

Room to Breathe

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Expects to improve diagnosis for nervous and circulatory systems: Dr. Romeu Côrtes Domingues

Room to Breathe

Siemens 70-centimeter Open Bore technology makes magnetic resonance imaging less claustrophobic and more comfortable, enabling faster and better imaging for delicate cases.

By Reinaldo José Lopes

It's been a long wait. In October 2007, Romeu Côrtes Domingues, MD, and his colleagues at CDPI (Clínica de Diagnóstico por Imagem, a major imaging diagnosis facility in Rio de Janeiro, Brazil) visited a factory in Erlangen, Germany, and were able to have a 'sneak peek' view of MAGNETOM® Verio, Siemens new 3 Tesla (3T) Open Bore magnetic resonance imaging (MRI) device. "It was still a top secret project back then," recalls Domingues. "We had almost closed a deal with another manufacturer, but when we saw MAGNETOM Verio, we realized that this was a completely different game – it was surely going to become the new benchmark in the market. We simply had to buy it – and that's what we did last year." Since it was a novel technology, though, MAGNETOM Verio still had to wait in order to be registered and approved by Anvisa (Agência Nacional de Vigilância Sanitária), the Brazilian counterpart to the FDA. "They took almost six months to do it, but thank goodness the device is finally about to be installed," says Domingues with palpable relief. The team at CDPI now expects to employ MAGNETOM Verio to reduce rejection by claustrophobic patients and significantly improve the diagnosis of a variety of conditions, especially those involving the nervous and circulatory systems. "We are happy and very proud to be the first in Brazil, and among the first in the world, to have this kind of technology at our disposal. Because we focus so much on MRI – we have 50 doctors working on it, with thousands of exams per month – we need the best. And there's no question MAGNETOM Verio is the best option." The Brazilian radiologist and his colleagues have been familiar with Siemens MAGNETOM systems for quite a while and have been working with a MAGNETOM Symphony and a MAGNETOM Avanto. "Siemens became the world leader in the market share of MRI devices, thanks also to their MAGNETOM Espree's Open Bore concept," states Domingues. "Still, mag-

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Clínica de Diagnóstico por Imagem, Rio de Janeiro, Brazil

netic resonance can be a difficult method when you take into account the patients' rejection rate due to claustrophobia or lack of comfort. Conventional small bores may frighten off about three percent of patients – sometimes we even need to hold a patient's hand to calm him or her down while the session proceeds," he says.

Ten Centimeters that Matter

Open Bore MRI changes that by providing ten centimeters of additional breathing room for the patients. "It may not seem so at first, but ten centimeters matter a lot. You'll never want to be examined in a standard-bore device after that," says Domingues. Combined with the Open Bore approach, MAGNETOM Verio will allow the team at CDPI to handle difficult procedures in a much more flexible way and, thanks to 3T, to provide them with a welcome enhancement in resolution and precision, and also with a bigger chance of an early diagnosis in a number of conditions.

"Of course, we're talking about doubling the magnetic field. And that means doubling the signal-to-noise ratio, too. Some lesions that are nearly invisible for a 1.5T machine – in a patient with a case of epilepsy that's difficult to control, for instance, or breast cancer at the earliest stages – are sure to show up with 3T." But at least in most systems, the precision of 3T comes at the price of "unfriendly 60-centimeter bore systems," as Domingues puts it – precisely the ones that look the most oppressive to patients. "The unique combination of 3T with Open Bore in MAGNETOM Verio will help us enjoy the best of both worlds," he says.

Domingues explains that both claustrophobic patients and children, who normally have a hard time undergoing MRI, stand to benefit from Open Bore technology. "Depending on the kind of procedure, you can actually let the mother caress the child during the exam. Obese patients, up to 250 kilograms, can also be redirected to it. And there are positioning advantages for those with chronic pain or limited mobility."

Even for patients who do not suffer from any disability and feel just fine in a tight place, Open Bore technology can make a difference, according to the Brazilian radiologist. "Let's say you need to image a patient's wrist. In any conventional machine he would have to go in with his wrist first, and we all know how unbearable it is to keep your arm stretched for 15 minutes. If you need to examine someone's knees, lumbar vertebrae or abdomen, the patient's head can stay outside the tunnel, as we say. And that's a lot less stressful."

Total Imaging

According to Domingues, another important factor for the success of Siemens MRI systems is Tim® (Total imaging matrix) technology. "This is crucial, because MRI procedures have now become so common that between 20 and 30 percent of our patients arrive here with requests to image two or three different areas," he says. With Tim, up to ten coils can be used at the same time. That means there is no need for the patient to get in and out of the system, or to change position inside it. At the end of a typical working day of 15 hours, the result is that about two or three extra patients



Open Bore systems open up new possibilities: MAGNETOM Espree and MAGNETOM Verio facilitate exams of claustrophobic, obese, and immobile patients, or patients in pain.

Summary

Challenge:

- Patients' rejection to MRI due to claustrophobia
- Difficult or impossible imaging of obese patients, patients that are immobilized, or people with chronic pain
- Lack of Open Bore MRI systems with a 3T magnetic field

Solution:

- Investment in MAGNETOM Espree, a 1.5T, 70-centimeter Open Bore system, and its newly released 3T counterpart, MAGNETOM Verio

Result:

- Improvement in workflow – up to 60 MRI examinations in a single day
- More comfort for patients
- Increased precision in difficult exams
- Better research capabilities

have been examined. "We broke our own record a couple of months ago, doing 60 sessions in a single day. One would never be able to reach the same amount with a different machine," reports Domingues.

With MAGNETOM Verio, the team at CDPI hopes to strike a rewarding balance between faster imaging and higher resolution. "By doubling the magnetic field, going from 1.5T to 3T, you could in theory, image a brain tumor in ten minutes, instead of spending 20 minutes on it. But with 3T, in those cases, we can produce a complete study of the relevant brain area, including perfusion, spectroscopy, and functional data, that enables us to classify the tumor as malignant or benign with a very high degree of certainty. That would take about 15 minutes, but the gain in diagnostic quality would more than compensate for the additional time we spend," he says.

Besides, the combination of Tim, 3T, and Open Bore technology is also suited to dramatically improve the diagnosis of numerous conditions, explains Domingues. In the case of breast tumors, MRI can both bring to light nodules that are

hard to detect through mammography, and guide doctors to obtain biopsies of the affected tissue with a high degree of precision. He says: "You are able to obtain 'slices' of breast tissue that are 0.5 millimeters thin, so absolutely nothing eludes us."

Thanks to Tim, an interesting trend in recent times is the use of MRI to image a patient's body from head to toe. "It can be very useful to detect metastasis. In patients with diabetes, where there's systemic damage to blood vessels, you can inject the contrast in the whole body in order to have a global picture. The same goes for myositis, a condition that affects the whole musculoskeletal system," Domingues says.

"In angiographies with 3T, you're able to do dynamic studies where the contrast is literally seen arriving at the artery and coming back through a vein real fast." The same praise goes to neurological exams. According to Domingues, smaller and more precocious lesions tend to appear in better detail and, with the help of spectroscopy, it is easier to say whether a given abnormality is a tumor, an inflammatory lesion, or a stroke. And

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there is also the possibility of dynamic imaging – a knee in movement, for example, a kind of exam that is often sought by Brazil’s top soccer players.

Research

Apart from the benefits for patients, Domingues sees MAGNETOM Verio as a boost for CDPI’s research capabilities. “We’ve been able to forge a strong partnership with universities in Brazil and abroad. It’s also a strong motivating factor for our doctors. It’s always good for them to get away from cases of headaches and meniscus lesions every now and then.” The research output has been so great, says Domingues, that his group has had 21 papers accepted for presentation at the 2008 annual meeting of the Radiological Society of North America

(RSNA) – more than all the Brazilian research groups put together in previous meetings. A paper by Domingues and his colleagues that has just been accepted for publication in the *American Journal of Roentgenology* shows how positron emission tomography (PET) and MRI can be combined to get a clearer picture of lesions in the nervous system, abdomen, and bones when the data from PET-CT (computed tomography) is somewhat doubtful.

Domingues hopes that MAGNETOM Verio will keep his team at the top of their game and, more importantly, the patients will feel like it is the best solution for them. “I believe that, once a patient is examined with MAGNETOM Verio, he won’t think of being imaged in another machine. The difference between it

and any other device is just staggering. That’s why we’re sure that this is an investment that will pay off. If you do the math, you’ll find out that, at the end of five years of work, you can buy another machine thanks to the time you saved with the first one,” he concludes.

Reinaldo José Lopes is a science and health writer at G1, Brazil’s largest news website.

Further Information

www.siemens.com/Verio
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Dynamic Duo

In the U.S., MAGNETOM Espree and MAGNETOM Verio also help to image children, claustrophobic and obese patients, and body areas that are difficult to image. The medical team at South Jersey Radiology Associates, New Jersey, like its colleagues in Rio de Janeiro, are witness to the flexibility and precision of both systems. “They enable us to capture patients we would not have been able to image with conventional MRI,” says William F. Muhr, MD, Director of Body Imaging at the private practice. In two of their locations east of Philadelphia, they decided to replace conventional 1.5 Tesla systems with the Siemens Open Bore technology. Muhr says MAGNETOM Espree and MAGNETOM Verio help to improve workflow at their facilities by easing the posi-

tioning of patients and diminishing the number of image retakes caused by anxiety-related movements. Thanks to MAGNETOM Verio’s 3 Tesla field, the New Jersey team also obtains high-quality images of difficult body areas. “We get really good image quality in abdominal exams for obese patients, and also in challenging exams of small structures like the wrist,” Muhr remarks.

For orthopedic exams, MAGNETOM Verio is fast, around 15 minutes on average, compared to 30 minutes in conventional systems, and that is probably a factor in the high acceptance rate among patients: For their next exam, around 90 percent of patients ask to be imaged on MAGNETOM Verio again.

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