

# Worldwide Leading Academic Center Gets a Lift in Advanced MR Imaging



As one of the largest and most authoritative scientific medical centers in Europe, Erasmus University Medical Center (Rotterdam, Netherlands), is committed to excellence in healthcare and a healthy population through research and education. Part of the institution's vision is to unite the latest scientific insights with practical application to benefit patient care—innovation and state-of-the-art technologies go hand-in-hand.

“We are a worldwide leader in population imaging,” says Gabriel

Krestin, MD, PhD, Professor of Radiology and Chairman of the Department of Radiology at Erasmus. The Generation R study is one example of this leadership in research and population health at Erasmus. It is a prospective cohort study designed to identify early environmental and genetic causes of normal and abnormal growth by following nearly 10,000 children born between April 2002 and January 2006 until they reach young adulthood. Many of the study's participants are ethnic minorities.

For the study, detailed assessments include physical examinations, biological samples, fetal ultrasound exams, observations and assessments, and questionnaires—all collected through the children's first nine years. Then, at age nine and again at age 13, all children undergo an MR examination of the brain, lungs, and cardiovascular system in Erasmus' Sophia Children's Hospital, the oldest children's hospital in Europe.

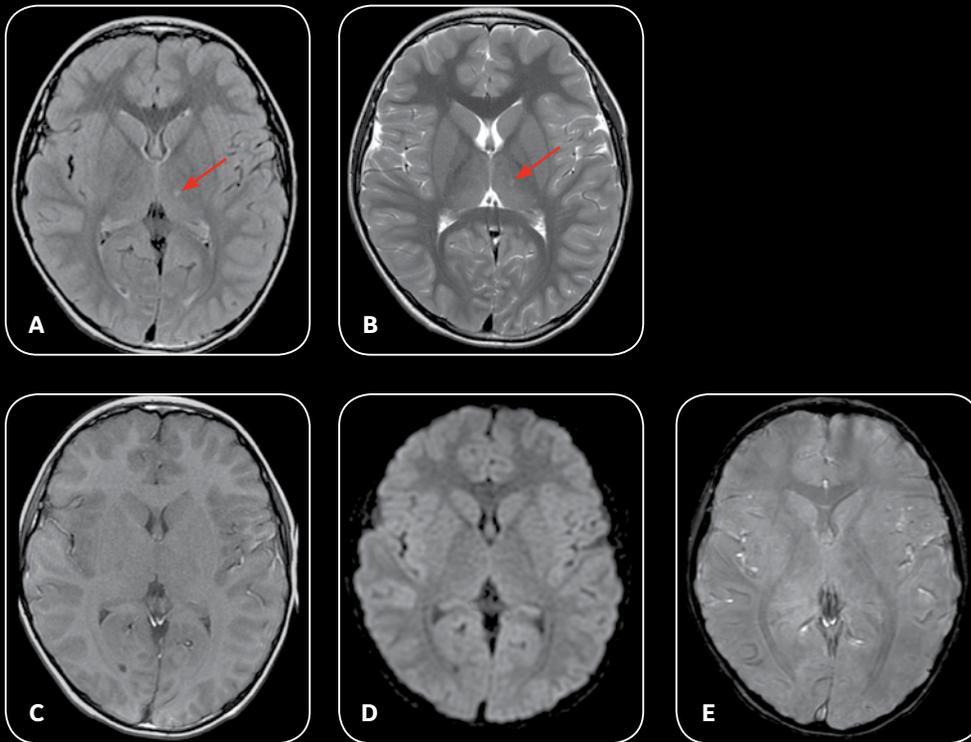


Figure 1. A 7-year-old patient referred for investigation of non-specific abnormalities on physical examination. (A, B) Axial T2 FLAIR and PROPELLER demonstrate a subtle punctate non-specific lesion in the left thalamus. (C-E) No evidence of endured perinatal asphyxia, other basal nuclei have a normal aspect.

Sophia Children's Hospital has two MR scanners; a Discovery™ M750w 3.0T wide bore that is frequently used for research such as the population study, and the recently upgraded SIGNA™ Explorer Lift 1.5T in May 2016. The SIGNA Explorer Lift was an upgrade from a 10-year-old SIGNA™ HDxt.

According to Professor Krestin, one of the key reasons for choosing the SIGNA Explorer Lift upgrade is the limited space available in the existing facility, as a new hospital is being built on the campus.

“We chose the upgrade because of the siting; we did not want to invest in construction to change the old building,” Professor Krestin explains. “Also, we were looking for minimal expense to move toward a state-of-the-art imaging system.” The 10-year-old magnet could still be utilized for another 8-10 years, making the SIGNA™ Explorer Lift upgrade a sound economical decision.

Another key factor in the decision to upgrade was to limit the downtime of the MR scanner. While connected to

the main hospital, Sophia Children's Hospital is a separate building and department. Installing a new magnet would not only incur construction expense, but the department would endure three months of downtime.

“In this case with the upgrade, our downtime was only two weeks. That was a big advantage,” adds Professor Krestin.

While the decision to upgrade the old scanner to SIGNA Explorer Lift made sense economically and logistically from a buildings management standpoint, it was the advanced clinical capabilities that made this a winning scenario for Erasmus.

### Gabriel Krestin, MD, PhD,

Professor of Radiology and Chairman of the Department of Radiology at Erasmus University Medical Center.



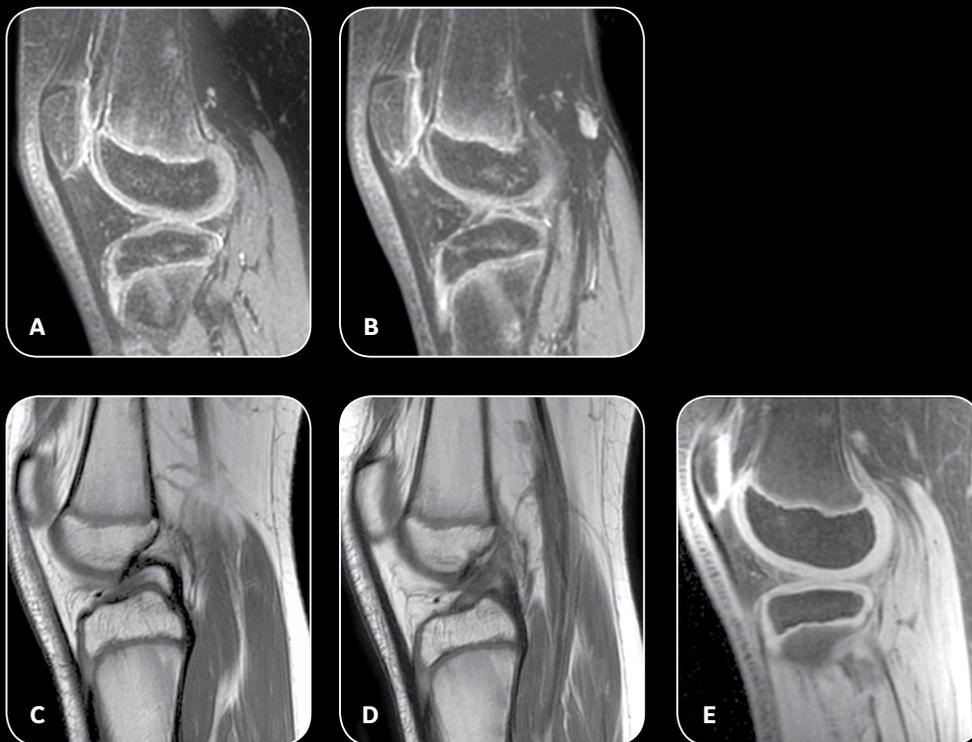


Figure 2. Patient with instability in both knees evaluated for underlying collagen disease or congenital anomaly of the cruciate ligaments. (A, B) Sagittal PD FSE demonstrate no evidence of congenital anomaly of cruciate ligaments. (C, D) There is non-specific foci of increased fluid signal in the Sagittal Cube FS series. (E) Sagittal IDEAL depicts normal cartilage.

## A complete MR portfolio

With the SIGNA Explorer Lift, Erasmus gains a complete MR portfolio with access to today's advanced technology at half the cost.<sup>1</sup> This includes GE Healthcare's SilentScan technology that reduces noise like never before—down to less than 3 decibels above ambient level. Increased functionality includes advanced motion correction techniques such as 3D PROMO with 3D volumetric

imaging for brain exams. PROPELLER 3.0 delivers motion robust imaging from head to toe and Body Navigators are designed to deliver real-time, robust free-breathing respiratory motion compensation.

Motion artifacts were a key issue with the old scanner, says Marjolein Dremmen, MD, a pediatric radiologist at Erasmus. "We have a lot more stable images without motion artifacts,"

Dr. Dremmen says. This is particularly beneficial in children over the age of five. The shorter scan times may also help the facility decrease the use of sedation in pediatrics.

"If a patient moves, we now scan with PROPELLER, PROMO, or SSFSE," says Sita Ramman, RT(R), Coordinator of Quality and Safety MRI at Erasmus. This has also led to a noticeable reduction in repeat scans, she adds.

“We were looking for minimal expense to move toward a state-of-the-art imaging system.”

*Professor Gabriel Krestin*



Figure 3. Six-year-old with atypical Guillain-Barré syndrome and infectious radiculopathy referred to MR for suspicion of spinal cord defects. No focal lesions were detected; no pathological enhancement was seen on the cervical level post contrast. Findings: normal morphology of the cervical spine.

In addition to the ability to scan patients who cannot remain still, there are other new applications Erasmus is able to perform on the SIGNA Explorer. According to Ramman, these include cardiac viability studies and patients with MR-conditional implants using MAVRIC SL. “Patients with MR-conditional implants are scanned on the SIGNA Explorer instead of another system.”

SilentScan also provides a significant advantage when imaging children who are afraid of the loud noise of an MR scanner. Patients are less afraid, Ramman says, and she no longer needs to change coils in a combined head and spine study.

“We love the new HNS coil. We are able to scan the head, neck and spine with one coil instead of taking patients off the table and changing coils. The same is true of the HD Body coil,” Ramman says. She also finds the quality of the Flex coils to be very good, but would like to see development of a small cardiac coil—the HD Body is too large and the Flex coils too small for these studies.

As a pediatric neuroradiologist, Dr. Dremmen sees a significant increase in image quality. SWAN is an important sequence that is consistently used in neuro exams at Erasmus. “This is really an advancement for differentiating between calcifications and blood vessels.” Susceptibility artifacts often

block the visualization of calcification, but now she can eliminate this by reconstructing images from the filtered phase.

While higher image quality is expected with any new system, Dr. Dremmen sees a distinct difference in the detail of the thalamus and intracapsular anatomy. In particular, the proton density sequence is significantly better with the SIGNA Explorer Lift upgrade and BRAVO provides excellent contrast to differentiate white and gray matter. Both sequences help Dr. Dremmen evaluate specific details in the brain.

“We’ve had some cases where this detail helped us make a more confident diagnosis of ischemia,” Dr. Dremmen

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Sita Ramman, RT(R)

adds. “Sometimes in small children it is difficult to see these abnormalities. Overall, it is easier to read the studies and that shortens the time we need to evaluate the patient case.”

As Erasmus continues to ramp up the SIGNA Explorer Lift with new sequences and capabilities, Dr. Dremmen looks forward to using double inversion recovery and black blood sequences, which are not yet optimized and ready for clinical use on the system. With the black blood sequence, she hopes to utilize it in place of CT for evaluation of pediatric craniosynostosis, a condition where one or more of the fibrous sutures in an infant’s skull prematurely fuses and ossifies, changing the skull growth pattern.

At Erasmus an average of 50 pediatric MR exams are performed each week. Now with SIGNA Explorer Lift, scan times are much shorter, requiring less time to complete a study with better image quality, says Ramman.

“Patient set-up is simplified, and we use Navigator for abdominal studies. We are not scanning more patients with the shorter scan times; we have more time to help the patients and parents so it’s less stressful for everyone.”

Ramman is impressed with how easy the system is to use. “The interface is the fastest we’ve ever seen,” she says.

“We are very pleased with the system; with the upgrade we have better image

quality and coils, faster scan time, and enhanced patient comfort—all without a major renovation.”

With the upgrade, Professor Krestin says the center is now back to the level of MR imaging they historically had—and one that is needed for a large, tertiary pediatric academic center. “We were limited in our imaging possibilities in diffusion weighted and functional imaging,” he explains. “We’ve improved our advanced MR capabilities and enhanced the quality to support our clinical investigations and research efforts.” 

#### References

1. Total upfront cost includes equipment, downtime and siting. Actual results may vary. Based on average estimate construction costs to upgrade a 1.5T 60 cm to SIGNA Explorer Lift vs. replacing with a new wide bore.

**Gabriel Krestin, MD, PhD**, is a Professor of Radiology and Chairman of the Department of Radiology at Erasmus University Medical Center, Rotterdam, Netherlands. He received his medical degree and completed his residency in radiology at the University of Cologne in Germany, where he also completed his fellowship training in abdominal imaging and MRI. He is a permanent Visiting Professor at Stanford University School of Medicine.

Dr. Krestin is a member of numerous national and international societies, is a member of the Executive Council and chair of the Research Committee of ESR, and serves on the editorial board of several international journals. His main areas of research are abdominal imaging, cardiovascular diseases, and molecular imaging.

**Erasmus University Medical Center** is based in Rotterdam, Netherlands, is affiliated with Erasmus University and home to its faculty of medicine. Erasmus is one of the largest and most authoritative scientific University Medical Centers in Europe.