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## MultiTransmit boosts spine imaging at St. Vincent's

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Patients with chronic and acute spine conditions are benefiting from the upgrade of the Achieva 3.0T to TX performance

The patient demographics of St. Vincent's Public Hospital, Sydney, Australia includes many immuno-compromised patients – for example post-transplant – and these patients seem to be particularly prone to the B1 inhomogeneities that lead to dielectric shading, especially in the area of the spine. After the MultiTransmit upgrade, however, the [Achieva 3.0T](#) has become the preferred choice for all spine exams at St. Vincent's.



Kirsten Moffat



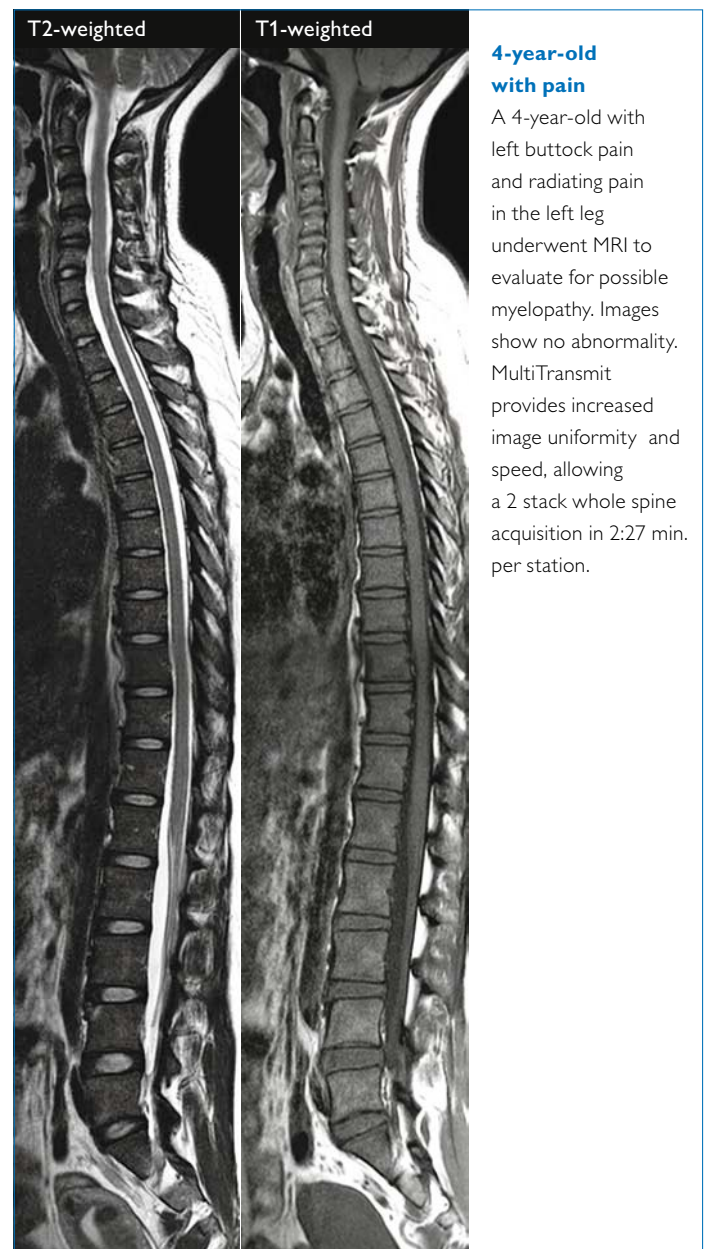
Joga Chaganti, MD

### MR helps visualize a broad range of spine pathology

St. Vincent's consultant neuroradiologist Joga Chaganti, MD, has long been an advocate of MR as the system of choice for imaging the spine. "The excellent resolution and soft-tissue contrast of MRI make it particularly attractive for imaging spinal tissues such as bone marrow, joints and ligaments which support stability within the spine, as well as the spinal cord itself and the layers surrounding it," he says. "Patients referred to our hospital for a spine exam can be suffering from any one of a broad range of conditions from lesions within the spinal cord, intra-dural tumors and extra-dural compressions such as spontaneous epidural hematomas which can lead to severely disabling conditions like paraplegia. The beauty of MRI is that it enables all these conditions to be investigated on just one modality by providing a direct visualization of the pathology."

Due to budgetary constraints, the hospital was later in investing in an MRI system than some other institutions. When they did, in 2007, they went for what they considered to be the best available on the market – the Achieva 3.0T. "From the start we were very impressed with the system, which provided an extremely high standard of imaging performance. Compared with other systems I had worked with, the image quality is superb. The flexibility to fully optimize parameters such as contrast and resolution, as well as the flexibility of the parallel imaging were also key factors in our choice for the Achieva," explains Kirsten Moffat, St. Vincent's MRI Manager. They did, however, experience some reservations with spine scans, which make up around 30 to 40% of the exams they perform.

*"We are now able to perform most full spine scans in two stations, instead of the three stations needed previously."*



### 4-year-old with pain

A 4-year-old with left buttock pain and radiating pain in the left leg underwent MRI to evaluate for possible myelopathy. Images show no abnormality. MultiTransmit provides increased image uniformity and speed, allowing a 2 stack whole spine acquisition in 2:27 min. per station.



St. Vincent's Hospital

*“The performance of the system with MultiTransmit can only be described as phenomenal.”*

A high proportion of the patients referred to St Vincent's are immuno-compromised, for example transplant patients. The MRI staff noted that some of these patients seem to be particularly prone to the B1 inhomogeneities that lead to dielectric shading, especially in the area of the spine. “Fortunately, by taking advantage of the MultiTransmit technology that Philips has made available for the Achieva 3.0T, we were able to fully overcome this challenge,” she points out, and it has inspired a new research study to try to understand this potential connection.

#### Achieva 3.0T TX meets special needs of St. Vincent's

MultiTransmit technology has been generating a lot of positive reactions from users. The team at St. Vincent's was particularly impressed with the reports in 2009 on the Achieva 3.0T TX from the University of Bonn, Germany – the first hospital to install the TX. “We also solicited the advice from the local Philips Healthcare organization and the consensus was that the best solution for us would be the upgrade to MultiTransmit, which was completed in March 2010,” recalls Ms. Moffat.

#### Post laminectomy

Post-operative exam of a 56-year-old immuno-compromised patient with possible infection. Sagittal STIR shows bilateral laminectomy L5 epidural granulations. Recurrent/ remanent disc at L4/5 is causing thecal sac compression. The MultiTransmit image shows increased uniformity supporting diagnostic confidence. With Multitransmit scan time is reduced from 5:44 to 3:09 minutes.

MultiTransmit 3:09 min.



Without MultiTransmit



MultiTransmit



#### Possible cord compression

Images show the thoracic spine part of a whole spine exam to visualize possible cord compression. MultiTransmit provides increased speed and consistent image uniformity.



*“We now schedule 30-minute slots for complete spine exams. Other spine exams went from 30 to less than 20 minutes, which is a big benefit for critically ill patients.”*

“The [performance of the system with MultiTransmit](#) can only be described as phenomenal,” says Dr. Changanti. “In spine imaging, we now have a much more homogeneous B1 field that virtually eliminates the effects of dielectric shading even in the most challenging patients. The result is much better image quality with fewer flow artifacts.”

The St. Vincent’s team also encountered SAR limitations with conventional 3.0T spine imaging, and acquisition times could be quite long. With severe spine conditions, this often resulted in considerable patient discomfort leading to poor image quality due to patient movement and, in the severest cases, the patients were not able to complete the exam. MultiTransmit enables reduction of local SAR, increasing scanning speed by up to 40%. “We are now able to schedule 30-minute time slots for complete spine exams. Other spine exams have gone from a half hour to less than 20 minutes, which is a big benefit for critically ill patients who can’t tolerate a long examination,” points out Ms. Moffat.

Given the patient demographics, most scans are full spine scans for cord compression or infection. Depending on the clinical indications, sagittal STIR, sagittal T1, axial T1 or axial T2 scans with or without fat saturation may be performed. And depending on indications from these scans a contrast-enhanced T1 scan with fat sat may also be added.

“Thanks to the improved B1 homogeneity, we are now able to perform most full spine scans in two stations (cervical-thoracic and thoracic-lumbar), instead of the three stations we needed previously,” adds Ms. Moffat. “So if a critically ill patient is only able to tolerate one sequence, we are able to still acquire most of the cervical-thoracic area in one take.”

#### **Powerful tools give an additional boost to spine imaging**

The upgrade has also enabled the St. Vincent’s team to expand its research interests, especially in areas such as diffusion weighted imaging (DWI) and diffusion tensor imaging (DTI). “In the past, DWI was used predominantly for stroke but there has now been a huge paradigm shift in DWI which has become a kind of functional imaging technique,” explains Dr. Chaganti. “If a patient is referred to us with, say a collapsed vertebra, we really can’t tell initially whether it is an osteoporotic compression or some internal malignancy. In such a scenario, DWI is being extensively used at St. Vincent’s to evaluate these conditions by looking at the ADC values. Our experience suggests that a figure of around 1.9 to 2.1 indicates that a highly cellular lesion could be responsible for the collapsed vertebra. In this way we can confidently identify the pathology behind the condition.”

The team is also evaluating the use of DWI for characterizing edema. “In standard imaging, any bright areas in the spinal cord could be due to ischemia, demyelination or tumor, and again DWI seems to be able to play a valuable role in identifying the edema as cytotoxic or vasogenic. We’re currently evaluating our findings on this,” says Dr. Chaganti. “We also plan to use DTI in the future in the cervical and thoracic cord as we believe this to be a very attractive technique.” ■

*“After the MultiTransmit upgrade we were able to fully overcome the inhomogeneity challenges presented by our special patient groups.”*



#### **Possible cord compression**

Thoracic spine part of a whole spine exam to visualize possible cord compression. MultiTransmit provides increased speed and consistent image uniformity.