

Combining Efficiency, Research, and Patient Care

The new generation of Siemens magnetic resonance systems serves the demands of modern hospital care by combining attractive features for patients with user-friendly technology for hospital staff. The University Medical Center Mannheim, Medical Faculty Mannheim, Germany, was the first hospital in the world to test the advantages of MAGNETOM Skyra.

By Annette Tuffs, PhD

Today, successful academic medicine is about achieving the highest efficiency, quality, and cutting-edge innovation – all while striving for maximum patient comfort and satisfaction. To fulfill such diverse requirements demands both technological advancement and clinical expertise. The first installation of MAGNETOM® Skyra, Siemens' latest 3 Tesla magnetic resonance imaging (MRI) system, at the University Medical Center Mannheim went a long way toward reaching these ambitious goals. The facility was the first in the world to be granted access to this groundbreaking top equipment. "We are honored to have been chosen as a partner," says Professor Stefan Schönberg, MD, Director of the hospital's Institute for Clinical Radiology and Nuclear Medicine.

The Medical Faculty Mannheim, part of Heidelberg University, has an excellent reputation for oncology and medical technology. It is also home to the Institute for Clinical Radiology and Nuclear Medicine, where state-of-the-art equipment provides the highest diagnostic standards to several thousand patients each year.

Increasingly Competitive Hospital Market

With mounting economic pressure on hospitals, fixed budgets for medical care in Germany, and the higher demands

of an increasingly competitive hospital market, modern diagnostic equipment is one of the cornerstones needed to ensure a hospital's high-standard patient services and reputation while maintaining top notch access to translational MRI research. The new Siemens MAGNETOM Skyra and MAGNETOM Aera (1.5 Tesla) systems combine visible high-standard patient care with efficiency and technical innovations. The introduction of Tim® 4G (Total imaging matrix) technology and Dot™ (Day optimizing throughput) engine with MAGNETOM Skyra and MAGNETOM Aera makes important contributions to enhancing the productivity of imaging procedures, not only improving quality, but also increasing patient throughput and therefore, the overall economy of an imaging department.

At the same time, Tim's 4th generation (Tim 4G), with up to 204 coil elements and up to 128 receive channels, allows further scientific developments for higher temporal and spatial resolution as well as anatomic coverage. The DirectConnect cableless or SlideConnect coils are easy and fast to handle and allow flexible combinations of multiple coils, offering parallel imaging in all directions and therefore, major advantages in orthopedic, neurologic, oncologic, and angiographic imaging. Additionally, the Tim coils allow the complete anatomy to be

Through the integration of Tim and Dot, MAGNETOM Skyra sets a new standard of efficiency and top-notch research. The open space and the friendly design is enhanced by the option of a pleasant "Illumination MoodLight" atmosphere.



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Stefan Schönberg, MD, Director, Institute for Clinical Radiology and Nuclear Medicine, University Medical Center Mannheim, Medical Faculty Mannheim, Heidelberg University, Mannheim, Germany

examined in fine detail without coil or patient repositioning. Tim 4G also provides higher signal intensity and homogeneity than previous systems. “The light weight as well as the flexibility of the larger body coil is appreciated by both the patient and the technician,” says Henrik Michaely, MD.

Modern Radiology Focuses on the Individual Patient

In order to help radiologists and technicians combine clinical accuracy with efficiency, Siemens has developed Dot. “Modern radiology is all about looking at the individual patient and his or her individual problem rather than the organ,” says Schönberg. For example, it is not good enough to simply order a diagnostic knee MRI scan – the radiologist has to bear in mind the underlying diseases such as a rheumatic condition, trauma, or tumor. Radiology protocols have to be

developed according to patient history and medical data, which are obtained directly from the hospital’s electronic clinical information system. The MRI scanning procedures are set on a screen, and the radiologist or technician is visually guided through the system.

Before the introduction of Dot, a great number of parameters had to be set before the examination. This meant extra time and effort for readjustment and possibly poorer quality of images. With Dot, there are just ten to 30 flexible parameters, and they are stable during the examination, helping ensure a swift examination and high quality. In the extra time saved by Dot, doctors and MR technicians can attend to their patients, integrate cutting-edge developments into clinical routine protocols, and interact more closely on a professional level. “Workflow and image quality have been greatly improved,” says Michaely.

Imaging greatly profits from Dot’s special automation and guidance workflow features. Measuring processes are automated and, through complex control mechanisms, presented in small portions, making interruptions of the imaging process unnecessary and therefore, saving time. “It has the advantages of an automatic gear box,” says Michaely. “Changing gears is unnecessary, but we stay at the wheel and decide where to drive and which scientific and clinical studies to perform.”

At the same time, Dot interacts with the examiner by asking specific questions at critical stages of the examination. “There is a complete overview over all parameters, and useful advice is given for arranging the imaging process.”

The University Medical Center Mannheim is currently using Brain Dot Engine and Abdomen Dot Engine with their own protocols. Michaely compares Dot to the autopilot system of an airplane: “The pilot can rely on it, but at the same time, has to be aware of complex situations, such as in high-end clinical and research applications. These situations demand his or her attention.”

MAGNETOM Skyra was tested in a scientific study: 100 patients who underwent MRI examinations at University Medical Center Mannheim had volunteered for an extra scan with the new device, with and without applying the Dot engine, giving radiologists the opportunity to test the new equipment and compare results. “Our initial experience shows that the images are exceptional, and the handling of the system and the patient will make MRI diagnostics much more efficient in the future. Thus, this opens the horizon for further integration of cutting-edge scientific developments into clinical routine,” says Schönberg. One of the next steps will be to make the system comparable between different academic hospitals, which will then put radiological imaging on another level.

Open Bore Offers Breathing Room

Another advantage of the new generation of MRI scanners is the reduced room space needed for hardware and the device

itself. Fewer space requirements allow easier integration of MAGNETOM Skyra and Aera into the surrounding scientific and clinical MRI landscape at the institute. Whereas former generations of scanners needed an extra room for the entire equipment, the new generation MRI scanners is more compact, and the hardware is contained in the same room. The names of the two new MRI systems, MAGNETOM Skyra and MAGNETOM Aera, signal one of their most prominent features, the 70-centimeter Open Bore design, which not only accommodates patients with very large frames, but also provides additional space and breathing room compared to previous MRI systems. This, in turn, means the patient is more likely able to remain still and easily follow physician or MR technologist instructions.



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Therefore, less time is needed to complete imaging, and image quality is considerably improved.

Even claustrophobic patients who, out of sheer anxiety, previously declined to participate in the MR examination are now overcoming their fears, according to Michaely. He quotes the example of a patient who previously would only agree to have his knee scanned, but was now ready to undergo an MRI of the spine with the new system. The open space and the generally friendly design, enhanced by the pleasant “Illumination MoodLight” option, should also help children¹ and parents overcome their fear of high-tech medicine.

The extra-wide bore also allows extra space for the anesthesiologist and his or her equipment. The new generation of MRI devices uses dockable mobile tables, which are ideal for patients who need special accommodations or set-ups for clinical or scientific exams. Better care can be provided to children who have to be sedated, severely ill patients under intensive care treatment conditions, immobile patients who need to be placed with special care, as well as extremely obese patients weighing up to 250 kilograms (550 pounds) using the mobile table. These features also contribute to higher efficiency: While the patient is being prepared for his or her examination outside the MRI room, the MR technologist has time to prepare for scanning.

How the patient feels during MRI scanning and how he or she cooperates is an important factor for the quality of the images in clinical and research studies. But taking the patient and his or her needs more seriously is also a prerequisite for adequate planning and execution of MRI scanning procedures, something that Tim and Dot facilitate.

Annette Tuffs, PhD, is a German medical journalist based in Heidelberg. The former medical editor of the daily newspaper Die Welt has contributed to the Lancet and the British Medical Journal since 1990.

¹ The safety of imaging fetuses/infants has not been established.

Summary

Challenge:

- Improve quality of MRI images
- Plan MRI scanning as part of an individual treatment
- Make MRI scanning a more patient-friendly procedure
- Test and establish the latest and most efficient MRI technology
- Take efficiency and patient processing into consideration
- Integrate cutting-edge scientific developments into clinical routine more easily

Solution:

- Utilize the Dot (Day optimizing throughput) engine
- Implement Tim (Total imaging matrix) technology
- Use MRI devices with Open Bore and soothing Illumination MoodLight
- Connect MRI technology with hospital data systems
- Make scanning easier and less stressful with mobile tables and light coils
- Establish a scientific study with patients undergoing extra scans voluntarily

Result:

- Shorter MRI scanning times and higher patient throughput
- Patients more likely to undergo MRI scans
- Consistently high image quality with Tim and Dot because of improved patient cooperation and improved coil technology
- Higher number of patients with previously limited access to MRI technology (children, obese patients, ICU patients) can be scanned
- More comprehensive morphologic and functional information

Further Information

www.siemens.com/mri-productivity