under the detector. For adult patients, lights in the room illuminate the work area. But, he points out, “Our patients live under the detector. They’re smaller than the detector, making it difficult to get proper lighting.”

“It’s a world different than five years ago, but now we can see what can happen in 10 to 20 years,” says Baskin. “What we do doesn’t fit the preconceived notions of what is possible. It takes time and perseverance and a degree of understanding.”

That understanding seems to have been reached between Children’s Hospital and Siemens, in no small measure.

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Leader of the Pack

Siemens Healthcare formed a partnership with Children's Hospital Boston five years ago to verify that the dose saving features of its interventional radiology system worked just as well in children as in adults. The challenge today is convincing everyone to make the most of it.

By Joanna Downer





Five years ago, medical physicist Keith Strauss at Children's Hospital Boston (CHB) drove a hard bargain. In negotiating with Siemens Healthcare, he said that CHB would buy and install a number of Siemens Artis zee interventional radiology systems only if the company worked with the hospital to modify the equipment's programming to meet the institution's needs – serving children of all ages.

"All the issues present in interventional imaging of adult patients are perhaps even more difficult or significant in pediatric patients, who can range in size from neonates to adolescents," says Strauss, Director of Radiology Physics and Engineering in the Department of Radiology at CHB. "But companies create standard operational programs based on adult imaging needs, and I knew those programs weren't right for our patients and their clinical needs."

Siemens listened. The company not only committed to a partnership to modify the system to better suit pediatric needs, but also connected Strauss with a Siemens designer – an engineer who knew the Artis zee interventional radiology system inside and out. "I traveled to Siemens' training center, and basically locked myself in a room with the design engineer for a week," says Strauss. "I tried to teach him everything I knew about pediatric imaging, and he tried to teach me everything he knew about the unique design features of Siemens equipment. In the end, we were able to replace the standard anatomical programs that work very well for adults and develop anatomical programs that work for interventional radiology in children." Interventional radiology uses imaging to provide guidance during minimally invasive procedures, particularly in cardiovascular medicine, cerebrovascular medicine, transplant and oncology, as well as for line placement and other

procedures involved in the diagnosis and treatment of a wide variety of conditions.

When speaking about radiation exposure children may have much greater risks compared to adults, because they have more time for long-term effects to appear and to affect their quality of life. But radiation dose is a concern for patients of all ages. In March 2009, the National Council on Radiation Protection and Measurements reported that radiation exposure per capita more than doubled in the United States in the previous two decades, largely due to increasing use of CT, nuclear medicine imaging, and interventional radiology. Each year, these make up only about 26 percent of the imaging procedures using radiation in the United States, according to the report, but they contribute 89 percent of total exposure from medical imaging. The group is working on a similar report regarding occupational exposure now. "In some respects, last year's report was a wake-up call for a lot of people," says Strauss, a leader in dose reduction efforts for many years. "I don't think people understood that the use of ionizing radiation had increased as much as it had for both diagnosing and treating illness."

It certainly seemed to awaken the U.S. Food and Drug Administration (FDA), which in February 2010 announced its "Initiative to Reduce Unnecessary Radiation Exposure from Medical Imaging". In late March, it held a two-day public conference on the topic that was attended by all stakeholders – patients, industry, regulators, healthcare providers – including Siemens Healthcare and Keith Strauss – and other groups. One of the goals of the initiative is to reapply the ALARA concept to imaging and interventional radiology in the United States. ALARA says that doses from exposures to ionizing radiation should always be

"As Low As Reasonably Achievable". Strauss knows there's an important balance. "The challenge in imaging is reducing the dose to the patient while retaining the image quality necessary to provide appropriate care for all patients – whether they are 300- or 400-pound adults or 3- or 4-pound neonates," says Strauss.

A Focus on Dose Reduction

Siemens has long recognized the need to minimize dose to patients, and its Artis family has long had many dose-saving features. For example, inherent design characteristics of the Artis zee enable ergonomic, streamlined, efficient operation, all of which supports dose reduction. Furthermore, the product line has flexibility that allows users to optimize system parameters such as exposure time, photon energy and others to match clinical needs while reducing dose.

New dose-monitoring features are also on the horizon for the Artis zee. One new feature, CAREguard, provides feedback to the physicians once a certain radiation threshold is reached. Because the threshold is configured by the operator, it can be tailored to departments' needs to help guide decision-making later during the exam. Another new feature, CAREreport, provides the opportunity to collect all relevant parameters related to dose in a standard format – DICOM – that external systems can monitor to report radiation dose. This report may allow healthcare providers to obtain accurate information about a patient's exposure history, which can also help guide clinical decision-making. The Siemens dose-reduction portfolio is based on the Combined Applications to Reduce Dose (or "CARE package") for the AXIOM Artis and Artis zee family. In short, CARE makes it easy for operators to reduce dose to patients, which also

reduces their own dose. Strauss says that it is important for optimized programs and dose-saving features to be easy to use. "Operators need to be able to focus on conducting an efficient, high-quality exam that enables them to reach the necessary clinical endpoint while properly managing all aspects of patient care," says Strauss. "Their primary focus shouldn't be dose reduction."

Making a Great System Even Better

At the annual meeting of the Radiological Society of North America (RSNA) in late November, Siemens will be emphasizing the ways in which its interventional radiology systems can meet unique clinical needs while reducing dose. The meeting's theme, "Personalized Medicine: The Pursuit of Excellence," perfectly fits the goal of Siemens' multi-pronged approach, which uses flexible system design, optimized operational programming, the CARE package, and training to reduce dose and maintain image quality in interventional radiology.

For example, the Artis zee family can serve patients of various sizes and its predecessor, the AXIOM Artis family, already had considerable dose-saving features in 2005. But Strauss recognized that in order to make the most of these capabilities in pediatrics, the system's operational programs needed to be optimized – almost personalized – for much smaller patients than assumed in the standard programs. Strauss and Siemens focused on the acquisition step, which involves generation of a beam of X-rays that passes through the patient to reach a detector. To reduce radiation dose to the patient, all imaging companies insert filters of copper or another appropriate material into the X-ray beam. "These spectral filters remove the low-energy photons that



contribute very little to image quality, and they are very effective at reducing dose to the patient," says Strauss. However, spectral filters also reduce the number of photons that reach the detector, potentially requiring increased exposure time to compensate for the lost photons. Unfortunately, the benefit of capturing more photons is more than offset by loss of sharpness caused by movement during the longer exposure. "Even in the most cooperative patients, you've got involuntary motion in the organs of the patient's body," says Strauss. "We need very short exposure

times to freeze motion, just as if we were photographing a galloping horse." Indeed, Strauss says that exposure times for adults should be no more than 8 msec to 10 msec, and for children just 5 msec to 6 msec – considerably shorter than most systems' factory settings. So in fact, optimizing the Artis zee for pediatrics required the team to actually reduce exposure time. "We realized that we needed to balance the need for photons by removing some of the spectral filters," recalls Strauss. "Doing so allowed us to retain some of the dose savings they provide, but also

allowed us to reduce the exposure time and improve image quality for pediatric patients."

After Siemens rewrote the software to provide shorter exposure times, or pulse widths, and to remove thicker filters sooner during the examination, it was installed at CHB for Strauss to test. "With my phantoms that simulate children, I was able to demonstrate that the modified system was performing correctly for children, and the Siemens engineer who installed the program recognized the changes compared to the equipment's operation," recalls Strauss, who

“One has the capability to significantly reduce dose if the design characteristics of the machine are optimized for one’s clinical needs, available in an easy-to-use way such as the Siemens CARE features.”

Keith Strauss, Director of Radiology Physics and Engineering,
Department of Radiology, Children’s Hospital Boston, MA, USA

received a letter from Siemens a few weeks later saying that the pulse-width modification would also be made available to other customers.

Thus optional dose-saving, image-enhancing software packages such as those developed with Strauss are yet another dose-reduction feature of the Artis zee family. In fact, Strauss reports that his efforts with Siemens enabled CHB to make great strides to reduce dose and maintain image quality during interventional fluoroscopic examinations. “One has the capability to significantly reduce dose if the design

characteristics of the machine are optimized for one’s clinical needs, available in an easy-to-use way by appropriately trained operators,” he says.

Spreading the Word

However, Strauss says he suspects that not too many institutions have done everything possible to reduce dose – even those using the pediatric package – because very few have further optimized the programming for their needs. And even then, the optimized settings need to be easy to apply appropriately and to use. For example, Strauss and

Siemens set up their pediatric anatomical programs to be stratified by patient weight, since that is easy to measure and correlates to patient size. Weight also might be an appropriate identifier of optimized imaging protocols for overweight or obese patients.

Strauss says Siemens’ partnership with CHB created modifications that fully met the hospital’s clinical requirements. “Quality requires effort – quality doesn’t just happen,” he says. “It takes organization, it takes effort, and it takes resources. This partnership gave the physicians and technologists at CHB an easy way to be satisfied that they’ve selected the right parameters for their patient’s needs. The remaining challenge is to get these principles in practice throughout the healthcare sector.” Meeting the challenge will require participation by industry and healthcare providers, patients and the public. It will require increasing awareness and providing additional training. So far, Strauss says that industry is responding to the call. With its longstanding commitment to dose reduction, Siemens has clearly led the pack.

Joanna Downer is a science writer based in Durham, North Carolina, USA. She holds a doctorate in chemistry from Washington University in St. Louis, Missouri.

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Direct Drainage Between Intra-hepatic Bile Ducts and Roux-en-Y Limb

Supported by syngo iGuide Toolbox

Courtesy of Mark Sands, M.D.,
Department of Diagnostic Radiology,
The Cleveland Clinic Foundation,
Cleveland, OH, USA



Dr. Sands showing the system, an Artis zee ceiling-mounted installed in the Department of Interventional Radiology.

Patient history

Adult male with congenital biliary atresia underwent a Kasai procedure after birth.

Diagnosis

The patient experienced repeated episodes of cholangitis despite left lobectomy with irregular dilated right-sided intrahepatic ducts.

Treatment

Establishment of a direct drainage path between the right-sided biliary ducts and the Roux-en-Y limb using components of a pediatric TIPS set. Pre-procedural CT imaging fused with intra-procedural syngo DynaCT imaging was

used for planning. syngo iGuide Toolbox graphics were overlaid onto live fluoroscopy for guidance during the procedure.

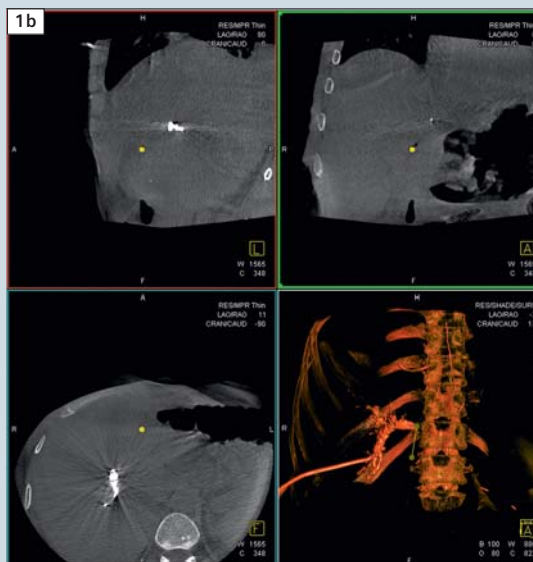
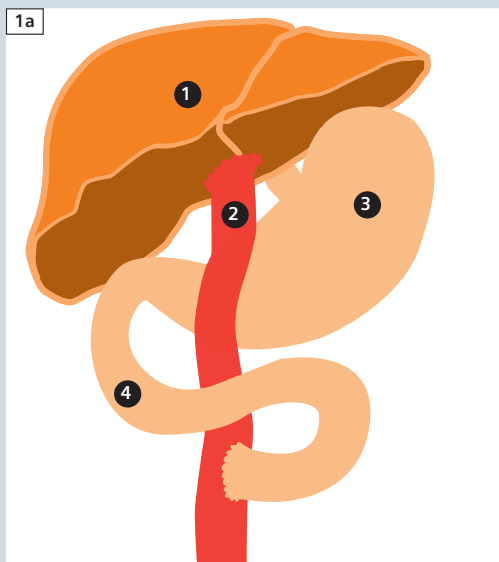
Comments

The case demonstrated the benefits of the advanced 3D capabilities of the system. The contrast-enhanced syngo DynaCT performed at the beginning of the procedure showed both the intra-hepatic dilated bile ducts as well as scant air bubbles delineating the location of the Roux limb. A syngo iGuide Toolbox line between these structures was drawn to serve as a guide for the puncture.

Fusing the intra-procedural syngo DynaCT with the pre-procedural CT allowed marking and overlaying the location of the major branches of the portal vein on the live fluoro image. Whereas the overlay of the planned path helped to steer the curved needle in the required steep angle, the simultaneous visualization of the portal vein branches on the live fluoro image provided additional information in helping to avoid the inadvertent creation of a portal vein-biliary fistula.

Contact

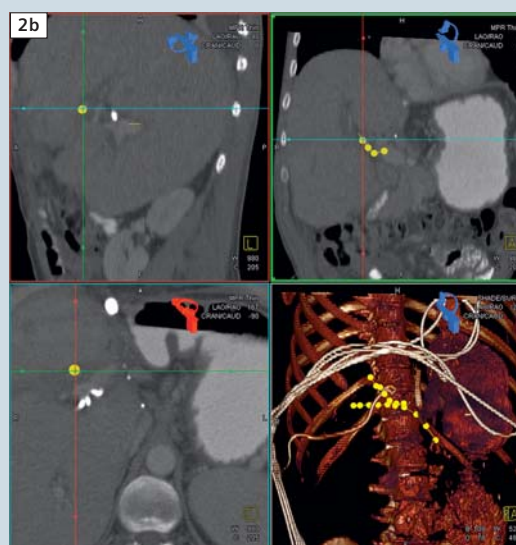
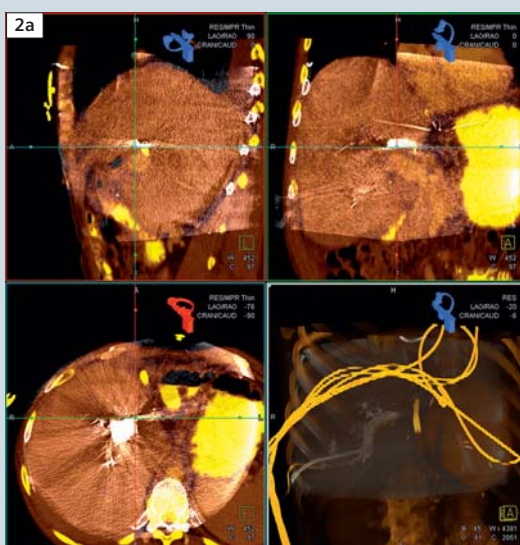
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1a Typical anatomy after Kasai procedure (Roux-en-Y limb).

- 1** Liver
- 2** Small intestine connected to liver.
- 3** Stomach
- 4** Duodenum (first part of small intestine).

1b syngo iGuide Toolbox line representing path from the right-sided intrahepatic bile duct to Roux-en-Y limb.



2a Fusion of syngo DynaCT and pre-procedural CT fusion of syngo DynaCT (colored in grey) and pre-procedural CT (colored in yellow).

2b syngo iGuide Toolbox lines in pre-procedural CT representing the major branches of the portal vein.



3a+b syngo iGuide Toolbox graphic overlay with puncture path and portal vein representation in different orientation.

3c Final result showing drainage catheter in Roux-en-Y limb.

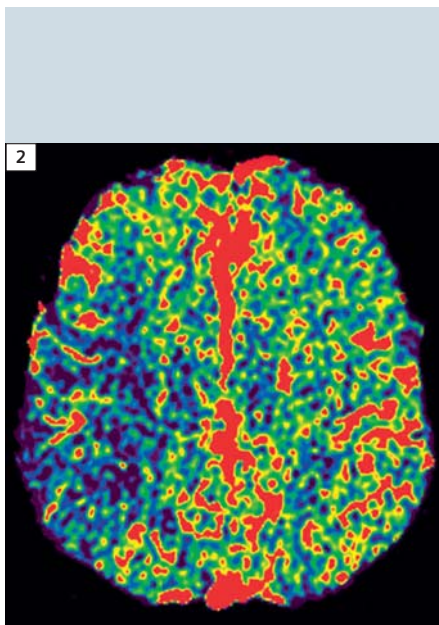
Endovascular Stroke Treatment Supported by syngo Neuro PBV IR*

Courtesy of Prof. A. Dörfler, M.D. and T. Struffert, M.D.

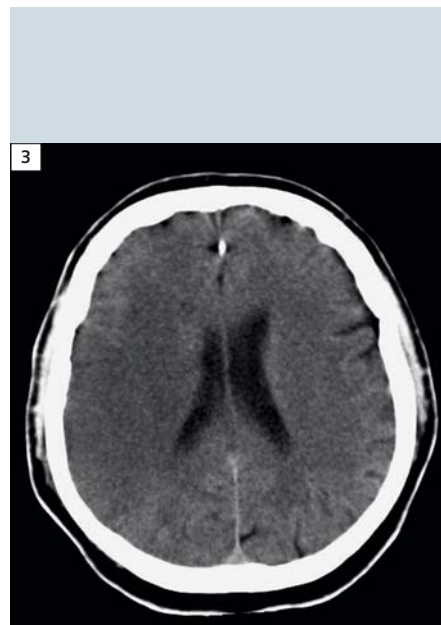
Department of Neuroradiology, University of Erlangen, Erlangen, Germany



1 2D DSA shows occluded right MCA.



2 syngo Neuro PBV IR shows clearly the large lesion in the territory of right MCA.



3 CT follow-up after 24 hours shows the stroke demarcation which matches well with the CBV lesion shown in syngo Neuro PBV IR (Fig. 2).

Patient history

A 56-year-old male was admitted because of acute onset of stroke symptoms with high grade hemiparesis on the left. CT could rule out hemorrhage. CT angiography revealed right middle cerebral artery (MCA) occlusion. CT perfusion failed because of movement of the patient during acquisition. The patient was transferred for neuro-interventional treatment to the angio suite.

Diagnosis

Acute occlusion of the right middle cerebral artery (MCA) followed by stroke.

Treatment

After 60 minutes, using several different devices, recanalization could not be achieved. syngo Neuro PBV IR was used for monitoring of brain viability. A large CBV/Neuro-PBV lesion occupying the central region was obvious. Treatment was terminated because the neuroradiologist had the impression that recanalization could not be achieved and the lesion indicated that a large stroke could no longer be reversed. Further attempts would increase the risk of hemorrhage. This case demonstrates the possibility to monitor a procedure and to change the

treatment strategy if obviously further treatment is without benefit and risky for the patient.

*Future 510(k). The information about this product is being provided for planning purposes. The product requires 510(k) review and is not commercially available in the U.S.

Interventional angiography of anterior communicating artery aneurysm

Supported by syngo Neuro PBV IR*

Courtesy of James V. Byrne, M.D., and Mudassar Kamran, M.D.

Department of Neuroradiology at Oxford Radcliffe Hospitals, University of Oxford, UK

Patient history

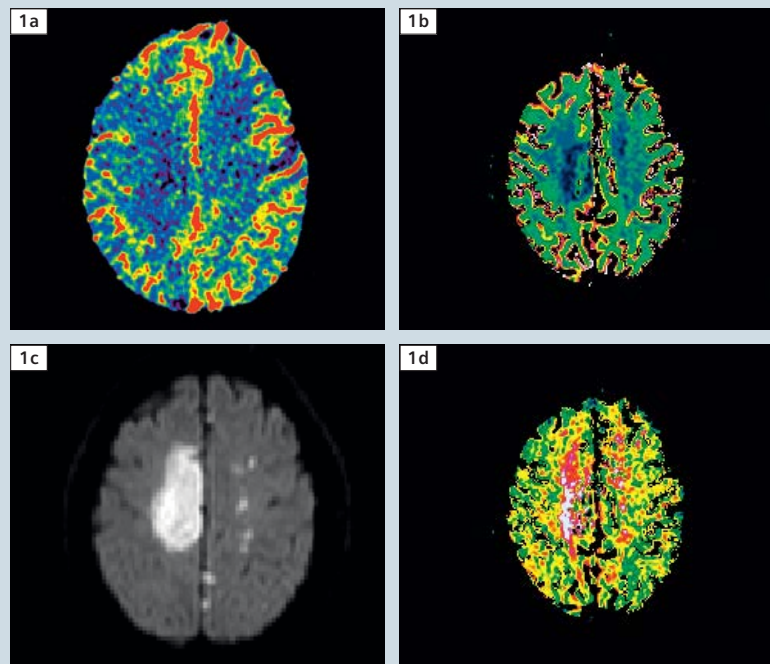
A 60-year-old lady presented (day 0; WFNS grade 1) with ruptured anterior communicating artery aneurysm (5 × 7 mm). The patient was treated by coil embolization (day 1) and she recovered well without neurological deficits (WFNS grade 1). On day 3, her level of consciousness deteriorated with onset of numbness in the left arm and leg. CT scan, performed on the same day, was normal and excluded ischemia, re-bleeding, or progressive hydrocephalus. On day 4, the patient developed weakness of both legs and was transferred to Neuro ITU for supportive therapy.

Diagnosis

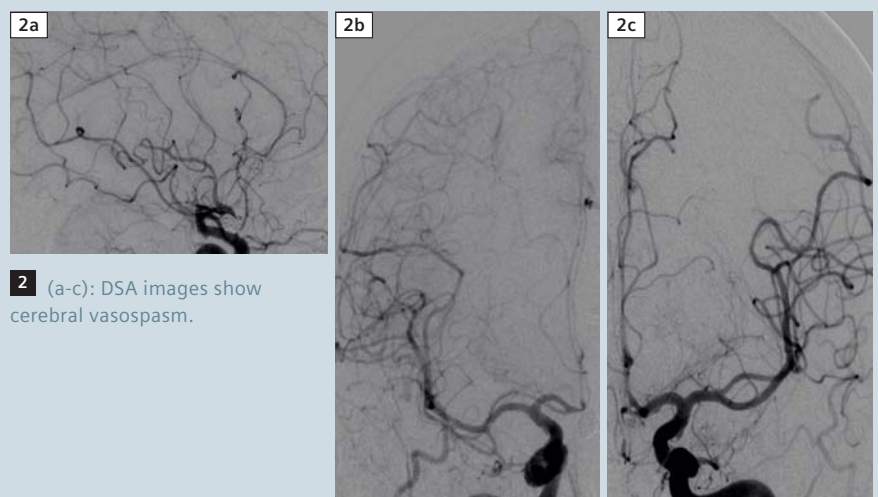
Perfusion weighted MRI (MR-PWI) on day 4, showed asymmetric cerebral hypo-perfusion, more marked in the right hemisphere (Fig. 1). On catheter angiography, cerebral vasospasm was evident affecting the anterior cerebral arteries (Fig. 2).

Treatment

A syngo Neuro PBV IR scan was performed during the same session as catheter angiography. On the syngo Neuro PBV IR maps, demarcated areas consistent with ischemia were evident and these correlated well with both the angiographic distribution of vasospasm and areas of hypo-perfusion seen on MR-PWI. The patient was treated by intra-arterial injections of the vasodilator Nimodipine.



1 (a) syngo Neuro PBV IR, (b) MR-PWI CBV, (c) MR-DWI, and (d) MR-PWI MTT images visualize the ischemic abnormality.



2 (a-c): DSA images show cerebral vasospasm.

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Endovascular Treatment of a Cerebral Vasospasm Supported by syngo iFlow

Courtesy of Alexander Bock, M.D.

Institute for Clinical and Interventional Neuroradiology,
Vivantes Klinikum Neukölln, Berlin, Germany



Dr. Bock and his assistant control the images and plan the next step of the procedure.



The detectors of the Artis zee biplane are positioned for the next syngo DynaCT run.

Patient history

64-year-old male with onset of thunder-clap headache, neck pain and accompanying nausea beginning ten days before. Self-medication with analgesics was ineffective. Patient was admitted due to left-side hemiparesis beginning one day prior.

Diagnosis

The patient suffered from subarachnoid hemorrhage (SAH) WFNS Grade 2 with a ruptured aneurysm of the anterior communicating artery (ACoM). In addition he presented with occlusion of the right internal carotid artery, and cerebral vasospasm.

Treatment

Guglielmi Detachable Coil (GDC) embolization of the ACoM aneurysm and repeated endovascular spasmolysis with intraarterial administration of nimodip-

ine, balloon dilatation of the ACoM, A1 and M1 segment on the right side, and finally stenting of the arteriosclerotic A1 stenosis on the right side was performed.

Comments

Left untreated, cerebral vasospasm leads to severe neurological deficits or death, making it one of the most feared and severe complications of SAH. The indication for arterial spasmolysis after SAH is confirmed either clinically or based on CT perfusion criteria. Critical cases require measuring of the partial oxygen pressure in vascular border zones of the brain tissue. Angiographic evaluation of a perfusion deficit is particularly difficult in multiple stenoses as with cerebral vasospasm. For the first time, syngo iFlow enables an accurate and reproducible determina-

tion of arteriovenous (AV) delay in one color-coded image derived from serial angiography. The AV delay is prolonged in hemodynamically significant stenoses. The normalization of the arteriovenous delay is one measure of the efficacy of endovascular spasmolysis. With syngo iFlow, this temporal data is immediately available to the examiner. In the presented case, an AV delay of 9.3 sec. on the right is significantly longer than on the left with 4.3 sec. (see Fig. 1c), correlating clinically with a hemiparesis on the left. After spasmolysis and balloon dilatation, the AV delay normalized (5.0 sec. vs. 4.3 sec.); see Fig. 2c.

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1 (a and b) Left internal carotid artery injection demonstrated high grade stenosis in A1, M1 and M2 segments, (c) syngo iFlow demonstrates the hypoperfused MCA territory on the right.



2 (a and b) After spasmolytic therapy and balloon dilatation no residual stenosis was observed. (c) syngo iFlow with normalized arteriovenous delay in both hemispheres.



The Sana Klinikum Lichtenberg is located in the center of Lichtenberg, one of Berlin's twelve boroughs. The advanced care hospital is managed by one of Germany's leading private hospital operators, the Sana Kliniken AG, and is also an academic teaching hospital affiliated with the Charité – University Hospital

Berlin, Berlin's chief university hospital. The area reflects the borough's character. Traditional meets modern, while old, beautifully preserved buildings and new architecture merge, producing a dynamic combination. The Clinic for Internal Medicine II, which specializes in cardiology, nestles in the midst of



Clear Images in the Cardiac Cath Lab

Acute situations are an almost daily occurrence in interventional cardiology, and require instant, confident decisions. Optimal image quality is the key prerequisite for success. Dr. Olaf Göing has extensive experience in the field of cardiac imaging. He and his team have been working with Artis zee systems for around two years. These advanced imaging systems are responsible for decisive improvements to cardiac catheter examinations and diagnosis.

By Matthias Manych

these surroundings. We are visiting one of its two cardiac catheter laboratories, which is equipped with a biplane Artis zee angiography system. Laboratory 2 boasts a monoplane, floor-mounted version of the latest C-arm family from Siemens Healthcare. While a constant stream of city traffic speeds by outside,

a relaxed yet concentrated working atmosphere prevails in the cardiac catheter laboratory.

Improved Images, Increased Routine Efficiency

An elderly patient with an existing heart condition, which is currently causing

him increased problems, is scheduled to receive the first examination. Dr. Göing, Head Physician at Internal Medicine II, makes a small incision in the groin, thereby accessing the femoral artery, into which he inserts the cardiac catheter. Shortly afterward, the monitors located directly above the treatment table show

A close-up, profile view of a man with light brown hair and a mustache, wearing a white lab coat over a blue and white striped shirt. He is looking slightly to the right with a thoughtful expression. The background is a soft-focus green plant.

“Imaging is an essential tool that allows us to act wisely, effectively and in the patient’s best interests.”

Olaf Göing, M.D., Head Physician Internal Medicine II, Sana Klinikum Lichtenberg, Berlin, Germany

to recognize relevant structures and therefore make confident decisions,” even during routine coronary angiographies. Imaging work has now become far more efficient, increasing patients’ confidence.

Challenges and Expectations

For Göing and his team, the examination and treatment of coronary heart disease are part of day-to-day business. The principle challenge lies in the wide range of interventional options in the field of cardiology. In the cardiologist’s eyes, the juxtaposition of basic internal operations, interventional-surgical measures and electrophysiology centered on evidence-based medicine is unique. Göing’s expectations of the imaging technology in the cardiac cath lab are correspondingly high: “Imaging is an essential tool that allows us to act wisely, effectively and in the patient’s best interests.” In particular, the interventionalist requires excellent reproductions of the coronary arteries and high-contrast images without disruptive image noise when treating acute patients.

Adipose patients, who constitute around 30 percent of all patients in the Lichtenberg cardiology department, are some of the most difficult to treat in this respect. When the radiation first has to break through the barrier of adipose tissue, the resultant image sometimes resembles a “snow flurry”, as Göing puts it. These images fail to display vessel contours clearly, while it is difficult to differentiate between the coronary and surrounding tissue. Moreover, the clear recognition of cardiac catheter guidewires in clinically challenging situations proved problematic until now. Adipose patients with acute coronary syndrome, who may require resuscitation, already require the examiner’s full concentration and experience. In the light of these inauspicious imaging conditions and ambiguous diagnoses, it is possible that

the doctor that he has reached the target area with the guidewire. He recognizes that, although the cardiac muscle’s pumping action is markedly weak, no stenosis or thrombus is present. The precise imaging allows him to decide quickly and confidently that no surgery is necessary. The patient is naturally relieved at this news, and is

left to arrange his next appointment before returning home. During routine examinations like these, patients are initially unaware that they are being screened by older C-arm models or, as is the case here, with the latest high-tech generation. However, as Göing reports, doctors realize that Artis zee makes it “significantly easier

a high-grade stenosis may initially be missed. However, any delays in making the correct decision endanger patients.

Progressive Synthesis

Several pitfalls in interventional cardiology, linked to previous X-ray systems, are now a thing of the past. The high-resolution imaging technology offered by Artis zee facilitates exact reproductions of ultra-fine structures that are so essential to the positioning of guidewires or coronary stents, which requires millimeter precision. The flat panel detector uses new algorithms and image processing programs to produce improved contrasts and higher detail resolution. The new X-ray tubes also make a decisive contribution to these developments. The tubes' increased performance ultimately results in improved image quality during screening. The examiner's awareness is now no longer distracted by a poor signal-to-noise ratio, allowing him to concentrate better on the significant image information. For Göing, the synthesis of high-performance X-ray tubes and improved image post-processing produces clearly positive results: "improved image quality during screening." This is particularly beneficial to adipose patients, providing more precise images during interventions. And, in the case of slim patients, higher-quality images can be achieved with a lower radiation dose. This reduction in radiation exposure is particularly crucial in the case of young patients and those who require frequent examinations.

Examples of progressive developments facilitated by Artis zee and cited by the cardiologist include rotational angiography with 3D reconstructions and the significantly improved reproduction of stents. A large number of technical integration options are now also possible. The results of fractional flow reserve (FFR) and intravascular ultrasounds (IVUS) can thus be displayed immedi-

ately at the examination table, without the need for control-room involvement. Together with the optimized image quality, these techniques are crucial to the avoidance of superfluous interventions on the one hand, and, on the other, to recognizing the need to act during a situation of ostensibly secondary importance. An exemplary case of the above occurred at the clinic just a few days before. An adipose patient (BMI 30) presented an extremely narrowed atrial branch of the coronary vessels, while vascular occlusion was diagnosed in a second vessel. The decision to remove the occlusion would have been made under previous imaging conditions. Now, with precise images and under real-time conditions, it was possible to establish that the vessel in question was so small that it fulfilled no decisive supply function. The urgent problem was the serious constriction in the other coronary atrial branch, which was successfully corrected with a stent.

Investment in the Future – for the Patients

The new Artis zee system commenced operations at the cardiology clinic in Lichtenberg in December 2008. Several different options from a range of suppliers were assessed at the start of the decision-making phase. Göing's decision to recommend Artis zee to the Sana group was based on three core factors: image quality, system operability and the management of innovations. Intensive discussions were held with Siemens in order to identify the correct design for this particular location. After all, the innovation finally installed had to be a permanent fixture with future potential. As a result, the successful integration of IVUS and FFR was essential to Göing. He now enjoys a reliable partnership in which he receives the necessary updates and support, and also has the option to integrate future innovations in Artis zee, even if these are not designed

by Siemens. The delighted Clinic Manager comments: "We have great technology combined with a good partnership – a real win-win situation." Using innovations like these and participating in their continued development and implementation boosts the motivation of the team as a whole, radiographers and doctors alike. Göing: "It also makes it easier for us to attract qualified staff." However, these technical advances primarily serve the patients. A total of 2,500 examinations and 1,600 interventions, of which around 400 are acute coronary syndromes, are expected to take place in 2010. For the head physician, the importance of modern equipment like Artis zee is verified by the case of a 16-year-old girl. She was admitted with a fulminant pulmonary embolism, a heart rate of 180 and blood pressure of below 60 mmHg. The patient was resuscitated, but it proved impossible to dissolve the embolism without intervention. The quick, confident procedure carried out in the cardiac catheter laboratory successfully stabilized the girl's condition and resulted in the pulmonary embolism's direct intravascular elimination. Göing reports: "We were able to show the girl's parents waiting outside the laboratory that their daughter was recovering – that's something I won't forget." The cardiologist predicts fewer rapid developments for imaging in the mid-term, because the technology is already extremely advanced. Instead, he anticipates the creation of techniques for dual morphology and functionality assessments or ones that minimize radiation exposure even further.

Matthias Manych is a biologist, freelance science journalist and editor specializing in medicine. In addition to other topics, he writes about imaging procedures on a regular basis.

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The EP Lab of the Future

For a few months now, the small village of Cotignola in Italy is home to a brand new, state-of-the-art electrophysiology department. The Villa Maria Cecilia Hospital has recently built new rooms and equipped them with some of the most advanced medical systems available. Prof. Dr. Carlo Pappone, Head of the EP Department in Cotignola, can now truly treat his patients in the 'Lab of the Future'.



Cath lab 3: Artis zeego system for hybrid procedures

Electrophysiology is a fast-growing field in cardiology and more patients are now being treated with a minimally invasive catheter-based procedure to cure their irregular heart beats instead of taking medication for the rest of their lives. The clinical characteristics of patients referred for electrophysiological treatment have changed during recent years. While the number of patients presenting with single endocardial reentry-circuit-dependent tachycardias is stable and even declining, it is clearly evident that patients with complex, multifocal and transmural substrates due to structural and degenerative diseases of the heart are increasing exponentially. Atrial fibrillation (AF) and cardiomyopathies (CM) are the representative examples of structural and degenerative pathologies that will be the source of the majority of cases in electrophysiology in the future. "The treatment of these patients represents a formidable

challenge, as it will require the development of novel strategies of treatment and the improvement and innovation of biomedical equipment", explains Pappone.

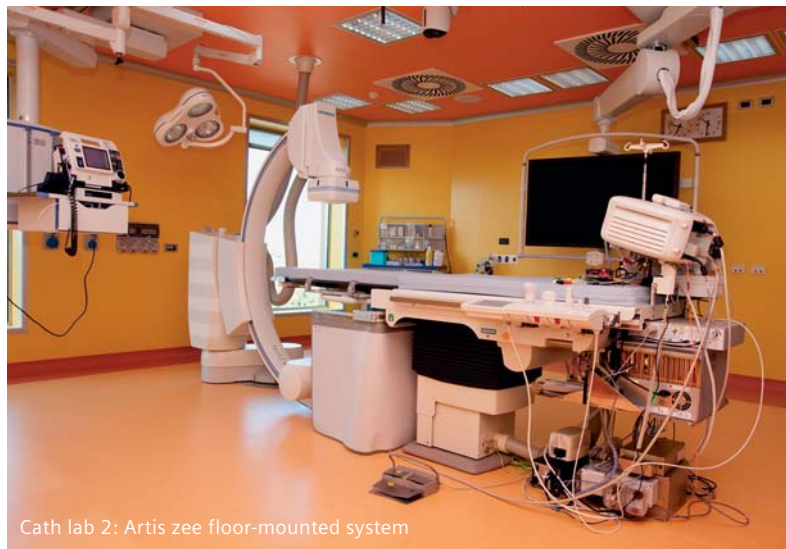
With the three new cath labs, the Electrophysiology Department can provide an ideal setting dedicated to the development of an interdisciplinary approach to patients with complex arrhythmias in congenital or degenerative heart disease, such as atrial fibrillation and heart failure. The specially designed rooms and the fully integrated technical and medical components allow hybrid procedures, alternative approaches to the epicardial aspect of the heart and treatment of hemodynamically unstable patients. With this architecture, the facility offers an ideal setting for the evaluation and development of new technologies of catheter navigation, imaging, reconstruction, image integration and ablation.

Easy installation and removal of equipment is key for an EP lab, as many medical systems are needed and they should all be available anytime, anywhere. With the right connection lines and cabling in all rooms, equipment can be added or removed without compromising the ergonomics of the lab. To enhance operator comfort, the new labs use only large displays with customizable layouts instead of multiple independent dedicated displays. The screen displays show all the necessary information for each stage of every procedure, avoiding the distraction of redundant or irrelevant information. The customizable aspect of the screen is very important because it permits continuous adaptation to clinical necessities. If new systems with new technologies are used in the lab, the generated images can easily be connected to the screen without complicated hardware adaptation. The rooms are directly connected to





Cath lab 1: Artis zee Magnetic Navigation system



Cath lab 2: Artis zee floor-mounted system

teaching facilities, research centers and clinical institutions worldwide via a high-speed Internet connection. This networking system will permit continuous teaching activity, direct online contact with companies and research facilities during product development and testing, online proctoring of less experienced centers as well as online consulting and cooperative research and clinical work with other hospitals throughout the world.

State-of-the art cath labs certainly need high-end medical equipment and imaging systems that support the treatment of heart rhythm diseases throughout the complete procedure. All our new systems are equipped with rotational 3D imaging, syngo DynaCT Cardiac, which creates CT-like images directly before or during the EP procedure to visualize and segment the left atrium. The acquired and segmented 3D images can also be directly exported to mapping systems and overlaid onto the live fluoroscopy images to help guiding the ablation catheter in a three-dimensional context. In addition, all rooms are also equipped

with non-fluoroscopic navigation equipment to reduce dose to patients, especially children, who are very dose-sensitive, during treatment.

The integration of all systems used in the lab played a very important role when the new lab was set up.

Different labs, different clinical goals

Every single one of the three cath labs at Villa Maria Hospital has been planned with a dedicated clinical focus to optimized treatment for various heart conditions.

Cath lab 1

Magnetic catheter navigation

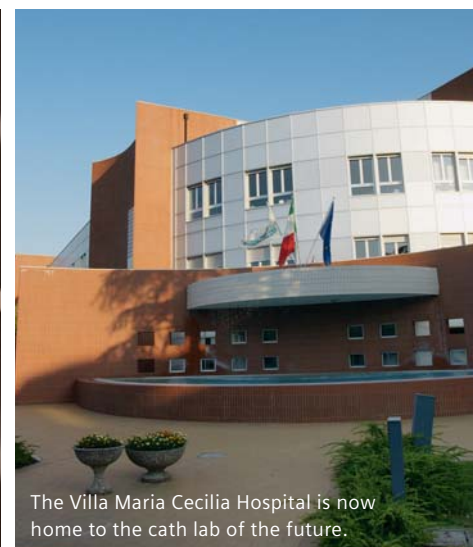
An Artis zee Magnetic Navigation system is the heart of this cath lab. Equipped with Niobe magnets from Stereotaxis, the lab is mainly used for the treatment of supra-ventricular arrhythmias, focusing especially on atrial fibrillation. The use of a system using magnetic navigation in electrophysiological procedures brings a number of potential advantages, including reduction in operator

dependency, reproducibility of results and more comfortable procedures for the patient. According to Pappone, the catheter maneuverability and contact stability permitted by the combination of soft-tip catheters and magnetic tip orientation make this system particularly attractive for the treatment of patients with complex substrates or unusual or difficult anatomies.

Cath lab 2

Image integration

The specialty of this lab is the ability to integrate a new medical positioning system in the future. This groundbreaking new concept works like a GPS system and will provide extremely accurate spatial localization of a dedicated miniature sensor that can be mounted on intra-cardiac devices, such as a catheter, an endoprosthesis, or an intravascular stent. Through continuous 3D spatial localization of the sensor with an accuracy of 1 mm, it can monitor the position of the devices equipped with the sensor in real time and therefore allows precise positioning of various devices



The Villa Maria Cecilia Hospital is now home to the cath lab of the future.

“When designing the new cath labs, there was one common goal: Keep the future in mind.”

Prof. Dr. Carlo Pappone, Head of the EP Department, Cotignola, Italy

inside the chest and the heart with significantly reduced amount of radiation.

Cath lab 3

Hybrid procedures

This lab was specifically designed in collaboration with cardiac surgeons, anesthesiologists and interventional cardiologists to work together on “hybrid” procedures. Its core is the Artis zeego, a unique angiography system based on robotic technology and more flexibility than any other C-arm system on the market. The system allows the cardiac team full access to the patient during continuous fluoroscopic imaging. The room can be used for various patient groups with different indications. Among them are patients with ventricular tachycardia who require a combined transcatheter endocardial and epicardial surgical approach. Others are candidates for resynchronization therapy for whom single or multi-site left ventricular stimulation is not feasible through the coronary sinus alone or who require concomitant resynchronization treatment and percutaneous mitral valve

repair for massive mitral regurgitation. This approach is also useful for unstable patients who require treatment under circulatory support and high-risk patients who are likely to require intensive hemodynamic support during or after the ablation or device implant procedure. The focus of the clinical research done in this lab is to create an innovative multidisciplinary approach within a complex clinical setting to treat patients needing simultaneous correction of structural pathologies of the heart or for whom the procedural risk is such that performing an ablation or implant procedure is not feasible in a standard setting. Particularly interesting are minimally invasive epicardial approaches and the development of dedicated instruments. Research will also involve the feasibility of epicardial devices that will use a non-thoracotomic subxiphoid approach.

“In 2011 we will start to build a new control room fully dedicated to remote procedures to further extend our networking concept by equipping the workplaces with the new Stereotaxis

Odyssey systems. My staff members will be able to perform remote procedures or supervise activities in centers that require assistance,” Pappone says, “and as we have a dedicated bioengineer on our team, we will also be able to provide direct technical support in case of equipment malfunction or hardware/software problems in interventional electrophysiological laboratories.”

The Future in Mind

“When designing the new cath labs here at Villa Maria hospital, there was one common goal for the whole project: Keep the future in mind. Anticipate future clinical developments and take a close look at future clinical needs. We want to take everything one step further with our equipment and I believe that the new labs will provide a unique test bed for new technologies and the development of new unconventional therapeutic strategies.”

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A person wearing a white short-sleeved shirt is lying down with their arms raised. The background is a blurred hospital room with wooden paneling and windows. The text is overlaid on the upper right portion of the image.

Putting the patient first

Hybrid operating rooms contribute considerably to reducing the trauma of surgery for patients. They also offer economical advantages to hospitals – precisely because they benefit the patients.



“One-stop
hybrid
techniques
really have
opened up
a whole new
perspective
in this field.”

Prof. Hu Shengshu,
President of Fuwai Hospital,
Director of the National Centre for
Cardiovascular Disease of China,
Peking, China

The Fuwai Hospital runs one of the largest cardiovascular programs in the world. More than 8,000 operations are performed in the Peking institution each year. This gives the Fuwai very extensive experience in this field. Professor Hu Shengshou is the President of Fuwai Hospital and the Director of the National Centre for Cardiovascular Disease of China – and he is a leading authority on hybrid approaches to surgery. Hu has no doubts that the hybridization of the cath labs and operating rooms into hybrid rooms represents the future of surgery. “The most important benefit,” says Hu, “is that hybrid rooms offer a new platform to promote cardiologists and surgeons working together to minimize trauma and to improve outcomes for patients. This means to actually practice the principle of putting the patient first.” Professor Hu and the Fuwai Hospital have participated in the development of hybrid approaches to surgery since the 1990s. “We began with hybrid methods in 1997,” says Professor Hu. “These treatments, however, were administered in sequence. That means that a patient would be in the operating room and receive one kind of treatment, then move to the cath lab, where he or she would receive another treatment.” The next step in sequence treatment was the move to the one-stop approach – the performance, that is, of both surgery and catheterization on the same table and at the same time. This became possible with the development of devices and techniques of real-time imaging, allowing the setup of truly hybrid operating rooms.

The Fuwai Hospital currently runs two such rooms. Having a long-term cooperation with Siemens, the hospital opted for a Siemens-equipped hybrid room in both cases. Its first room, with a floor-mounted AXIOM Artis dFA system, has been in use since 2007. The second room is equipped with an Artis zee floor-mounted system; it was installed in July 2010. For a hospital like the Fuwai in Peking, being at the forefront of technology is mandatory. “That’s why we opted for the next generation of the C-arms,” says Hu, meaning Artis zee floor-mounted. “Compared to the AXIOM Artis dFA, the new system has more advanced imaging applications and clinical tools.”

New perspectives for a wide range of applications

At the time of the interview, the installation of the second hybrid room had just been completed, so it was not in use yet – the first operation was scheduled for the following day. The Fuwai’s first room, however, had long established itself as the hospital’s busiest operating room.

“It has been in use every day,” says Hu. “From 2008 to 2009 we performed approximately 400 operations in this hybrid room” – including roughly 107 treatments of coronary heart disease and great vessel surgery each, as well as approximately 280 cases of congenital heart disease and about 17 aortic cases in 2009.

“In all these fields of application,” says Hu, “the one-stop procedures possible in a hybrid room are a significant improve-

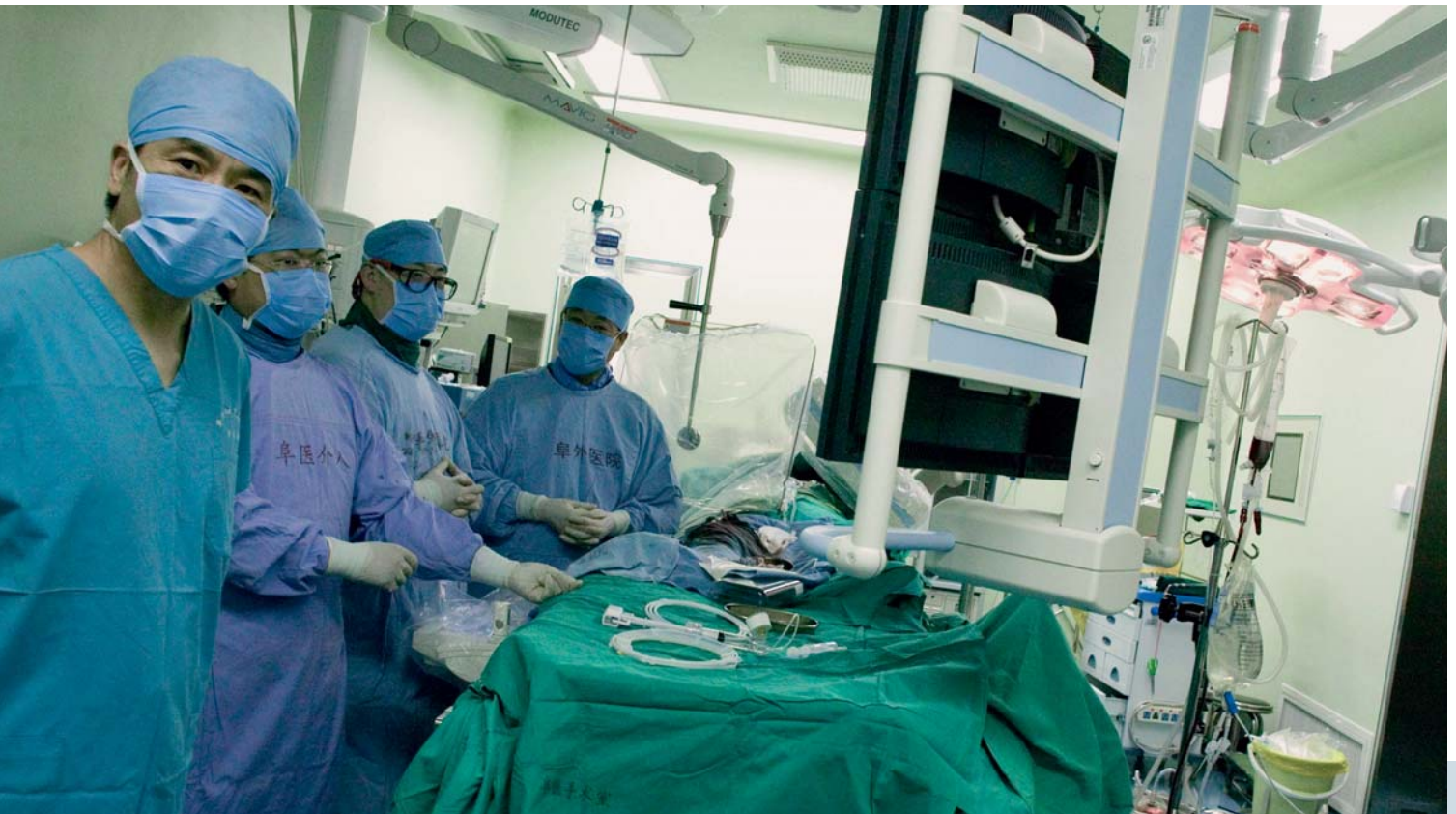
ment over traditional forms of surgery.” “The treatment of newborn babies,” he explains, “who suffer from pulmonary atresia is a case in point. With classical surgery, the mortality is very high. Interventional radiology alone did not have a high rate of success either. But with hybrid techniques, we have been able to improve the success rate significantly.”

Hybrid treatments are moreover of great benefit for particularly vulnerable patients, he adds. “This is a field where the hybridization of interventional radiology, cardiology, and surgery in one room achieves very, very good results.” The same is true for cases of congenital heart disease where classical surgery would require a whole series of operations. Hybrid techniques are a significant improvement here, explains Hu.

A further main field of application for hybrid techniques in the Fuwai Hospital is surgery of the great vessels. “With classical surgery this frequently required major surgical interventions and complications could arise. On the whole, the results achieved with traditional surgery were rather poor,” says Hu. “But one-stop hybrid techniques really have opened up a whole new perspective in this field. Conditions that used to require complicated procedures have become quite easy to treat.”


Hybrid Doctors

The already impressive range of applications possible with a hybrid room is certain to grow, Hu thinks. “The development of hybrid forms of treatment is an ongoing process,” he says. “And it is



A multi-disciplinary team of surgeons and OR staff are working together to enable optimal outcomes for the patient.



A man with dark hair and glasses, wearing a white lab coat over a purple checkered shirt, is shown from the chest up. He is looking slightly to his right and speaking, with his hands held out in front of him in an expressive gesture. The background is a blurred office or clinical setting with a computer monitor and other equipment visible.

“Hybrid operating rooms not only benefit the patients, but also help to enhance the workflow for the surgeons.”

Prof. Fu Weiguo, Director of the Department of Vascular Surgery,
Zhongshan Hospital, Shanghai, China

clear that the number of applications for hybrid surgery is going to increase continuously."

The development of hybrid procedures not only affects the treatment of the patients, says Hu. It will also have far-reaching consequences for the medical disciplines relevant to the work in the room. "Traditionally, a doctor trains as an internist, interventional radiologist, surgeon, and so on. But with the increasing hybridization of interventional radiology, cardiology and surgery, this will change. In the future, the emergence of hybrid techniques will not only change the clinical, therapeutic patterns, but also the patterns in the training of doc-

tors. This will gradually dissolve the boundaries between the different disciplines. Just as we have hybrid rooms today, I expect that in the future we will have hybrid doctors."

And not only in great medical centers such as the Fuwai. Hybrid rooms, Professor Hu is convinced, are equally useful for smaller hospitals.

In Shanghai, more than 1,200 kilometers further south, his colleague Professor Fu Weiguo, Director of the Department of Vascular Surgery in the Zhongshan Hospital, agrees.

Hybrid rooms are a new platform for multiple surgical disciplines and will spread fast and far, he is sure, not only

to centers of excellence such as his hospital. The Zhongshan Hospital is a major teaching hospital affiliated with the Ministry of Health and Fudan University. It was founded in 1937 in commemoration of Sun Yat-sen (who is commonly known in China as Sun Zhongshan), the great pioneer of the Chinese revolution. "In fact, I think that in the future it will not do for a hospital to run only one hybrid room," says Fu. "The reason is that the cardiovascular surgeon needs it, so does the vascular surgeon, and the general surgeon needs a hybrid room, too. So I would advise Siemens to produce more of them," he quips.

His hospital installed a ceiling-mounted Artis system in 2008. "We already had Siemens equipment – alongside equipment by two competitors – in our cath lab. Our interventional radiologist came to the conclusion that the Siemens equipment is one of the most reliable," says Fu. "Moreover, the resolution is excellent. Finally the exposure to radiation is very small for the doctors. Furthermore, it is easy to use and has great applications such as overlay fade. So the choice for us was pretty clear."

Win win situation for doctors' daily work and clinical efficiency

The Zhongshan Hospital so far uses its hybrid room exclusively for vascular surgery and has performed more than 1,000 cases by now. "We mainly use it for treatments related to abdominal aortic aneurysms, thoracic aortic aneurysms, aortic dissection and aortic bypasses. This is where we largely use road maps. Another thing that we pay a lot of attention to is overlay imaging combining 3D images with live 2D fluoroscopy," says Fu. In the future, he expects the use of the hybrid room to expand. "I think that later on, we will

The hybrid OR in Shanghai is equipped with a ceiling-mounted C-arm system from Siemens and is ideally suited for minimally invasive vascular surgery.





also use it for liver transplants and to check the liver artery and related conditions with angiographic imaging," he adds.

Using a hybrid room has enabled the hospital to increase its capacity for minimally invasive treatment. In the cath lab, only small surgical interventions are possible. This is because asepsis is limited in the cath lab, as is the work of the anesthetist. Minimally invasive procedures conducted in the Zhongshan Hospital's hybrid room, on the other hand, allow for a far greater range. They include the treatment of aneurysms, where formerly open surgery was required. The same is true for the treatment of aortic dissection. "This would have required a prosthesis put into place in the cath lab, whereas now we can solve the problem in the hybrid room by inserting a stent under image guidance," says Fu. "So this is another application where we can now replace traditional surgery with minimally invasive procedures." Other applications where hybrid rooms prove to be superior to conventional cath labs or ORs

In the past one and a half years, Dr. Fu and his team finished over 1,000 cases in the hybrid room.

include direct punctures of the renal arteries or complicated intracerebral aneurysms. Blood vessel occlusion is another case in point. "Formerly, we would have had to do a bypass, but as we can now insert a stent this is no longer necessary. Such techniques have brought us – have brought the patients! – huge benefits," says Fu.

"One very significant advantage is that blood transfusions are not necessary in such cases, because the surgical wound

one room under the same anesthesia, saving time and costs.

As a consequence, a hybrid room, besides benefiting the patient, can also be of economical benefit to the hospital. "From a medical standpoint, there can be no doubts about the benefits of hybrid rooms," says Professor Fu. "Because I want my patients to get optimal care at any time. Moreover, from a purely medical standpoint of course, questions of funding are immaterial. That's up to

"From a medical standpoint, there can be no doubts about the benefits of hybrid rooms."

Prof. Fu Weiguo, Director of the Department of Vascular Surgery, Zhongshan Hospital, Shanghai, China

is minimal," says Fu. This also means that the time patients need to stay in the hospital after surgery has decreased dramatically. "In cases of surgical interventions that used to require a stay of two weeks, the patient today can leave after two or three days, because with minimally invasive treatment, the incision obviously is very small, which means that the recovery time for the patients is short," says Fu. Originally, some complicated cases had to be done in two steps. First, an aortic bypass in the operating room, then a stent was placed in the cath lab. Now, with the hybrid room, these two steps can be completed in

the chairman of our department," he quips. "But naturally, he sees the needs of the patients too. When we were in the process of deciding to acquire a hybrid room, we had no doubts, neither from a medical nor from an economic point of view."

Justus Krüger is a freelance journalist based in Hong Kong. He has written for the Financial Times Deutschland, Geo, the South China Morning Post, the Berliner Zeitung and M&K Wissen.

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State-of-the-Art Training

Shanghai Training Center provides training modules for angiography, fluoroscopy and radiography systems.

Siemens Healthcare has implemented a global training process in order to offer state-of-the-art training for Customer Service Engineers, applications specialists, and customers worldwide. Three training centers have been established: Shanghai in China; Cary in North Carolina, U.S.; and Erlangen, Germany. China became a logical choice as the location of the third Siemens Training Center, because it is a fast growing healthcare market, and on its way to becoming the largest market in Asia. All training centers are equipped with the latest Siemens systems and the most current software. The center in Shanghai is the most recent addition. As part of Siemens Medical Park Shanghai, it is equipped, for instance, with two digital radiography and fluoroscopy systems (AXIOM® Aristos and Iconos). Each training center is independent yet also interconnected with its two sisters. If a customer requires training not offered in Shanghai, Siemens offers the option to join a class in either Erlangen or Cary. The three training centers offer the same quality of training. To help to provide a truly global and standardized training approach, our trainers rotate

worldwide. All courses are held in English, as the centers not only serve their respective home markets. The courses help Siemens customers deepen their understanding of extremely sophisticated, state-of-the-art medical equipment such as radiography, fluoroscopy, and angiography systems. That in turn empowers them to improve workflows, avoid and detect operational errors, and fully utilize their equipment's potential. This improves exami-

nation results and increases patient care and satisfaction.

UPTIME Services training is based on the combination of theoretical and practical knowledge in an effective learning environment. All participants receive a certificate after having passed the course.

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The training courses offer the following customer benefits:

- Improved examination results by utilizing all existing functionalities
- Increased patient satisfaction thanks to shorter examination times
- Additional revenues due to well-organized assignment of staff and system
- Competitive edge thanks to higher efficiency
- Higher system availability because of workflow and maintenance improvements
- Economic staff planning due to increased know-how

Two Partners. One Room.

A shared dialogue on ideas and technologies that deliver the symbiotic, hybrid environment you need for cardiac procedures with devices and imaging. Opening up a new range of therapy possibilities.

Stronger together. The hybrid room.



Medtronic

Strategic
Partners

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Hospitals today need to restructure their operating rooms so they can adapt easily to different medical requirements and surgical procedures. Having recognized this trend early on, Siemens has been a pioneer in developing state-of-the-art hybrid room technology for years, installing them in hundreds of locations around the globe. This year, Siemens installed its 250th hybrid room in Cape Town, South Africa – the first in the southern hemisphere with Artis zeego.

250 Installations Worldwide: Siemens Continues Pioneer Role in Hybrid Rooms

By Kristin Palitza

The Cape Gate Medi-Clinic, a spanking-new, 140-bed, multi-disciplinary hospital with a ten-bed ICU and six ORs, recently purchased a Siemens Artis zeego system. It is the only high-end C-arm system currently on the market that is based on robotic technology and that offers clinicians unique imaging possibilities without having to move the patient. The C-arm system also gives more flexibility because it can be “parked” easily in the corner of the room, or against the ceiling, which saves space in the OR and thus won’t interfere with the surgeon or the anesthesiologist.

With the Artis zeego, the Cape Gate Medi-Clinic has turned one of its ORs into a one-stop shop for radiology, open surgery and endovascular interventions. “It’s an extremely specialized unit that is built around surgeons’ needs,” says Cape Gate Medi-Clinic hospital manager Riaan Vorster. “We looked at different hybrid room manufacturers but decided to go with Siemens, because the Artis zeego is the only model that has in-built robotic technology and the functionality that comes with that,” he explains. “We also like its user-friendliness and the additional elements, like the specialized



Siemens Artis zeego system is installed in the hybrid operating room at Cape Gate Medi-Clinic.



Riaan Vorster, Hospital Manager of Cape Gate Medi-Clinic showing the flexibility of the newly installed Artis zeego system.

operating table." The system comes with an integrated OR table that has a floating tabletop and vertical as well as lateral tilt movement, which gives surgeons easy access to the patient all around.

As the manager of a hospital, which just opened its doors in February 2010, Vorster is keenly aware of the fact that clinicians increasingly require extremely versatile ORs that allow them to carry out both open and complex minimally invasive surgical procedures in the same room. By investing in the Artis zeego, he laid the basis to attract new therapeutic opportunities and thus the best physicians in the country, he says.

Saving Cost, Time and Lives

Using a hybrid room means that it is no longer necessary to start operating only once a patient has undergone imaging in the hospital's radiology department. Because the Artis zeego enables pre-operative imaging inside the OR, physi-

cians can address patient needs much more quickly than before and thus eliminate the hassle of scheduling additional surgical procedures.

In short, procedures can be performed faster, more efficiently and with fewer risks and complications. "The biggest advantage for patients is that the hybrid room is a one-stop option. There is no rescheduling, no different appointment, no moving between different floors," explains Professor Danie du Toit, a vascular surgeon at the Cape Gate Medi-Clinic. As a result, patients have to spend less time in various ORs, which usually leads to shorter intensive care stays and lower hospital bills.

Any equipment that saves time has the potential to save lives, too. Hybrid rooms lower a patient's infection risk because they minimize the need to move patients from one room to the next for different procedures. To control infection risk even further, the Cape Gate Medi-Clinic's hybrid OR is outfit-

ted with a laminar flow ventilation system. There are an increasing number of hybrid procedures that require a sterile environment, anesthetics and high-end imaging to be available during the operation. One of the key advantages of the hybrid room is that it allows clinicians to integrate open and endovascular surgery. Du Toit hopes to make the hospital's hybrid room the most sought-after surgical facility in the region. "With the Artis zeego, we can give our patients much better service, because it's all one integrated procedure," he notes.

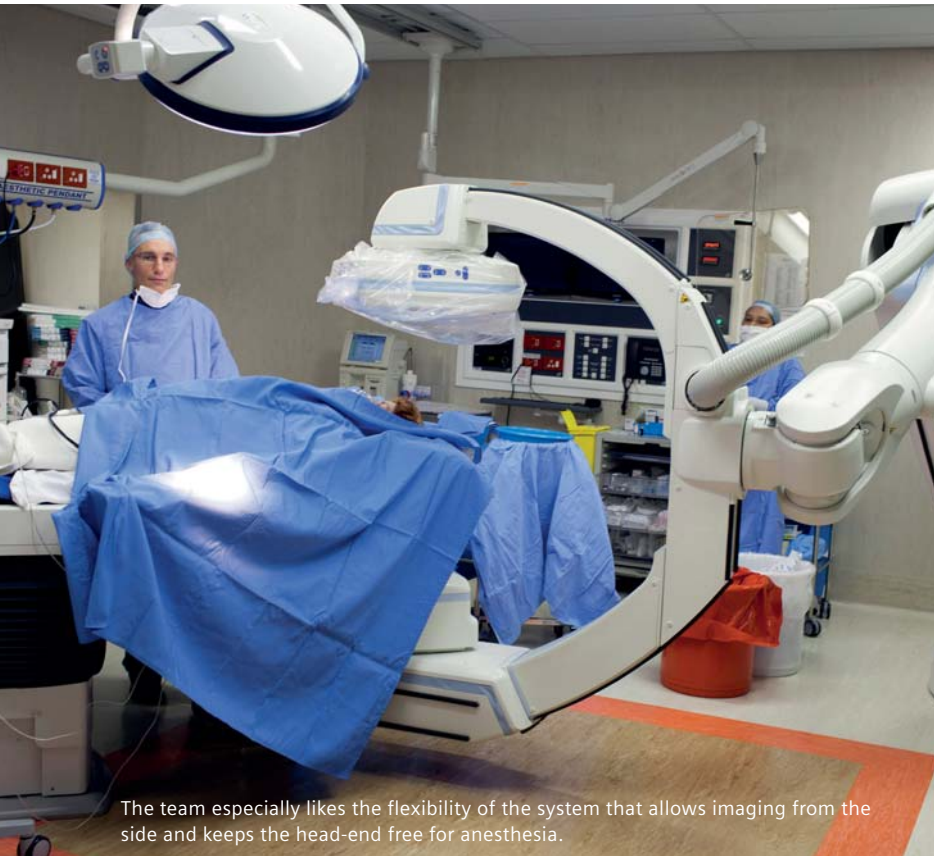
Du Toit, who works at the Cape Gate Medi-Clinic three days a week, currently attends to an average of four patients each day in the hybrid room. He predicts that in the next five to ten years, the hybrid room concept will become a "must have" for all South African hospitals. "Hybrid rooms are the future, not only for vascular surgery but also for cardiology, oncology, gynecology and neurosurgery," he says. Although the Cape Gate Medi-Clinic currently offers only vascular services, it is hoping to open a cardiology unit in the near future.

Hospitals have an increasing demand to use high-end imaging equipment in an OR environment, because most new surgical therapies require highly advanced imaging systems to perform them. There are many patients suffering from cardiac disease, for example, who are either too sick to be operated on or still too healthy for treatment. They can now be treated with minimally invasive endovascular procedures in hybrid rooms.

"The Artis zeego is a fantastic concept. Due to its imaging technology, we can treat more patients in an endo-vascular manner, without the need to expose them to open surgery. In fact, 50 percent to 60 percent of vascular procedures that used to be surgeries have now become endovascular procedures, thanks to this new technology," notes du Toit.

Imaging from Multiple Angles

The Artis zeego's C-shaped, rotating imaging arm enables surgeons to easily

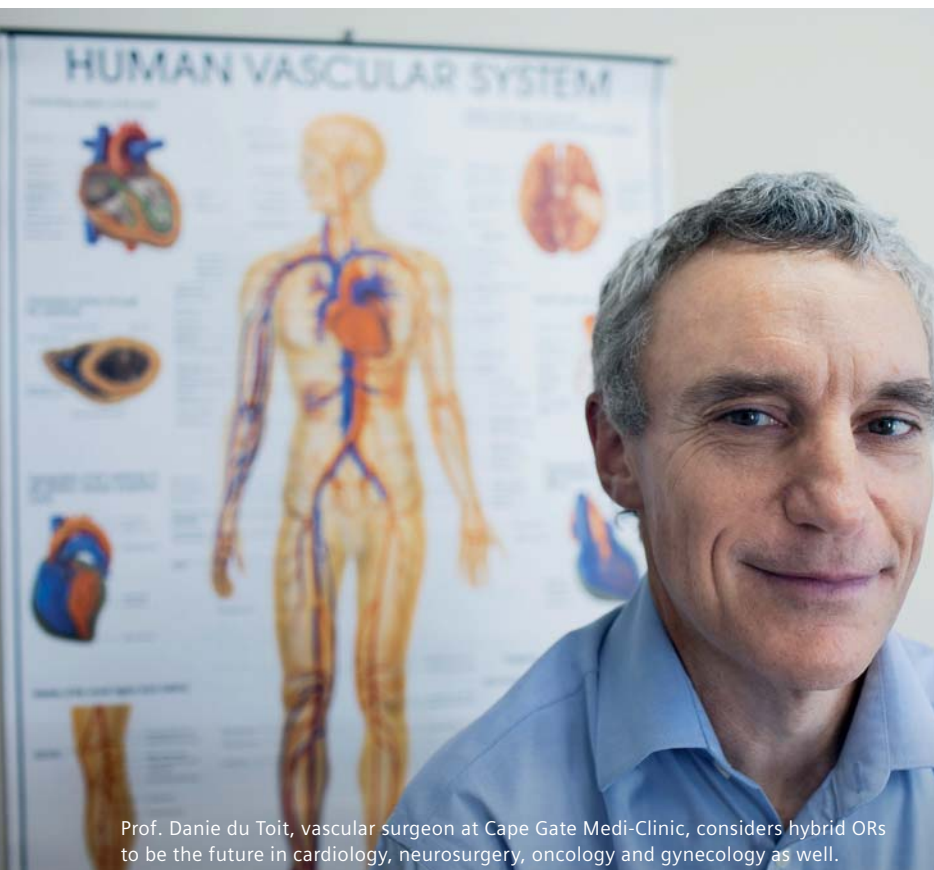


The team especially likes the flexibility of the system that allows imaging from the side and keeps the head-end free for anesthesia.

acquire views from various angles, offering more comprehensive diagnostic possibilities. Joan Dippenaar, the X-ray technician who operates the Artis zeego at the Cape Gate Medi-Clinic, says

“With the Artis zeego, we can give our patients much better service, because it’s all one integrated procedure.”

Prof. Danie Du Toit, M.D.,
Vascular Surgeon, Cape Gate Medi-Clinic,
Cape Town, South Africa



Prof. Danie du Toit, vascular surgeon at Cape Gate Medi-Clinic, considers hybrid ORs to be the future in cardiology, neurosurgery, oncology and gynecology as well.

she is impressed with the functionality and user-friendliness of the system. “It can do so much more than traditional radiography technology. You can bring the robotic arm in a lot of different positions and at the same time move the operating table in more than one plane,” she notes. “You simply tell the machine which body part needs to be imaged and it travels into that exact position by itself. That makes our work much easier and faster.”

Until recently, screening could only take place at the same time as operations if the necessary equipment was wheeled into the operating theater. This used to limit the space available to the surgeon. The Artis zeego, however, has been designed with the dimensions of the theater in mind. In an OR of only 50m², it can be neatly stored away from the operating table until it is required. Dippenaar says she particularly appreciates the option to park the unit out of the way with just the press of a button. Each image taken by the Artis zeego is immediately displayed on a 56-inch,



“Our vascular unit generates at least 15% of our overall profit. Through the Artis zeego, this unit has become our hospital’s center of excellence.”

Riaan Vorster, Hospital Manager, Cape Gate Medi-Clinic,
Cape Town, South Africa

medical-grade screen with 8-megapixel image resolution, showing all of the critical details – directly at tableside and with better sharpness. The system’s 2D and 3D visualization functions perfectly show bones, organs and also soft tissue. This means less radiation for the patient, because more information can be gained from a single image.

All images are linked into a centralized data management system, which helps the surgeon to gain a better overview of all patient data and thus make faster and better decisions. Dippenaar says she finds it extremely useful that she can program the C-arm to move back into an exact previous position, for instance during or after the intervention. “That means we can re-image without radiation and without having to re-inject contrast liquid. Additionally, the high quality of the images means that we can dilute the iodine contrast liquid, which is a benefit to patients’ kidneys.” She also likes the fact that she can adjust the different computer screens and move them as needed, depending

on where the surgeon stands at the operating table. Additional screens right next to the image help to monitor a patient’s vital functions. This has shown to be particularly helpful for guiding catheters and needles with more confidence during minimally invasive surgery.

Generating Revenue

From a hospital management perspective, investing in hybrid room technology is of advantage not only to patients’ recovery and health. It also has substantial financial benefits for the hospital itself. Vorster highlights the fact that surgeons generate the highest revenues for a hospital, especially if they can offer highly specialized services, supported by the most advanced technology. “Our vascular unit generates at least 15 percent of our overall profit. Through the Artis zeego, this unit has become our hospital’s center of excellence, which makes us extremely competitive and gets us patient admissions from an ever wider-reaching area,” he says.

Vorster believes the purchase of the hybrid room system has secured the Cape Gate Medi-Clinic’s future. “We are hoping to see a return on our investment in the Artis zeego in five years’ time, and current calculations show that we are spot on in terms of that target, although the hospital currently only uses 35 percent of the hybrid room’s capacity,” he says.

It therefore doesn’t come as a surprise that the first installation of the Artis zeego in the southern hemisphere has generated much interest from physicians far and wide, claims Vorster: “Since we installed the hybrid room technology a few months ago, we have had much interest from other private hospitals that would like to find out how it works in practice.”

Kristin Palitza is an award-winning freelance healthcare writer, editor and correspondent based in Cape Town, South Africa. She writes news, in-depth features and commentary for the South African, German and UK print media, among others.

The First of its Kind – The Pioneer in Hybrid Rooms

By Irène Dietschi

The Monaco Cardio-thoracic Centre (C.C.M.) is an independent 40-bed hospital devoted to thoracic and cardiovascular diseases. Built at the end of the eighties by the initiative of cardiac surgeon Dr. Vincent Dor, its aim has been to enable permanent and international teams of doctors to accommodate patients from the Mediterranean region as well as from other European countries. With more than 2,500 catheterizations and about 800 cases of surgery each year, the C.C.M. is quite active.



Dr. Vincent Dor is a cardiac surgeon based in Monaco and the founder of the Monaco Cardio-thoracic Centre (C.C.M.). Last February, at 77 years of age, he retired from daily practice of surgery, but he is still active and healthy, he says.

Dr. Dor, the hybrid room technology by Siemens was launched in the Monaco Cardio-thoracic Centre. Can you tell us how it all started?

When we began with the C.C.M. project back in 1986, the architects designed one of the two cath labs for patients who needed surgery immediately but couldn't be moved. Four years later we implemented this idea together with Siemens: a state-of-the-art operating theatre with an angiography system normally used in interventional cardiology built inside. It was a 'hybrid room'

according to current understanding, although we didn't use that term back then. We called it an 'angio surgical room'.

So you were ahead of your time ...

If you want to be successful in medicine you must anticipate the needs of your patients. And what was needed in invasive cardiac surgery was the ability to do the procedure immediately without having to transfer the patient to another department or from one hospital to another. We said this kind of operating room was the tool of the future.

What are your experiences looking back?

We have examined the utilization of our hybrid room very carefully over the years: more than 6,000 procedures have been done in this room, all of which had a potential risk of surgery during the operation. For example, we've treated well over 2,000 cardiac infarctions, 535 in an acute phase, twelve of which needed a conversion to cardiac surgery immediately in the same room. This could be done without any trouble. For other procedures such as angiography, angioplasty, valvular dilatations or vascular stent surgery, the ratios of imperative conversion to immediate surgery was about the same. The nurses and technicians who work in the hybrid room have multiple skills, mastering both surgical as well as radiological techniques.

How did the room develop?

Prior to our room nothing like it existed. We built a hybrid table with a surgical

root platform and a radiological tray, with material from Siemens. Around 2000, Siemens modified the table so it became more adaptable for vascular surgery. It was a very long tray with a different root platform. And recently in 2010 we acquired a new Artis zee angiography system from Siemens.

Can you describe your relation with Siemens?

It's been a very long and fruitful relationship on both sides: when we had the cost calculations to the center in 1984/85 we approached three big medtech companies to become our partner. Siemens was the only one that went for the deal. They agreed to be in charge of all the center's equipment, which was mostly Siemens but not all, and we paid them according to a leasing schedule.

Do you see yourself as a pioneer with regard to hybrid rooms?

Not really. At the end of the eighties, with the increase of catheterization in cardiology and cardiac surgery, it was obvious that such a room was needed. There was much talk about it by many people. We were just the first ones to actually build it.

Irène Dietschi is an award-winning Swiss science and medical writer.

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Yielding Benefits with Ysio

Interview with Mr. Gunes Sar, Project Leader of Equipment Purchasing/ Unit Construction, and Manager of the Departments of Radiology, Vascular & Nuclear Medicine, Zaans Medical Centre, Zaandam, The Netherlands.



Please tell us about the medical imaging department at the Zaans Medical Centre.

We perform in excess of 120,000 procedures per year at the Zaans Medical Centre imaging department. We have eight full-time radiologists working here, with an additional 45 radiographic technologists. We offer a complete gamut of imaging services, which is very easy to do now that our department has installed the two Siemens AXIOM Aristos FX Plus systems and one Siemens Ysio digital radiography (DR) system with a wireless detector and one fixed detector in the wall-mounted Bucky. We also have the Ortho package installed in all three of the machines.

We recognize an important area in the management of a medical imaging department is the efficient use of equipment and improved workflow. How has the Ysio made an impact compared to other DR/CR systems?

The changeover from analog to digital radiography with the Siemens Ysio has had a great impact on our workflow. Working with the two AXIOM Aristos FX Plus systems since 2008, we improved our throughput by up to three times with our X-ray procedures. Since the installation of the Ysio system in 2009, we have entered another dimension of speed and efficiency in DR procedures. As well as its ability to be installed specifically to our needs, the Siemens Ysio DR system also makes it possible to help clinical patients at the bedside, with picture quality that rivals CR in sharp-

benefits that all imaging department managers can appreciate.

How has the installation of the Ysio and the department's existing two AXIOM Aristos FX Plus systems helped you to schedule your patients within the different rooms?

Using our RIS, we can plan the exam path for every patient in any of the three rooms. The Ysio enables the radiologist to remotely organize patients from the comfort of the Ysio room. The other huge benefit is the flexibility and versatility of the wireless detector. In

“In a nutshell, the patient can remain in his own bed with the Ysio – that’s a quality improvement for the patient!”

ness and readability. This is better for the patient, because the specialist can now see the image within five seconds on the screen. For the radiographic technologists the Ysio has proved to be highly efficient, fast and with high quality, featuring new generation detectors. You can use the touchscreen pad on the Ysio if you want to adjust kV or mAs or other criteria. We used to have five analog CR rooms – now we have three DR rooms, saving us space. Our workflow has improved by a factor of three, and throughput has also increased. Quick diagnostics for the patient, higher throughput, better workflows, and ease of use for radiographic technologists are

a nutshell, the patient can remain in his own bed with the Ysio – that’s a quality improvement for the patient!

What did you identify as the particular strengths of the Ysio as opposed to its other competitors when you were making your purchasing decision?

The main positive attributes that contributed to our decision to install the Ysio were:

- Wireless detector with high-quality X-ray images
- Very easy to use
- Touchscreen interface on the X-ray tube



“Since the installation of the Ysio system we have entered another dimension of speed and efficiency in DR procedures.”

Mr. Gunes Sar, Project Leader Equipment Purchasing / Unit Construction,
Manager Radiology, Vascular & Nuclear Medicine Department, Zaans Medical Centre, Zaandam, The Netherlands

- An automatic movement control is pre-installed – this is a big plus for the radiographic technologists
- Special ortho software is available from the vendor, so that we can do stitching procedures using our multi-modality workstation
- The system is very fast in its movements and post-processing
- It is a compact, fully automatic system, which can be installed even if there is a shortage of space in the department

Has the installation of this system brought any other unexpected benefits? Here I would particularly like to highlight the ergonomic features for the radiographic technologists, which are excellent. Everything is fully automated, and controlled by the technologist. Our dedicated DR room is large enough, leaving more space for bed patients or trauma trolleys.

What two key benefits you would emphasize about the Ysio system if you were speaking to another imaging department manager looking to purchase a DR system?

The two main benefits I would emphasize to another imaging department manager are firstly that it is a very fast system that enhances your workflow, with a very good price-quality ratio. Secondly, the training of radiographic technologists on the Ysio is very fast and easy indeed, which saves a lot of time compared to other systems.

Do you plan to modernize the department further in the future, and if so, in what areas?

We are still busy modernizing our medical imaging department. As part of our cooperation with Siemens, we purchased two ARCADIS® Varic mobile C-arm systems for the OR and one

SPECT.CT with Symbia T6 for our nuclear department with another soon on the way. The newest machine that we have purchased is the Artis zeego multi-axis system, which will be the first system for interventions of its kind in a radiology department in the Netherlands. We are very proud that this was made possible with the help of Siemens Germany and Siemens Netherlands – particularly to acquire the Artis zeego, with its large display. We hope that this will be operational by October of this year.

For more information please visit www.siemens.com/ysio

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More Space for our Smallest Patients

Interview with Dr. Caren Landes, Consultant Pediatric Radiologist at Alder Hey Children's Hospital NHS Foundation Trust, Liverpool, England, United Kingdom on the recent installation of an AXIOM Luminos dRF.

Founded in 1914, Alder Hey Children's NHS Foundation Trust in Liverpool U.K. is one of Europe's largest children's hospitals, providing care for over 200,000 patients each year as well as being a national center for head and face surgery and a center of excellence for

children with cancer, heart, spinal and brain disease.

Dr. Caren Landes is a consultant pediatric radiologist at Alder Hey children's hospital where an AXIOM Luminos dRF was recently installed. She was kind

So, patient access was an important consideration. How was this system able to address this?

The footprint of the unit itself is smaller than the old one allowing more free space in the room. Another thing that

“One of the most important benefits is the adjustable table height.”

enough to take some time to explain their decision criteria when selecting this system and her experience with it so far.

You have recently installed an AXIOM Luminos dRF system. Can you explain your reasons behind the purchase of this type of system and how this is integrated into the department?

It's installed in the X-ray department in a dedicated screening room. We had a screening unit in the room that had reached the point where it needed replacing. We looked at a number of units whilst we were thinking about replacing the old system, with a view to addressing some of the problems with the old system. One of the limitations of the old system was that we couldn't get around the back of the unit in order to hold the smaller babies for some of the more specific examinations.

I was surprised about how small the electronics are behind the scenes. It's really just a single box on the wall, whereas the old system had a huge wall full of cupboards. We were very lucky when we put the unit in as we were able to redesign the room to make it much more accessible for patients and staff.

Have you found any other benefits that you did not anticipate initially?

One of the most important benefits is the adjustable table height. You can imagine that we're dealing with children of all sizes and heights, and if you're only small coming into a room where everything is towering above you, it can be very intimidating. The fact that we can bring the table down to a child's level is fantastic. They climb on and then have a little ride to bring them to our level.





“Because the footprint of the unit itself is smaller than the old one, the Luminos dRF opens up more space in the room.”

Caren Landes, Consultant Pediatric Radiologist, Alder Hey Children's Hospital, Liverpool, England, UK

Can you describe the volume and type of examinations you are performing with the system?

We do around 30 patients a week across the whole spectrum. We obviously do screening on the unit, so that typically means gastrointestinal and urological studies, but we also use it in association with other teams within the hospitals. Urodynamics use the system as do speech language therapists to do phonetics and swallow assessments. We also use it for leg length and spinal measurements so we cover a huge spectrum of patients.

Are there any examinations that you perform now that were not possible previously?

The full length spine views are new to us. We didn't use the previous system to do that. It has made a huge difference for the orthopedic surgeons who really like to see full length spines for planning for surgery.

Dose is obviously an important issue, especially in Pediatrics. What is your experience with the new system in this respect?

We've always been extremely aware of the importance of making sure we use low doses on children. On the old unit we did have low doses when compared with the national standards, but with the Luminos dRF we reduce the doses even further and it hasn't been at the detriment of the image quality.

Good that you mention image quality. How satisfied are you with this on the new system?

The image quality has been really good. We have a good relationship with Siemens and they've been fantastic setting up their protocols to make sure that we get the best image possible.

What about the 2-in-1 capabilities* of the system. Are they of benefit in pediatrics?

Particularly when you're dealing with children, you need to make sure the patient is happy. If they are happy on the system and they need a plain film, it's great that they don't have to come out of one room, go into another room and potentially get upset. It makes a huge difference that we can do everything in here in one shot.

The other thing that we do use all the time is the fact that you can take a run of fluoroscopy and then take a still image from the run rather than an additional plain film exposure. So you don't have to worry about catching the images all the time, you can take a run and then select the relevant images at the end.

*The 2-in-1 solution offers all benefits of digitized workflow applied to fluoroscopic and radiographic procedures.

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Diagnosis of Idiopathic Primary Esophageal Achalasia Supported by Luminos dRF

Courtesy of Caren Landes, M.D.

Department of Pediatric Radiology, Alder Hey Children's NHS Foundation Trust, Liverpool, England, United Kingdom

Patient history

An 11-year-old boy presented with a 12-month history of worsening dysphagia and vomiting. He was unable to tolerate solid foods and had resorted to a semi-solid/liquid diet. There was also evidence of significant weight loss.

Diagnosis

The imaging tests requested included a chest X-ray, an upper gastro-intestinal (GI) contrast study and an abdominal ultrasound.

In view of the patient's symptoms, the upper GI contrast study was performed as the initial examination.

The patient was able to comply and swallow barium in the supine position. Fluoroscopy demonstrated a dilated esophagus with inhibited peristalsis and acute tapering at the lower esophageal sphincter with narrowing at the gastro-esophageal junction, producing a 'bird's beak' appearance. The patient was then brought into the erect position under fluoroscopic control and barium was seen to pass through the narrowed gastro-esophageal junction, confirming the diagnosis of achalasia.

Treatment

As a result of the prompt diagnosis the patient was referred to the pediatric surgeons for esophageal dilatation.

This was performed successfully and without complications allowing the patient to resume a normal diet.

Comments

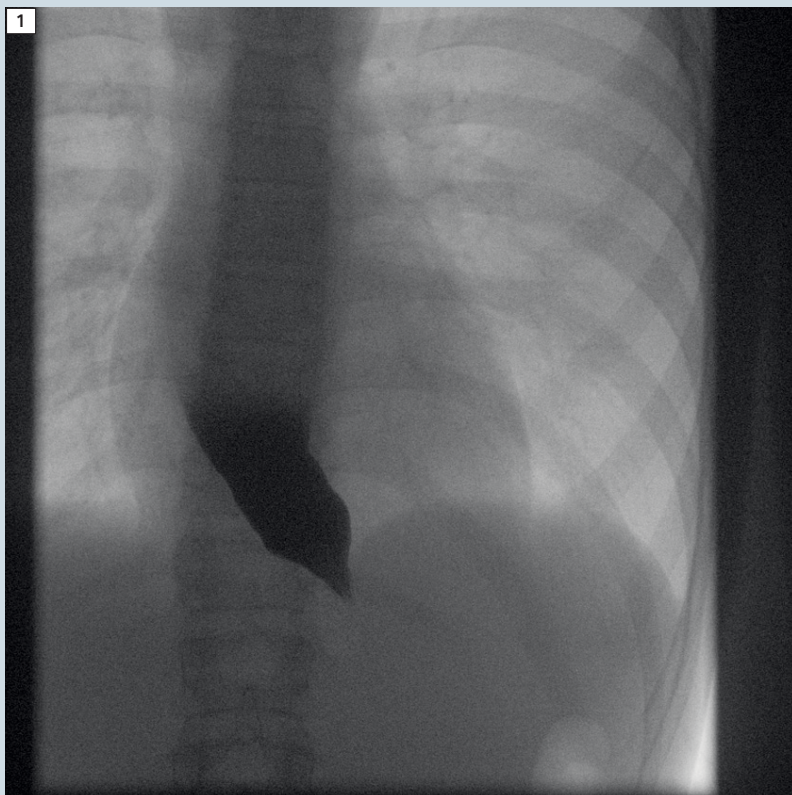
As there was considerable clinical concern, the request was expedited to ensure the examination was performed as promptly as possible. Expedient management of this case also had the benefit of reducing anxiety in both the child and his family.

The prompt assessment and immediate diagnosis meant that an appropriate management plan could be initiated as soon as the imaging had been performed. The ability to adjust the position of the table quickly and easily with the patient in position is invaluable in the assessment of an anxious child, improving patient compliance and therefore the diagnostic result.

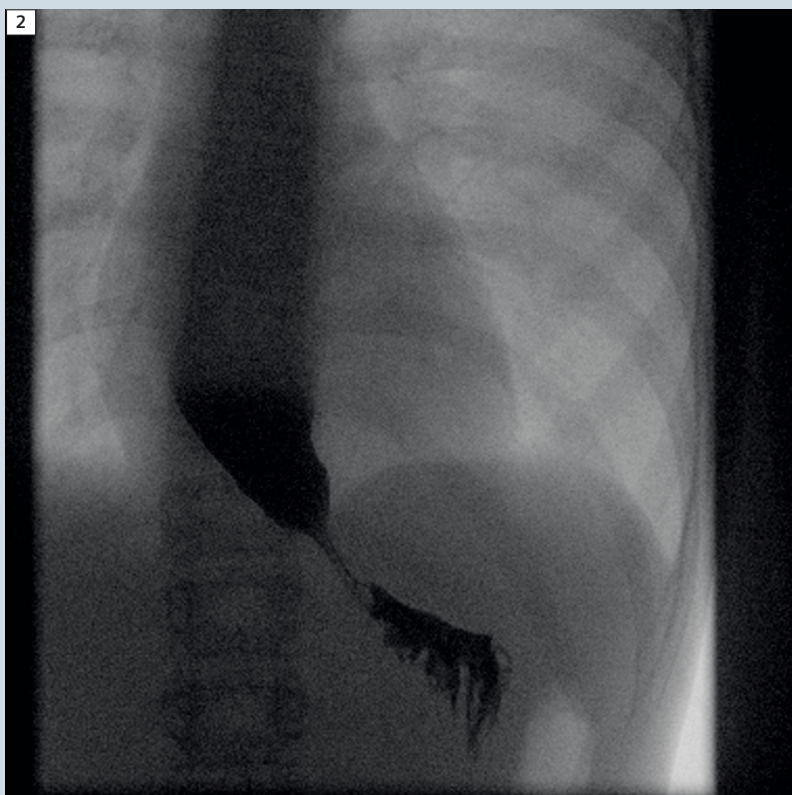
In addition the image review on the workstation and flexibility of the viewing screens allows the radiologist to show the patient and the family the images, highlighting any explanations given with examples.

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1 Contrast filled a dilated esophagus and failed to pass through the gastro-esophageal junction while the patient was in a supine position, giving the appearance of a 'beak' at the distal end.



2 With the patient erect contrast was seen to pass through a narrow gastro-esophageal junction, confirming the diagnosis of achalasia.



How to Join the Digital Era

'Digital revolution' is among the buzz words of the last decade and has affected almost every part of our lives. Digital X-ray equipment also brings tremendous advantages to medical imaging and to hospitals; however, the initial investment is often a barrier to converting to digital, leading to the question: Can I upgrade my analog system to evolve to a fully digital solution, rather than replacing it? Siemens has the answers to help customers join the digital era with ease.

“We have a very busy department, and needed a durable and reliable system. Our workflow is very efficient. Our patients’ visits are expedited and they are very satisfied. The mobile detector is not an issue. In fact, it is a success!”

Pam Southard, Director of Imaging at Ferrell-Duncan Clinic, Springfield, MO, USA

Many hospitals are already reaping the benefits of digital equipment and the workflow improvements it brings to a radiography department. The integration of a mobile flat detector (mFD) may make a huge difference. The mFD boosts the overall versatility of the system, enables quick and easy handling and streamlines the workflow. Additionally, the mobile flat detector helps save time and cost as it enables direct digital radiography and eliminates the need for film or CR (computed radiography)

cassettes. It supports table Bucky, wall Bucky and free exposures providing the advantages of digital radiography while maintaining the familiarity of conventional film cassette handling.

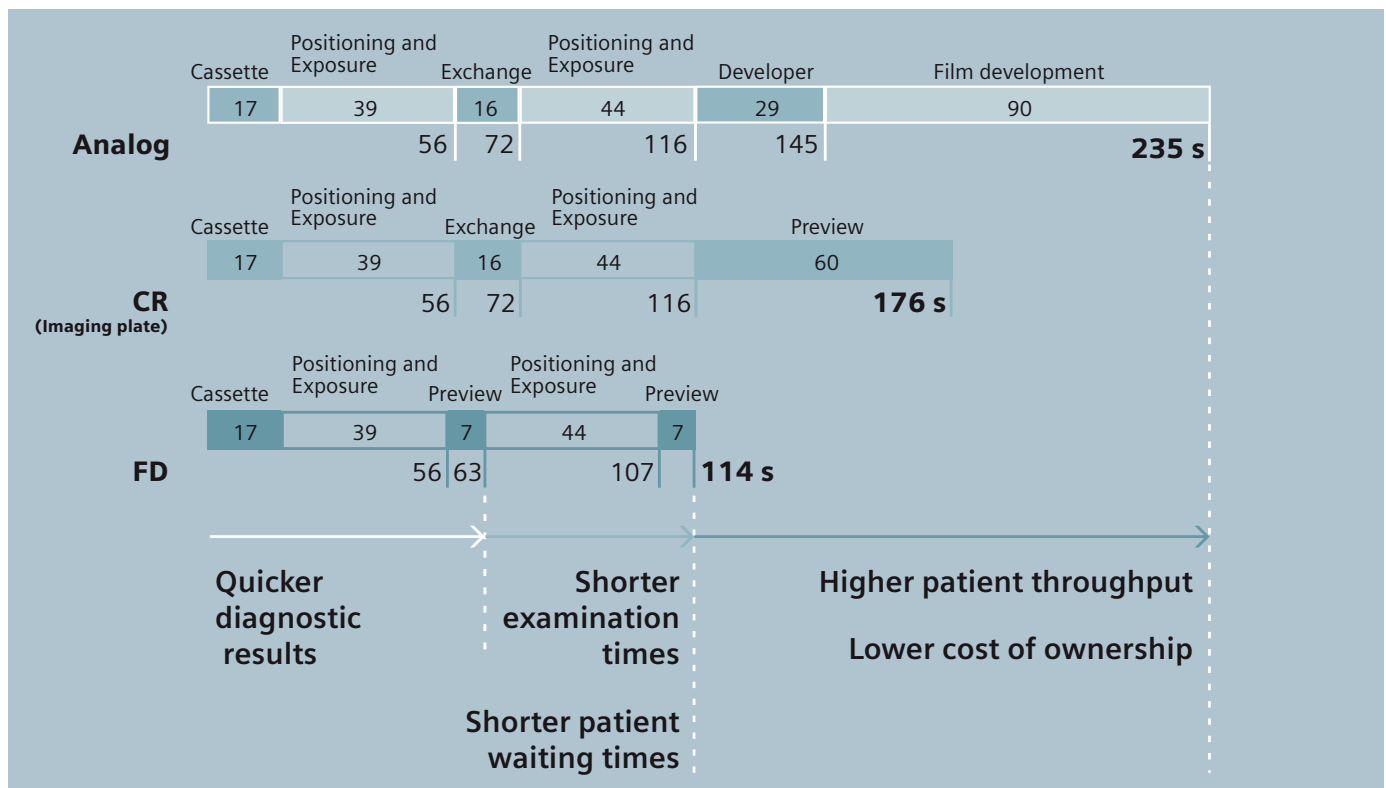
Investment confidence

Although the benefits are clear, the high initial investment can inhibit conversion to digital radiography. The mFD upgrade from Siemens Healthcare now offers a fully-integrated digital radiography solution for MULTIX radiography

systems and AXIOM Luminos TF fluoroscopy systems. This upgrade enables the confidence in and convenience of a single contact partner for the entire system, protecting your initial investment and keeping your system up-to-date.

Flexible and efficient

With the new mFD integrated into the existing system, the full spectrum of radiographic applications can be covered for chest, general or trauma imaging and extends the flexibility of the system





to accommodate different patient conditions. It can be removed from the Bucky to examine patients on stretchers or wheelchairs, improving workflow and patient comfort. Additionally, as preview images are available within seconds and many work steps such as the identification and processing of cassettes are eliminated, working with the mFD is easier and examination times are reduced. Thanks to the wide dynamic range of the flat detector, images can be corrected for under- or overexposure, while advanced image post-processing provides greater contrast detail and soft tissue visibility.

These workflow improvements translate into more convenience for the users and a decidedly more positive experience for patients.

Affordability with high reliability

Examination times with digital flat detector systems can be reduced by up to 50% compared to analog systems* – as shown in the chart comparing conventional film-screen cassettes, CR cassettes and flat detector technology. The resulting shorter examination and

patient waiting times can increase patient throughput and lower cost. Further, as the costs of film and processing are eliminated, digital radiography with the mFD can also yield advantages in operational costs. As a complete and integrated solution from Siemens, the mFD upgrade has the high quality, robust design and flexibility you need to have confidence in your investment.

Clever Upgrade

The upgrade of a conventional X-ray system to digital is a significant investment and various considerations have to be made. There are several upgrade

*Results may vary data on file.

“The detector works like a cassette and we are able to do ‘out of Bucky’ exams with the benefits of direct radiography for improved workflow.”

Dr. Ulrich Lörcher, Director of Diagnostic Radiology, Deutsche Klinik für Diagnostik, Wiesbaden, Germany

solutions currently available, and it is not necessarily obvious as to which upgrade suits a given facility best. Retrofitting with a digital flat detector may appear to be a fast and simple solution, however, there are several important factors to be considered. Digital detectors can not be compared with film or CR cassettes, as they need to be activated to be able to accept an X-ray exposure and then transfer image data to the acquisition workstation. This has important consequences for retrofitted detectors, as the detector, acquisition workstation and generator need to communicate, requiring a high level of integration compared to film screen or CR systems with no integration.

In order to choose the right upgrade solutions, here are some questions one should ask when considering the switch from analog to digital.

- Is there an interface between generator, imaging system and detector? How is it implemented and is it user-friendly?
- Are the exposure settings from the generator transferred to the acquisition workstation to be included in the DICOM header or will they need to be recorded manually?
- Will the factors like kV or mAs set on the generator be transferred to the imaging system automatically? Or will they need to be recorded manually?
- Will X-rays be blocked if the detector is not ready for an exposure?
- Is the Automatic Exposure Control (AEC) still functioning correctly following the upgrade and are the exposure parameters optimized for the retrofit?
- What modifications are made to the existing system and what are the effects of this on service, system reliability and warranty conditions?
- Is the combination of the X-ray system and the flat panel detector upgrade certified? E.g. CE certification. Although the individual systems may be certified, the combination may not, which can result in liabilities moving from the supplier to the purchaser.

Keeping pace with the future

When it comes to upgrading already installed systems, Siemens Healthcare is the right partner. Apart from the huge customer base around the world, Siemens strives to keep every customer up-to-date with the latest technology developments. Medical imaging equipment often means a major investment in technology which needs to benefit the hospital in the most efficient way possible. For almost every system, new clinical applications, hardware or software upgrades can be offered. Your Siemens representative would be glad to sit together with you in order to explore your system's future potential. To take advantage to this service, please contact your local Siemens sales representative.

Key benefits of going 'digital' with Siemens

Improved workflow

Quality control can be done directly at the imaging system, rather than at a central workstation

Eliminate physical movement of cassette-based between the exam room and processing

No more bottlenecks caused by cassette-based systems

Fully integrated

The mFD upgrade is a fully integrated and validated system that is supported by Siemens

Affordable

The mFD upgrade presents an optimal solution to go digital with existing equipment.

Time-saving

Save up to 50% time per examination (see graph on page 63)

The acquired image is displayed in less than 5 seconds

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A World Championship Location for *syngo* DynaCT

Spain is riding high and so is Siemens' Angiography and Fluoroscopic and Radiographic Systems Division: Soccer world champions and partner of choice for angiographic suites respectively, a good couple of reasons to celebrate the first workshop for *syngo* DynaCT/ *syngo* iGuide.

Granada, in the south of Spain, has a fascinating history, rich architecture, wonderful landscapes and amazing sightseeing opportunities, all great reasons to host an event. But the beauty of the city is simply a bonus; the key benefit for the location can be found in its two main hospitals: Hospital Clínico San Cecilio and Hospital Virgen de las Nieves.

Two of Spain's most highly respected interventional radiologists, Dr. Pedro Pablo Alcázar, interventional neuroradiologist at Hospital Virgen de las Nieves and Dr. Fermín Garrido, interventional radiologist at Hospital Clínico San Cecilio, are working with an Artis zee ceiling and an Artis zee biplane system in their clinical routine. The combination of the clinicians' enormous talents and the advanced capabilities of their Siemens interventional systems were a guarantee of success.

The workshop took place on the 10th and 11th of June 2010. The focus of the workshop was to promote the clinical benefits of *syngo* DynaCT and its use in

combination with *syngo* iGuide. *syngo* iGuide helps to plan interventional needle procedures. The software displays the length and angulation of the needle path, and automatically adapts the position of the C-arm.

During the first day, twenty radiologists from clinical sites around Spain used the opportunity for some hands-on training with the *syngo* iGuide software and anatomical phantoms. The second day allowed the attendees to observe live interventional procedures. "During the procedures we could really appreciate the high image quality of *syngo* DynaCT," said Rubén Larbec, AX Applications Specialist at Siemens Healthcare. During a mediastinal puncture, in which the radiologist proceeded with a peripheral contrast injection, the mammary artery could be perfectly recognized and avoided.

The biggest challenge of such an event was to work directly with patients. "We are really convinced by the robustness and effectiveness of our technology, and the customers notice that. Moreover, hands-on activities make them more interested and involved in the project" stated Rubén Larbec.

After the interventions, Dr. Teresa Moreno, interventional radiologist at Hospital Juan Ramón Jiménez in Huelva, acknowledged that she was "surprised that *syngo* DynaCT was much easier to

use than she thought it would be before the workshop." Regarding *syngo* iGuide specifically, Dr. Milagros Marini, interventional radiologist at Hospital Juan Canalejo in La Coruña, pointed out that "the laser cross is a big differentiator" when performing a puncture. Minimizing dose is always important and thanks to the accuracy provided by the laser, it is markedly reduced.

At the conclusion of the workshop, Sigrid Ferschel from AX Siemens Healthcare gave an overview about future software developments.

Dr. Francisco Ramirez, Head of Radiology at Hospital Clínico San Cecilio, summarized the workshop as a "big success where renowned interventional radiologists from all around Spain could appreciate technological innovations in Siemens equipment." Dr. Fermín Garrido added that "this kind of workshop is as necessary as attending scientific congresses and in this respect Siemens is doing a great job with training." It "seems to be Siemens' time" concluded Dr. Milagros Marini. Many professionals are already noticing this. It is everyone's job to make them truly believe it.

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Dr. Pablo Navarro from Hospital de Puerto Real, Dr. Teresa Moreno from Hospital Juan Ramón Jiménez, Dr. Miguel Canis from Hospital Reina Sofía, Dr. Santiago González from Hospital Clínico de Salamanca, Rubén Larbec, Siemens AX Applications Specialist, and seated Dr. David Contreras from Hospital de Denia.



Dr. Pedro Pablo Alcázar, interventional neuroradiologist, and his team work with the Artis zee biplane at Hospital Virgen de Las Nieves (syngo DynaCT, syngo iGuide, L&S).

It is CLEAR: Siemens Provides CARE for ALL

The field of medical imaging is one of rapid innovation and advancement. Siemens Healthcare has been a leading force in this advancement, continuously striving to discover new technologies that allow for better diagnosis and treatment therapies. Inevitably such rapid change can lead to an array of different system versions in the field, which can lead to limitations for users wishing to stay at the cutting edge of technology.

This is why Siemens Healthcare AX is undergoing its largest field update in history, to provide all Artis zee customers with the latest software with CLEAR image quality improvements. The latest software does not compromise on dose reduction with the incorporation of the complete array of CARE features (Combined Applications to Reduce Radiation) and opens the door to new technologies and advancements. Siemens Healthcare AX is showing its commitment to all its Artis zee customers, both new and old. Following its launch in 2007, the Artis zee portfolio of interventional systems has been a phenomenal success. With over 2,000 Artis zee systems installed around the world, clinicians and patients continually benefit from its excellent image quality and advanced applications in 2D and 3D imaging. Starting in December this year, it is about to get even better.

Every Artis zee system in operation will be updated to the latest software level as Siemens Healthcare Angiography Division (AX) performs its largest field update in history. Along with the traditional software stability and system performance improvements expected with a required update, Siemens Health-

care AX software provides image quality enhancements while also helping to reduce radiation dose by incorporating the complete array of dose-saving applications.

A CLEAR View

With CLEAR, the new image quality improvement program, Siemens brings together high levels of image quality with the automation and customization required in a busy interventional suite. The vast array of CLEAR features included on every Artis zee system provides the clinician with greater confidence, potentially reducing examination time and improving throughput.

Providing a Standard of CARE

Siemens does not compromise on dose reduction. As a leader and pioneer in the field of dose reduction Siemens consistently develops new solutions. Siemens was the first company to implement a variety of dose-saving and monitoring features in the interventional routine, many of them unique on the market.

All of the CARE features provided for the Artis zee systems are packaged in the update, including CAREguard. This

new feature allows that the dose really is kept As Low As Reasonably Achievable (ALARA).

Knowledge and Training is Key

To ensure that every clinical site gets the most from the latest software, applications support will visit every Artis zee system installed. The knowledgeable and fully-trained specialists will be on site to match the image quality needs of the customer with the benefits of CLEAR imaging. Additionally all CARE features will be fully demonstrated, and best practices explained so that dose reduction features are used for all patients.

Opening the door

To maximize the return on investment and allow for clinical establishments to offer the latest clinical therapies to patients, the new software enables the latest technology to be installed on the systems. This provides system upgrade potential for this rapidly advancing field of medical therapy.

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Upcoming Congresses 2010/2011

We always would like to give you the opportunity to get in 'touch' with the real system and learn more about system handling to keep you in step with

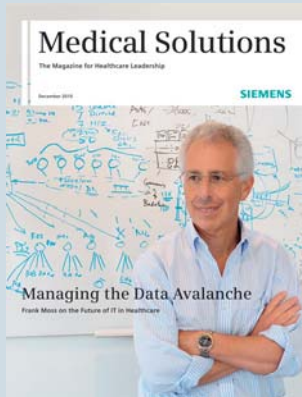
the latest technological advances. You will have the chance to experience our technology at international congresses, trade fairs, and workshops. In the list

below you will find information on various events where we offer you the opportunity to meet AX.

Title	Location	Short Description	Date	Contact
DGK	Nürnberg, Germany	Deutsche Gesellschaft für Herz- und Kreislaufforschung	Oct 7 – 9	www.dgk.org
CCT	Kobe, Japan	Complex Cardiovascular Therapeutics	Nov 3 – 5	www.cct.gr.jp/2010/index.html
MEDICA	Düsseldorf, Germany	Tradeshow	Nov 17 – 20	www.medica.de
Veith Meeting	New York, NY, USA	Annual Symposium on Vascular and Endovascular Issues	Nov 17 – 21	www.veithsymposium.org
RSNA	Chicago, IL, USA	Assembly and Annual Meeting	Nov 28 – Dec 3	www.rsna.org
Boston Afib	Boston, USA	Boston Atrial Fibrillation Symposium	Jan 13 – 15	www.afsymposium.com
AsiaPCR	Singapore	International Symposium	Jan 13 – 15	www.asiapcr.com
Arab Health	Dubai, Arab Emirates	International Congress of Radiology and Tradeshow	Jan 24 – 27	www.arabhealthonline.com
STS	San Diego, CA, USA	The Society of Thoracic Surgeons	Jan 31 – Feb 2	www.sts.org/sections/annualmeeting
DGHTG	Stuttgart, Germany	Dt. Gesellschaft für Thorax-, Herz- und Gefäßchirurgie	Feb. 13 – 16	www.dgthg.de
ECR	Vienna, Austria	European Society of Radiology	Mar 3 – 7	www.myesr.org
CIT	Beijing, China	China Interventional Therapeutics	Mar 16 – 19	www.citmd.com
SIR	Chicago, IL, USA	Society of Interventional Radiology	Mar 26 – 31	www.sirmeeting.org
ACC	New Orleans, LA, USA	American College of Cardiology	Apr 3 – 5	www.acc.org
Charing Cross	London, Great Britain	Vascular & Endovascular Consensus Updates	Apr 9 – 12	www.cxsymposium.com
AANS	Denver, CO, USA	American Association of Neurological Surgeons	Apr 9 – 13	www.aans.org/
CMEF	Shenzhen, China	China Medical Equipment Fair	Apr 18 – 21	http://en.cmef.com.cn
TCTAP	Seoul, South Korea	Transcatheter Cardiovascular Therapeutics Asia Pacific	Apr 27 – 29	www.summit-tctap.com/2011
GEST	Paris, France	Global Embolization Symposium and Technologies	Apr 27 – 30	www.gest2011.eu/
HRS	San Francisco, CA, USA	Heart Rhythm Society	May 4 – 7	www.hrsonline.org
AATS	Philadelphia, PA, USA	American Association for Thoracic Surgery	May 7 – 11	www.aats.org/
EuroPCR	Paris, France	Cardiovascular Course	May 17 – 20	www.europcr.com
AEPC	Granada, Spain	Association for European Pediatric Cardiology	May 18 – 21	www.aepc2011.com
ASCVS	Phuket, Thailand	Asian Cardiovascular Thoracic Surgeons	May 26 – 29	www.ascvts-atcsa2011.org
Deutscher Röntgenkongress	Hamburg, Germany	6. Gemeinsamer Kongress von DRG und ÖRG	Jun 1 – 4	www.roentgenkongress.de
UKRC	Birmingham, UK	UK Radiological Congress	Jun 6 – 8	www.ukrc.org.uk

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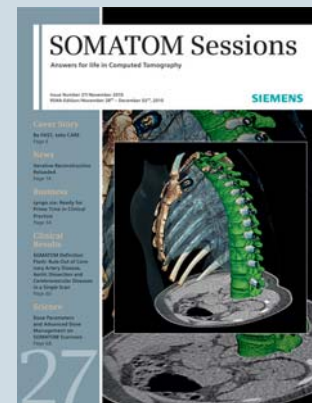
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