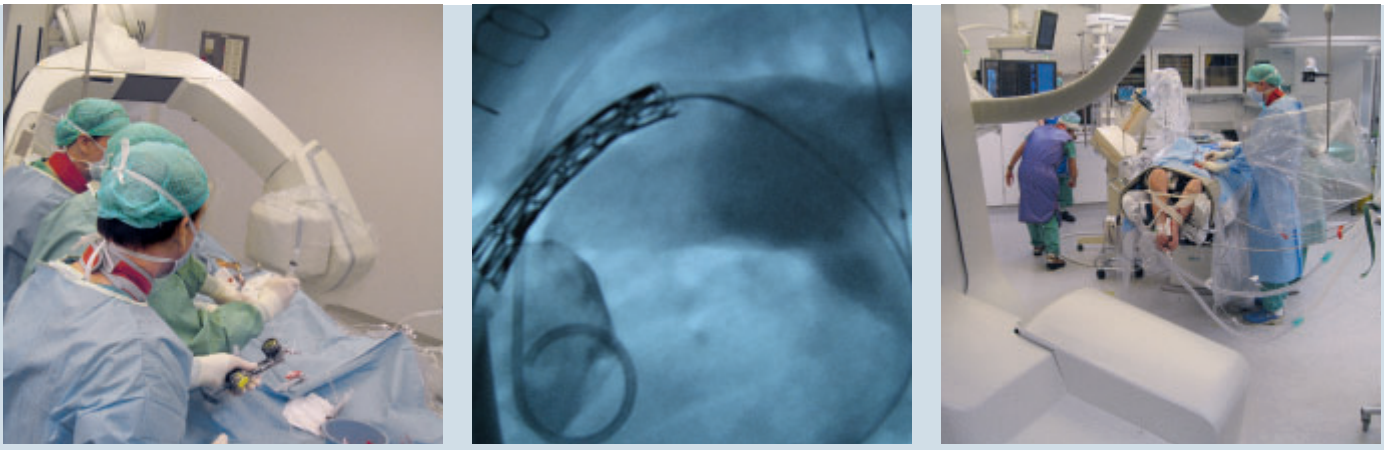
Further Reading

Siemens offers a variety of customer magazines and information channels. 'Further Reading' introduces a selection of articles and topics featured there that may be of interest to you. To learn more, follow the link below each article. To subscribe to any of the magazines, see page 77.



Artis zeego delivers precise images during the intervention and can easily be stowed away when not needed.

Artis zeego Supports Hybrid Rooms

The combination of a C-arm with robotic technology is the formula for Artis zeego®, the latest high-end angiography system from Siemens. Artis zeego provides the physician with almost unlimited freedom of movement. The system's flat detector rotates around the patient at such high velocity and precision that cross-sectional soft tissue images are created, acquiring more anatomical details than ever before possible with an angiography system and thus, increasing diagnostic certainty. Artis zeego allows the physician to adapt the working height to his or her individual needs, reducing fatigue and back pain during long procedures. If the system is not used, it can be conveniently parked out of the way, which is particularly useful in hybrid operating rooms (OR), which combine radiology, cardiology, and surgery. The Interventional Center at the Rikshospitalet in Oslo, Norway, was the first facility to implement Artis zeego in such a room. "When we plan an operation in the limited space of an OR, the increased flexibility with Artis zeego means that we don't have to restrict ourselves to avoid problems with the C-arm," says Per Kristian Hol, MD, Manager of Radiological Research.
"Instead, we can make the plan with a full focus on the patient and the best procedure for the operation at hand." Increasingly advanced and complicated interventions performed in the hybrid room require the full support of a C-arm, especially for changes during the procedure or immediate control. As Hol confirms, "When expertise and technology are scattered, you always are at risk of losing precious time if something needs to be adjusted. Artis zeego decreases that risk." That is, Artis zeego enhances patient outcomes as it enables imaging and treatment with greater speed, efficiency, and precision.

www.siemens.com/AXIOM-Innovations-zeego

Paradigm Shift in Echocardiography

The acquisition of nonstitched, real-time, full-volume 3D images of the heart in one single heart cycle with the new ACUSON SC2000™ volume ultrasound system marks a breakthrough in echocardiography. Called 'Echo in a Heartbeat,' the technology represents a paradigm shift in ultrasound imaging, 55 years after the world's first cardiac ultrasound recording using Siemens technology in 1953. With a high-volume acquisition rate – in one second, every second – acquisition time is dramatically reduced, improving workflow in the echocardiography suite.

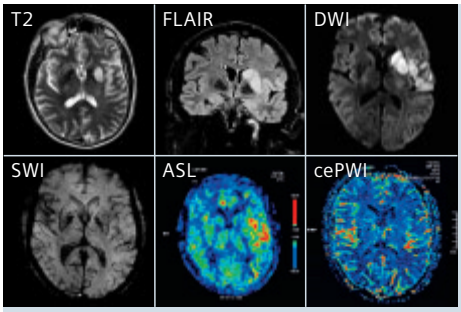
The advanced architecture of the ACUSON SC2000 system delivers vastly more information than today's conventional systems and is strengthened by Siemens patented Coherent Volume Formation™ technology. Coupled with the system's high-volume acquisition rate, Coherent Volume Formation moves away from serial line-by-line acquisition towards simultaneous, multiple beams, delivering excellent image resolution.

Customizable, programmable, and protocol-driven workflow sequences deliver repeatability for better outcomes: greater efficiency, accuracy, consistency, and care – from data acquisition to diagnosis.

Whitepapers on the advanced system technology and architecture have been published and can be downloaded from the website listed below.

The ACUSON SC2000 volume imaging ultrasound system represents revolutionary innovation for echocardiography.

www.siemens.com/echoinaheartbeat



67-year-old male patient with dysphasia and right-side hemiparesis

Arterial Spin Labeled Perfusion MRI

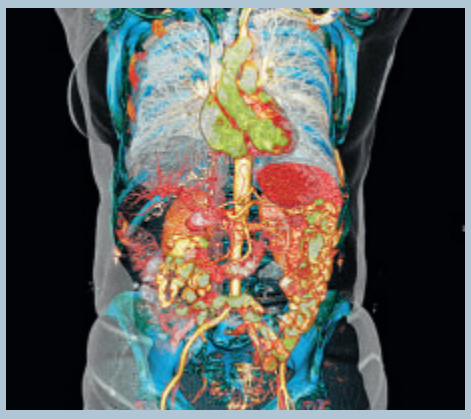
In the neurology world, perfusion refers to the delivery of oxygen and nutrients to tissues by means of blood flow, and is one of the most fundamental physiological parameters. Disorders of perfusion also account for most of the leading causes of medical disability and mortality. Perfusion measurements serve as biomarkers for a broad range of physiological and pathophysiological functions and are of direct diagnostic value in vascular disorders. In the field of magnetic resonance imaging (MRI), perfusion imaging measures the rate at which blood is delivered to tissue. There are several methods for the measurement of classical tissue perfusion. One such method is arterial spin labeling (ASL).

ASL MRI is a noninvasive method to assess cerebral perfusion. This technique uses magnetically labelled blood as an endogenous contrast agent. With ASL MR imaging, the protons of arterial water are magnetically labeled in the feeding vasculature of the brain. The labeled arterial protons flow through the vascular tree and exchange water with the unlabeled brain tissue. A perfusion-weighted image can be generated by the subtraction of an image in which inflowing arterial spins have been labeled from an image in which spin labeling has not been performed. Clinical applications include cerebrovascular disease, degenerative disease, brain tumor evalutation, BOLD fMRI, and intervention planning.

In clinical neuroscience, while the application of ASL perfusion MRI to the diagnosis and management of acute stroke is both obvious and feasible, the clinical utility of ASL is likely to be much broader since only a minority of acute stroke patients undergo MRI. ASL perfusion MRI could greatly enhance the evaluation of both Transient Ischemic Attack (TIA) and chronic cerebrovascular disease by quantifying regional cerebral blood flow (CBF) in specific vascular territories where interventions may be planned, or by allowing the effects of pharmacological therapies on CBF to be evaluated. Several approaches now also exist for selective arterial labeling, allowing the perfusion distribution of specific arteries to be assessed independently. More detailed information about the applications of ASL are highlighted in the latest neurology edition of the Siemens MR magazine *MAGNETOM Flash* and can be viewed using the link below.

www.siemens.com/
MAGNETOM-Flash-ASL

A New Vision of Healthcare



Siemens plans to achieve the next generation in optimized care through integrating clinical laboratory diagnostics, medical imaging, and information technology.

In its fall 2008 issue, the Siemens research and innovation magazine *Pictures of the Future* dedicated a whole section on the early detection of diseases and how Siemens plans to achieve the next generation in optimized care through integrating clinical laboratory diagnostics, medical imaging, and information technology. The articles, complemented with statistics and background information, literally paint a picture of the future – and of the technologies in the Siemens Healthcare development pipeline that may help make it come true.

From Molecules to Man

This article describes how, from genes and proteins to cells, tissues, and our entire organism, scientists are in the process of piecing together a systems view of how we work. As they do so, they are linking the results of laboratory tests to diagnostic images, injecting the resulting knowledge into advanced decision-support systems, and devising strategies for early detection and targeted treatments.

The Future of Medical Imaging

At the center of this article are infrared-based systems that pinpoint abnormal tissues and cells, blood tests that detect traces of cancer proteins, research that is zeroing in on imaging the first signs of Alzheimer's, and strategies for accelerating the process of discovering new drugs. An interview with John V. Frangioni, MD, PhD, Associate Professor of Medicine and of Radiology at the Beth Israel Deaconess Medical Center and Harvard Medical School in Boston, Massachusetts, U.S., focuses on solving clinical problems through the application of advanced engineering and chemistry. Another Harvard expert, Mukesh G. Harisinghani, MD, Director of the Clinical Discovery Program at the Center for Molecular Imaging Research and Director of Body MRI, Massachusetts General Hospital, and Associate Professor of Radiology at Harvard Medical School, explains how magnetic nanoparticles can help in detecting lymph node metastases.

The Battle Against Breast Cancer

This story features major advances in imaging technologies that are now making possible more precise examinations that place less stress on patients, like digital mammography (brought to the patient with the help of mobile units), computed-aided detection, breast tomosynthesis[1], automated breast volume scanning[2] and eSie Touch elasticity imaging with ultrasound, and magnetic resonance imaging techniques for the breast. Also focusing on breast cancer is an article about how researchers are closing in on a diagnostic test that will be able to predict whether a patient with breast cancer can be successfully treated without chemotherapy. Automated analysis of tumor-specific genes is the key to a new world of individually-tailored treatment.

Answers in the Blood

Accurately diagnosing illnesses such as cancer can be an extremely complex and protracted process. Yet, there are now many tests that provide a fast and accurate identification of diseases in the lab – often using just a few drops of blood. This article explains how some of them work.

A second article from the world of laboratory diagnostics focuses on efficiency: In order to accelerate workflows in the clinical laboratory, Siemens has developed an automated laboratory system that runs a large variety of tests in one analyzer. It can analyze up to 200 samples and perform up to 1,500 diagnostic tests per hour.

[1] Caution: Investigational Device. Limited by U.S. Federal Law to investigational use. The information about Digital Breast Tomosynthesis is preliminary. This product is under development and not commercially available in the U.S., and its future availability cannot be assured.

[2] The information about this product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.

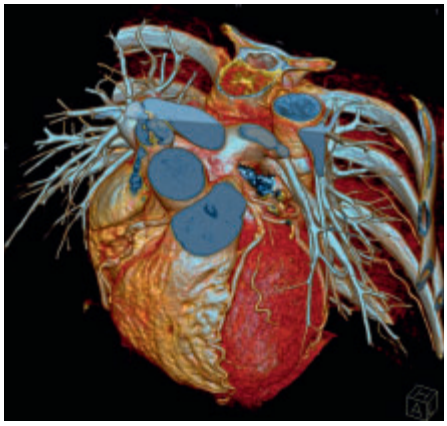
www.siemens.com/PoF

How to Reduce Dose

Outstanding developments in the field of computed tomography (CT) within the last ten years – for instance Dual Source CT (DSCT) or dual energy – have increasingly made it a standard examination method for many indications. Thus, the question of radiation dose becomes more and more important.

The German Heart Center in Munich, in cooperation with the American Mayo Clinics in Rochester and Jacksonville, and the Friedrich-Alexander University in Erlangen-Nuremberg, Germany, conducted the 'International Prospective Multicenter Study on Radiation Dose Estimates of Cardiac CT Angiography in Daily Practice (PROTECTION-I).' The study compared five CT units from four different manufacturers. It included 1,965 cardiac CT scans that were carried out in a total of 50 clinics and heart centers. The results show clear differences in radiation doses depending both upon the CT system manufacturer and the behavior of the operator. Radiation can be significantly reduced by more consistently using already existing technologies for dose reduction in CT systems, for example, the 100 kilovolt scan protocol or the step-and-shoot mode.

According to the study, the SOMATOM® Sensation 64 performed best. Close behind was the DSCT SOMATOM Definition. Thomas Flohr, PhD, head developer of the SOMATOM Definition Dual Source at Siemens Healthcare in Forchheim, Germany, believes that "The DSCT would have performed even better if it had already been equipped with the current, improved version of the step-and-shoot technology during the study." Despite this, in identical clinical situations in the study, the average radiation dose of the DSCT SOMATOM Definition was more than ten millisievert below that of the competing scanners ranked in fourth and fifth place. Clearly, Siemens has developed a radiation-saving system and additionally provides very good systems training so that operators can take advantage of the total radiation reduction potential of the device.



49-year-old patient with a high-grade lesion in the right coronary artery revealed by a quick, 1.8 mSv, low-dose cardiac examination with the SOMATOM Definition with Adaptive Cardio Sequence.

www.siemens.com/
SOMATOM-Sessions-Dose

Diagnostic Center Frankfurt: Innovation and Expertise at the Highest Levels

By Wiebke Kathmann, PhD

A visually impressive new building, modern work processes, extremely up-to-date equipment, and outstanding cooperation between the Departments of Radiology and Cardiology are the cornerstones of success at the new Diagnostic Center of the University Hospital in Frankfurt am Main.

The architecture is intriguing: clean lines, spaciousness, and a waiting area that looks like a VIP lounge. Heading up the Diagnostic Center and adding to its appeal by creating an aura of tranquility are the Director of the Diagnostic and Interventional Radiology Department, Professor Thomas Vogl, MD, and cardiologist and Director of the Medical Clinic III, Professor Andreas Zeiher, MD. Patients feel well cared for – also, of course, due to the fact that both Vogl and Zeiher are renowned experts in their fields and offer innovative interventions. Vogl's international forte is computed tomography-(CT) and magnetic resonance imaging-(MRI) guided intervention mainly of liver and lung tumors and metastasis. People from all over the world consult him for transpulmonal percutaneous chemoembolization, a method used for localized chemotherapy of lung tumors, or for laser-induced interstitial thermotherapy (LITT). Zeiher's specialty, among others, is regenerative medicine, for example, stem cell therapy, specialized catheter interventions, and measurement of intracardiac flow in diastolic dysfunction.

The appropriate environment for these manifold capacities was established with the new Diagnostic Center. In order to cope with the changes in the German healthcare system, an update of facilities and concentration of resources was necessary, as the center's Commercial Director Dr. Hans-Joachim Conrad, stresses. Now, all functional aspects – from the helicopter landing place on top of the building, to the Departments of Radiology and Cardiology in the middle, to the shock room in the basement – are located in one building. "We were able to tighten our processes and increase efficiency – among other things – through the bundling of the latest imaging systems in one building," says Conrad. The center is equipped with state-of-the-art equipment from Siemens: three MRI systems, eight angiography systems, three CT scanners, and one urology system support expertise in Frankfurt, providing patients with innovative care.

www.siemens.com/
news-frankfurt