

### Healthcare Sector

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#### **Siemens exhibits innovative solutions for cardiovascular medicine at ESC 2009**

**Siemens Healthcare exhibits its innovations for cardiology at the Congress of the European Society of Cardiology (ESC) 2009. In addition to the latest imaging systems, this also includes laboratory diagnostics and clinical IT systems for patient management. During this year's event, Siemens will be offering visitors to the congress an extensive theoretical and practical training program on new diagnostic and therapeutic techniques.**

The great progress made in medicine during the past few decades has reduced the death rate for cardiac diseases considerably. At the same time, the number of patients with chronic heart diseases such as cardiac insufficiency has been rising, thus increasing healthcare costs. Medical innovations must therefore contribute to cost reduction while at the same time offering a higher quality of health care. In fact, the spectrum of new diagnostic and therapeutic techniques which improve care and can be performed faster as well as in a more patient-friendly manner, has been expanding rapidly.

Innovative methods such as interventional valve therapy require an interdisciplinary collaboration and an integration of techniques from different medical fields. Hybrid operating rooms are just one result of this development. The hybrid OR combines a full-functional cardiac cath lab with a fully equipped operating room. Multidisciplinary teams with cardiologists and cardiac surgeons can thus join forces to perform new types of therapies. Cardiac MR (magnetic resonance tomography) and cardiac CT (computed tomography) offer entirely new insights into the heart, thus providing information on the heart which alters the treatment path for many diseases considerably. These imaging techniques, but also echocardiography and nuclear medicine increasingly enable physicians to offer a more personalized medicine, i.e. to select "the right therapy for the right patient". Furthermore, as so-called "gatekeepers", they help to determine whether cost-intensive therapies such as e.g. the implantation of an ICD (implantable cardioverter/defibrillator) are indicated according to current guidelines.

Such an innovative environment also makes it necessary for physicians to undergo continuing education and training. Siemens Healthcare supports its customers in this regard, and is therefore offering extensive training sessions dealing with innovative techniques in cardiology at this year's Congress of the European Society of Cardiology. The topics covered include, for example, cardiovascular CT and MRI, real-time 3D echocardiography and management of heart failure.

### **Innovation at the ESC**

#### **Syngo DynaCT Cardiac: 3D imaging in the cathlab**

At the ESC 2009, Siemens will be demonstrating a new cardiac application for the syngo DynaCT Cardiac imaging application. During transfemoral aortic valve replacement, a heart valve prosthesis gets implanted via peripheral artery access. To position aortic valve prostheses accurately, the cardiologist must have very precise knowledge of the individual anatomy of the patient's aorta. That's where syngo DynaCT Cardiac comes in: During the intervention, it generates CT-like cross-sectional images on an angiographic C-arm system and offers 3D reconstruction of the aortic root. These 3D images can be overlaid on actual fluoroscopic images and provide a kind of three-dimensional roadmap for the examiner. Thus, with syngo DynaCT Cardiac, the cardiologist can position the valve prosthesis more accurately and more quickly than before.

### **Additional highlights presented at the ESC**

#### **Change of paradigms in echocardiography: Transthoracic real-time 3D echocardiography within a single heartbeat**

With the Acuson SC2000 volume echocardiography system, Siemens showcases the world's first system capable of generating real-time 3D images of the entire heart during a single heartbeat without the need for stitching small cardiac volumes acquired during several heart cycles. This new technology – "echo in a heartbeat" – is one of the greatest innovations in echocardiography since decades. 55 years after echocardiography pioneers Inge Edler and Hellmuth Hertz used Siemens equipment to acquire the first ultrasound images of the heart, real-time 3D echocardiography is now ripe for clinical routine. Due to a completely new transducer technology and an improved system architecture of the Acuson SC2000, the physician obtains an excellent 4D image of the heart, even faster than before, since the system offers automated analysis of the acquired data sets.

## **Coronary CT angiography: highest diagnostic accuracy at an extremely low dose**

The high scanning speed of the Somatom Definition Flash CT scanner makes it possible to perform examinations at an extremely reduced radiation dose. While the average effective dose for cardiac computed tomography ranges from 8 to 30 millisievert (mSv), the Siemens Somatom Definition Flash offers sub-mSv scanning while producing optimum image quality and diagnostic accuracy. A scan of the entire heart can thus be acquired in just 250 milliseconds (ms), which corresponds to roughly one-fourth of a heartbeat.

In the meantime, several clinical studies have confirmed that the Somatom Definition Flash enables cardiac CT with a dose of less than one mSv in over 70 percent of all patients. For example, Stephan Achenbach, Professor of Cardiology at Erlangen-Nuremberg University, reported at this year's SCCT congress that he was able to scan the entire heart in 270 milliseconds (ms) with a dose of approx. 0.95 mSv during routine examinations.<sup>1</sup>

## **Dual energy CT of the heart: Additional information on cardiac perfusion**

Based on a single cardiac data set acquired simultaneously with two different X-ray energies referred to as "dual energy", a great variety of information about the myocardial morphology but also perfusion can be obtained now in one single exam. The dual energy (DE) application syngo DE PBV (heart perfused blood volume) allows analysis of myocardial perfusion, thus providing information previously not available in CT imaging. Information about myocardial perfusion is of greatest importance for the management of patients with coronary artery disease.

The current clinical standard for examining myocardial perfusion is SPECT (Single photon emission computed tomography). In a study recently published in the American Journal of Cardiology, myocardial perfusion following an infarct was measured using SPECT, the standard technique as well as dual energy computed tomography (DECT). It showed that DECT correctly identified 96 percent of the permanent myocardial perfusion defects and 88 percent of the reversible myocardial perfusion defects identified with SPECT. DECT compared very well in comparison with SPECT and holds great promise for evaluation of myocardial perfusion.<sup>2</sup>

## **Magnetic resonance: New functionalities for routine cardiological examinations**

The latest applications in the field of cardiac magnetic resonance tomography (CMR) increasingly support the cardiologist in daily routine. CMR can thus be used more easily and faster for patients

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<sup>1</sup> Achenbach et al. Sub-mSv Coronary CT Angiography Using Prospectively ECG-Triggered High-Pitch Spiral Acquisition, SCCT 2009 proceedings, 17.07.09

<sup>2</sup> Ruzsics B et al. Comparison of dual-energy computed tomography of the heart with single photon emission computed tomography for assessment of coronary artery stenosis and of the myocardial blood supply. Am J Cardiol. 2009 Aug 1;104(3):318-26.

with acute and chronic cardiac conditions and has the potential for a completely new "standard of care". For example, CMR now enables a convenient and comprehensive myocardial ischemia testing (inadequate myocardial blood flow). Due to inline applications such as syngo Inline VF (ventricular function), important cardiac functional parameters such as the ejection fraction and cardiac volumes are already automatically calculated during data acquisition. Siemens CMR also generates high-resolution perfusion images during the examination. Furthermore, even minimal myocardial scar gets visualized by the exceptionally robust and simple "delayed enhancement" technique. The various measurement and evaluation possibilities offered help to save time, simplify the examination and generate images of consistently high diagnostic quality. The cardiologist thus receives a comprehensive tool for better differential diagnosis of complex heart diseases. The new cardiac applications are available for all systems of the Siemens Magnetom family equipped with Tim technology.

### **A question often asked in nuclear medicine is: What IQ does your SPECT have?**

In nuclear medicine, Siemens will be exhibiting SPECT (single photon emission computed tomography) imaging with "intelligence". The Symbia gamma camera family now comes with a new feature, IQ•SPECT, which reduces acquisition time for cardiac exams by 75 percent down to five minutes. In addition, the CT attenuation correction can be calculated and calcium scoring can be implemented during the examination. The outstanding features of IQ•SPECT include: a new collimator which acquires the heart in higher resolution compared to the rest of the thorax, organ-centered movement of the camera around the patient and a new 3D reconstruction technique.

### **New IT packages especially for Cardiology**

Syngo Dynamics is a comprehensive multi-modality diagnostic image review and evidenced-based reporting system incorporating decades of Siemens experience in both clinical and administrative workflows. The IT solution displays images of the beating heart and integrates cardiovascular images acquired with various modalities such as CT, MR and ultrasound. The newest version of syngo Dynamics 8.0, currently under development, will be presented at ESC 2009. The upcoming version 8.0 will include features to enhance the cardiology department workflow and address market demands. This includes e.g. a greater transparency of workflows and resources within the cardiology department, which is especially important for the hospital management. For example, a tool designed for administrative reporting of key performance indicators, such as resource utilization and physician productivity, will support proactive department management. In addition, a new scheduling option allows users to better manage resources in cath and echo labs. For the patient, this translates to shorter waiting times and a faster diagnosis.

With syngo Dynamics 8.0, the corresponding application for remote image viewing will take on a new appearance. The screen display (Look & Feel) and functional sequences will be adapted to the standard workplace. The application offers a high level of performance so treating physicians will be able to conveniently access patient images from almost any location, even at a low network bandwidth.

### **Laboratory diagnostics in cardiology: Troponin test fulfills the most stringent guidelines of cardiology societies**

Today, cardiac troponins are the preferred blood markers for diagnosing myocardial infarction. Siemens was the first company to develop a fully automatic, high-precision and highly sensitive troponin test ("TnI Ultra"), which fulfilled the stringent requirements of the ESC and ACC (European Society of Cardiology/American College of Cardiology). Siemens' TnI Ultra enables an earlier and better identification of infarct patients. Since this troponin test has already been successfully used on the fully automatic "Advia Centaur" immunoassay systems from Siemens Healthcare, it is now also available for the new, integrated Dimension EXL analysis system from Siemens Healthcare.

Dimension EXL provides both clinical chemical and immunodiagnostic parameters on a single platform. This integrated architecture enables parallel processing of the corresponding assays, thus increasing laboratory productivity. In addition to routine and special diagnostics, the parameter menu also includes therapeutic medication monitoring from immune suppressives to drug screening. Using the LOCI (luminescent oxygen channeling immunoassay) module, innovative chemoluminescence technology can be used to supply highly sensitive analysis results in an especially short time.

### **Fast diagnosis of heart failure: NT-proBNP/BNP test**

Patients suffering from heart failure exhibit elevated levels of BNP (B-type natriuretic peptide). Heart failure can be differentiated from other disorders with similar symptoms very quickly by performing BNP analysis. A reliable and cost-effective blood analysis tool for diagnosing heart failure is thus available to physicians in addition to imaging techniques. Effective immediately, Siemens also offers its NT-proBNP/BNP assays on all analyzing systems belonging to the Immulite, Dimension and Advia Centaur product families.

The **Siemens Healthcare Sector** is one of the world's largest suppliers to the healthcare industry and a trendsetter in medical imaging, laboratory diagnostics, medical information technology and hearing aids. Siemens is the only company to offer customers products and solutions for the entire range of patient care from a single source – from prevention and early detection to diagnosis, and on to treatment and aftercare. By optimizing clinical workflows for the most common diseases, Siemens also makes healthcare faster, better and more cost-effective. Siemens Healthcare employs some

49,000 employees worldwide and operates in over 130 countries. In fiscal year 2008 (to September 30), the Sector posted revenue of 11.2 billion euros and profit of 1.2 billion euros. For further information please visit:

[www.siemens.com/healthcare](http://www.siemens.com/healthcare).