The Next Level of MRI

Automating processes, reducing complexity: Siemens answers challenges created by the demand to help physicians deliver ever-faster diagnosis and care with a new generation of magnetic resonance imaging (MRI) systems. The Institute for Diagnostic and Interventional Radiology at the University Hospital in Essen, Germany, will be one of the first centers to work with the new technology. *Medical Solutions* talked with the head of the institute, Professor Michael Forsting, MD, about the demands he has for modern MR diagnostics.

By Sonja Fischer

A complete view of the whole spine is made easy with Tim technology – without repositioning the patient.

During the past several years, new applications and expansions such as whole-body functionality or parallel imaging enabled the integration of MRI into the daily diagnostic radiology routine. What next important step would you like to see in the development of this technology?
FORSTING: When we look at the image quality acquired with MRI today, it is obvious that the technology has already reached an unbelievably high performance level. For years now, our examinations have provided us with wonderful images. All in all, the technology has really come a long way. But MRI is also one of the most complex imaging modalities. Radiographers have to perform numerous configurations prior as well as during the examination to obtain these great images. Thus, depending on the type of examination performed, some of them are actually quite long. For me, the next step is to simplify the technology for the user and make the systems even faster. That's what I expect from our new scanner as well.

Developments such as continuous table move or integrated body coils have already reduced examination expenditures.
FORSTING: That's correct. The integrated coils, for example, are a huge step forward. It is no longer necessary to add or remove them constantly during the examination – activities that literally turned MRI into a construction site. But radiographers still require a relatively long training period until they are ready to fully operate an MRI system on their own.

Does this mean you consider shorter training periods for radiographers to be one of the keys to optimizing workflows in your hospital?
FORSTING: Yes – strictly speaking, one should ask the radiographers rather than the physicians: 'What improvements

would you like to see?' And today, they say: 'System operation must be more intuitive – we can't reinvent the settings every single time.' I think this must be possible using intelligent software that also supports quick training for radiographers. And I have faith that Siemens manages to provide just that. Surely, in my opinion, Siemens systems have more power, more gradients, are quicker – after all, highly competent engineers are at work here. But when you look at the systems, you can also tell that early on in their development, the radiographer's important job was also accounted for in the planning process. The engineers really ask for the expertise of those who will work with the system once it is in operation.

You head one of the largest radiology departments in Germany, train many medical specialists, have numerous MRI research projects, and the department supports three additional hospitals in the vicinity. This means that imaging as such has to meet completely different requirements with respect to complexity, workflow, and technology. How do you manage this?
FORSTING: To begin with, I believe that radiology has to be a large department in the future because the discipline has grown to a level where a single person is no longer able to display all of its contents. Today, you can't be equally good in neuroradiology, mammography, pediatric radiology, and so on. Instead, you need specialists who see many patients each day. Conversely, you can also offer your expertise to smaller hospitals that are unable to establish comparable know-how. And in our case, we also have to deal with the educational aspects of the profession. The shortage of physicians in Germany has led to fewer and fewer unsolicited applications for jobs. However, our experience here is quite different. Many young physicians apply to our institute because with us, they have the opportunity to get to know everything pertaining to imaging – from simpler 1.5 Tesla systems used in clinical routine to highly complex examinations with our 7 Tesla system[1], that we use, as one of the few facilities worldwide, for our patients as well. Plus, they see a large number of different disease patterns here.

Is patient throughput at the MRI system important to you?
FORSTING: Of course, but not so much in the area of reimbursement because we are a university hospital. Nevertheless, throughput is very important for us – because of the large number of patients required each day for the specialization of our doctors and because of increasing demand. The waiting lists for MRI are the longest here.
I believe that the modality of the future will be MRI for the most part – and not only because MRI does not expose patients to radiation. The number of applications fields is also growing steadily, and whole-body MRI is opening up new perspectives. In the long run, it is therefore imperative that we are able to examine even more patients with MRI.

What other criteria played a role in your decision to obtain your newest MRI system?
FORSTING: For us, it was very important that the system had a whole-body function and that it performed this examination quickly. We have a relatively high rate of referrals for this and several research projects that address cardiovascular diseases, where, in addition to the heart, all vessels have to be displayed as accurately as possible. For this purpose, you can only use a system that provides whole-body functionality and – ideally – easy and quick system operation. Generally, cardiac examinations with MRI are on the rise – in our area of care, we perform a total of ten cardiac examinations per day, and this number will certainly increase.

Will the future of MRI also involve preventive care?
FORSTING: There are a number of diseases where preventive care makes absolute sense. A good example is colon cancer because this type of cancer develops very slowly. For this, MRI would be an excellent choice. So yes, if we want medical imaging for preventive care, it certainly should be MRI. I also think that in a few years, MR mammography will play an important role in preventive care. However, the speed and depth of penetration certainly depends on the financing available.

[1] 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. Only field strengths up to 3T are clinically used.

Biography

Professor Michael Forsting, MD, is a radiologist and neuroradiologist. Since 1997, Forsting has headed the Neuroradiology Department. Since 2003, he has been responsible for the Institute of Diagnostic and Interventional Radiology and Neuroradiology at the University Hospital of Essen. In 2008, he was named Dean of the Medical Faculty.
Forsting is involved in empirical and clinical research dealing with stroke, MRI of brain tumors, and endovascular therapies for intracranial vessel malformations. He has received numerous awards for his work, including the Wilhelm Conrad Roentgen Award of the German Society of Radiology and the Science Prize from the European Society of Neuroradiology.

Further Information

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mri-productivity

Redefining Productivity in MRI

The latest Siemens magnetic resonance imaging (MRI) systems, MAGNETOM® Aera[1] (1.5 Tesla) and MAGNETOM Skyra[1] (3 Tesla), are designed to make MR exams easier for the radiographer and more comfortable for the patient. Both systems are equipped with two newly developed, powerful, and intelligent technologies[2] to enhance both productivity and image quality in the MRI suite:

• **Tim® (Total imaging matrix)** technology has already provided a large anatomical coverage without patient or coil repositioning in previous Siemens MRI systems. Now, the newly designed, ultra-high-density array enables higher spatial and temporal resolution and an imaging distance of up to 205 centimeters with no patient repositioning. Up to 204 coil elements deliver more signal than ever before. With up to 128 RF channels, the signal-to-noise ratio can be increased by 20 percent. The new Tim Dockable Table augments throughput as patients can be prepared outside the scanning room, and simplifies the setup of critically ill, physically challenged, and obese patients.

• **Dot™ (Day optimizing throughput) engine**[1], the imaging world's first MRI "throughput engine," offers user guidance and automated workflows to reduce the complexity of MRI. Dot provides multiple scan strategies for different patient conditions. The user selects the appropriate strategy and the examination protocol is automatically adjusted.

Together Tim and Dot enable expert-level scans. Dot, for example, provides appropriate slice positioning automatically. Additionally, users are presented their predefined decision points at critical steps. Intelligent, automated workflows are customizable to the standards of the institution and enable to do more, with consistently high image quality.

In combination, these technologies enable practitioners to perform up to 30 percent more exams per day.[3] Furthermore, both MAGNETOM Skyra and Aera come with a 70-centimeter Open Bore and a short magnet to make exams more patient-friendly, especially for claustrophobic and pediatric[4] patients.

[1] The information about the product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.
[2] All current Tim systems can be upgraded to the next-generation Tim + Dot.
[3] Results may vary. Data on file.
[4] The safety of imaging infants under two years of age has not been established.

With the new Tim Dockable Table, patients can be prepared outside the MRI suite and wheeled in when ready.

Summary

Challenge:
- Cutbacks in healthcare reduce capacities in terms of staff, reimbursement, and time
- Complexity of MRI scanning may cause long exam times

Solution:
- MAGNETOM Aera (1.5 Tesla) and MAGNETOM Skyra (3 Tesla) featuring Tim and Dot technologies

Result:
- Improved clinical workflows and reduced exam times
- Easier and quicker exam setup for radiographers
- Increased productivity with up to 30 percent more exams per day
- Personalized scanning for each patient