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Breakthrough solutions deliver powerful imaging applications at Istanbul School of Medicine

Istanbul University and Istanbul School of Medicine are the oldest university and oldest medical school, respectively, in Türkiye. Fatih Sultan Mehmet, also known as the Ottoman Sultan Mehmet II, first established Istanbul University in 1453. The University has a rich history as a pioneering institution for medical education and today remains at the forefront of scientific research and health service delivery.

The Istanbul School of Medicine Radiology Department has three MR systems, with SIGNA™ Victor 1.5T being the latest edition to the fleet. Led by Şükrü Mehmet Ertürk, MD, Professor and Chairman, the Radiology Department is a pioneer in medical imaging and a benchmark for other institutions in Türkiye. Professor Ertürk has also served as Vice President of the Turkish Society of Radiology and President of the Turkish Society of Magnetic Resonance Imaging.

"We were looking for a system that employs the latest technological advancements and provides a flexible base for future innovations and improvements," says Prof. Ertürk. "Our academic output is high, and we are committed to clinical excellence. We also aimed to acquire a scanner that can create a comfortable and user-friendly patient environment."

SIGNA Victor was chosen for its winning configuration, thanks to its integration of a cutting-edge, deep-learning algorithm for image reconstruction, AIR™ Recon DL.

"DL-based algorithms such as AIR Recon DL safeguard image quality and enhance workflow by optimizing imaging times," he says.

"Additionally, features such as free-breathing abdominal and cardiac applications reduce patient anxiety and improve compliance and diagnostic outcomes."

According to Prof. Ertürk, the advanced SIGNA Victor MR system enables the department to scan between 35 to 45 complex imaging procedures daily across various specialties like oncology, neurology, musculoskeletal and cardiology, all without needing dedicated time slots for specific exam types. Scans are noticeably faster—in some instances up to 50% shorter—with an increase in spatial resolution estimated between 30% to 40%.

"Balancing quality with throughput is a daily challenge in our hectic radiology department. We need more scanners like SIGNA Victor," Prof. Ertürk says.

SIGNA Victor is a powerful and efficient MR system, including a green magnet that requires 70% less helium and reduces power consumption by more than 10%. Breakthrough solutions such as AIR™ Coils, AIR Recon DL, AIR x™ and AIR™ Touch help address today's challenges like rising power costs and managing high patient volumes while maintaining satisfaction.

Prof. Ertürk shares that the technologists have said that after SIGNA Victor was installed in the department, their workflow has become noticeably smoother and more efficient. In particular, they appreciate the intuitive nature of the system, especially with the latest MR 30 for SIGNA™ software, which makes it incredibly easy to navigate and operate, even for complex procedures.

Prof. Ertürk and the technologists consider AIR Recon DL technology to be "a game-changer," as it significantly boosts image quality while reducing scan times. This translates directly into less patient anxiety and greater satisfaction, as the technologists can often complete exams more quickly and comfortably.
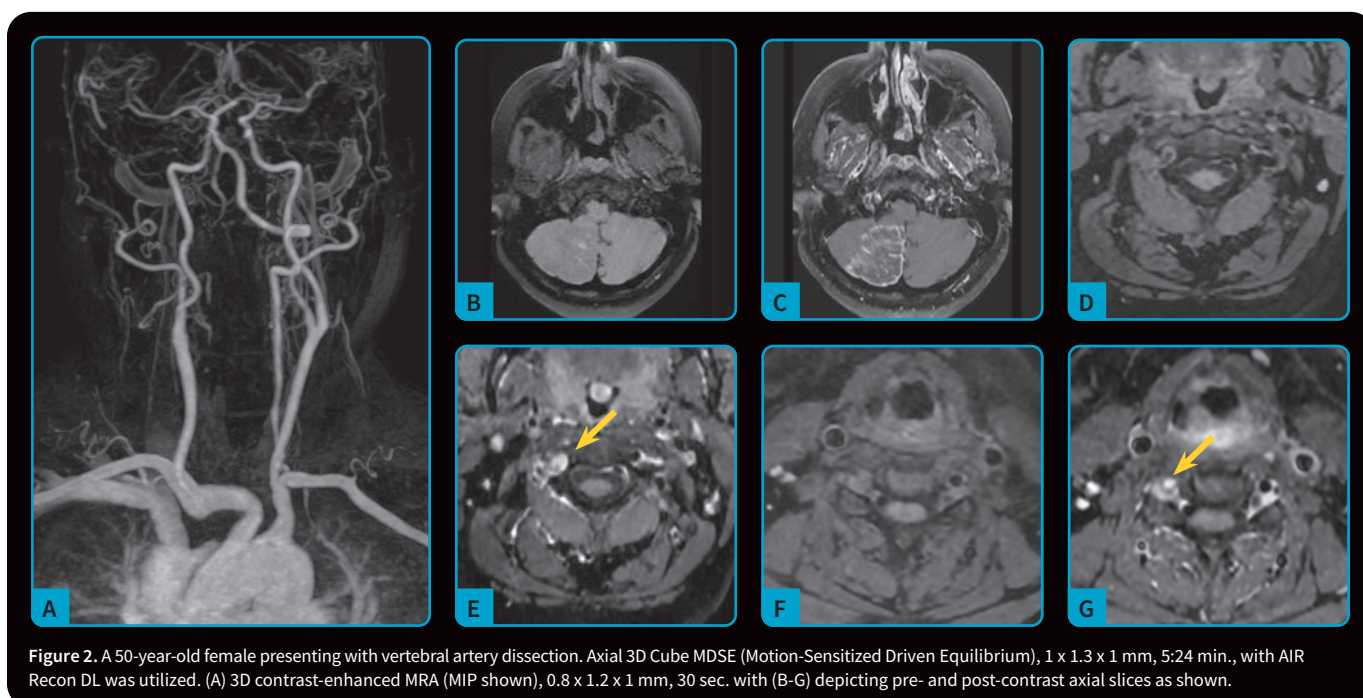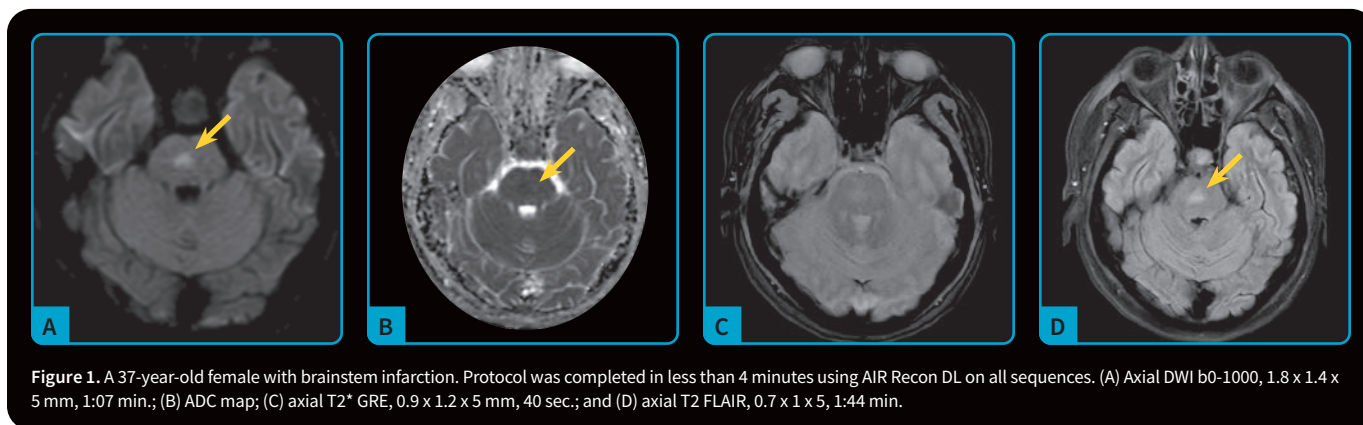
"The AI capabilities of SIGNA Victor are especially remarkable; we've seen significant improvements in image quality that eventually improve our diagnostic accuracy and overall productivity," Professor Ertürk adds.

At Istanbul School of Medicine, SIGNA Victor is equipped with MR30.1 software, which Prof. Ertürk says helps simplify and improve workflow for technologists and radiologists. AIR Recon DL is utilized across nearly all 2D, 3D Cartesian and non-Cartesian PROPELLER-based sequences. For Prof. Ertürk, the combination of MR30.1 software and SIGNA Victor are representative of the MR scanner of tomorrow.

"AI is the future of radiology. Using AI, one can improve image quality while shortening the scan times. The classical trade-off between image quality and acquisition times will no longer be critical and we are witnessing this especially in abdominal, neuro, pediatric and cardiac imaging," says Prof. Ertürk. "We can achieve images with high-contrast spatial and temporal resolution for individual patients. Faster and non-compromised imaging translates into higher patient output and improved workflow."

Currently, most of the neuro, spine and breast imaging patient cases are preferentially scheduled on SIGNA Victor at Istanbul School of Medicine. The hospital has been moving some challenging cardiac, abdominal, MSK and prostate exams to the system as well.

Diffusion techniques such as MUSE and PROGRES are routinely used, and oZTEo is being adopted for MR bone imaging. The department also uses AIR Coils extensively across anatomies due to the outstanding SNR the coils can achieve. "I believe that they will replace all other traditional coils shortly," Prof Ertürk adds.

Figure 1. A 37-year-old female with brainstem infarction. Protocol was completed in less than 4 minutes using AIR Recon DL on all sequences. (A) Axial DWI b0-1000, 1.8 x 1.4 x 5 mm, 1:07 min.; (B) ADC map; (C) axial T2* GRE, 0.9 x 1.2 x 5 mm, 40 sec.; and (D) axial T2 FLAIR, 0.7 x 1 x 5, 1:44 min.

Figure 2. A 50-year-old female presenting with vertebral artery dissection. Axial 3D Cube MDSE (Motion-Sensitized Driven Equilibrium), 1 x 1.3 x 1 mm, 5:24 min., with AIR Recon DL was utilized. (A) 3D contrast-enhanced MRA (MIP shown), 0.8 x 1.2 x 1 mm, 30 sec. with (B-G) depicting pre- and post-contrast axial slices as shown.
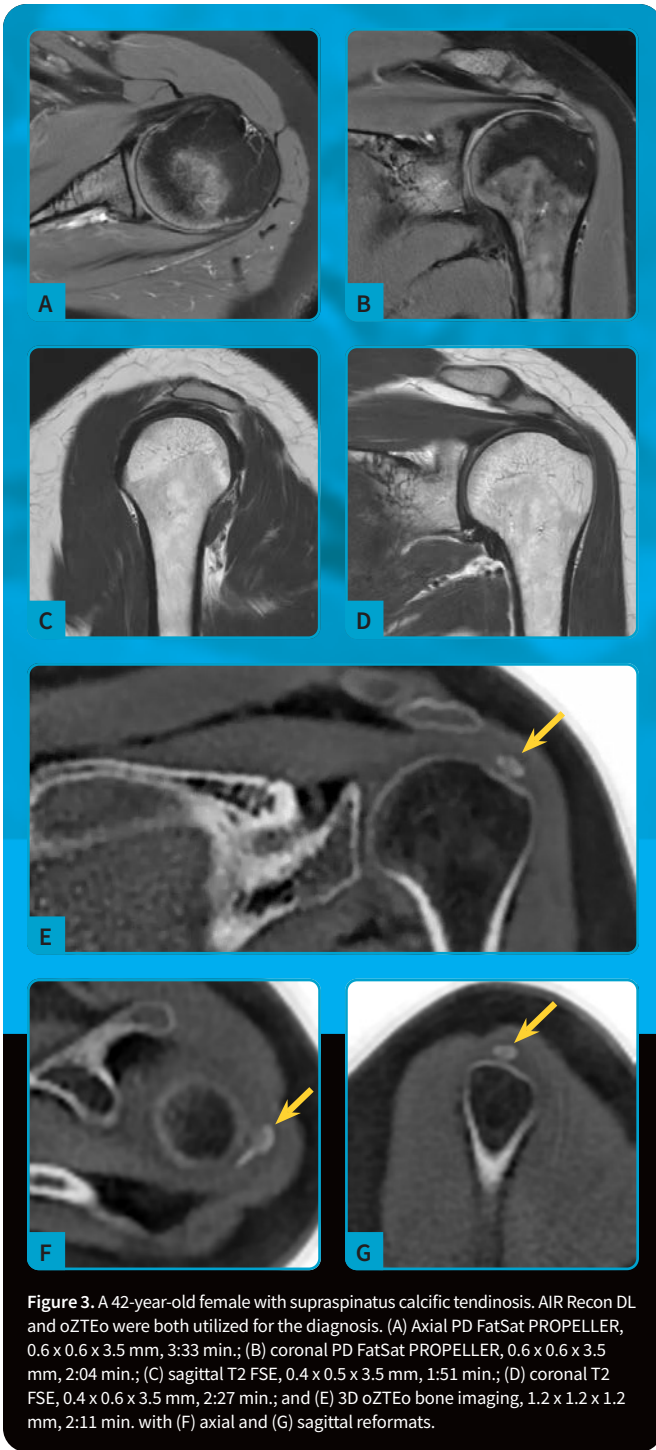
Figure 3. A 42-year-old female with supraspinatus calcific tendinosis. AIR Recon DL and oZTEo were both utilized for the diagnosis. (A) Axial PD FatSat PROPELLER, 0.6 x 0.6 x 3.5 mm, 3:33 min.; (B) coronal PD FatSat PROPELLER, 0.6 x 0.6 x 3.5 mm, 2:04 min.; (C) sagittal T2 FSE, 0.4 x 0.5 x 3.5 mm, 1:51 min.; (D) coronal T2 FSE, 0.4 x 0.6 x 3.5 mm, 2:27 min.; and (E) 3D oZTEo bone imaging, 1.2 x 1.2 x 1.2 mm, 2:11 min. with (F) axial and (G) sagittal reformats.

Figure 4. A 47-year-old female with rectal cancer. AIR Recon DL was used for all sequences. (A) Sagittal FOCUS DWI, b50-800, 1.7 x 1.7 x 4 mm, 3:16 min.; (B) ADC; (C) sagittal T2 PROPELLER, 0.6 x 0.6 x 3 mm, 3:15 min. with (D) corresponding T2 fused image; (E) axial T2 PROPELLER, 0.8 x 0.8 x 4 mm, 3:06 min. with (F) corresponding T2 fused image; and (G) coronal T2 PROPELLER, 0.8 x 0.8 x 3 mm, 3:14 min. with (H) corresponding T2 fused image.

For example, prior to SIGNA Victor, certain cardiac exams were particularly challenging due to many factors—from low SNR to patient compliance. Now, with the advanced AIR Recon DL capabilities, the department has improved both SNR and resolution, as well as patient comfort with AIR Coils. The technologists consistently acquire high-quality images even in these demanding cases and they appreciate the wider use case of AIR Recon DL compatibility, especially its significant difference when it comes to DWI applications of internal structures, such as PROPELLER DWI.
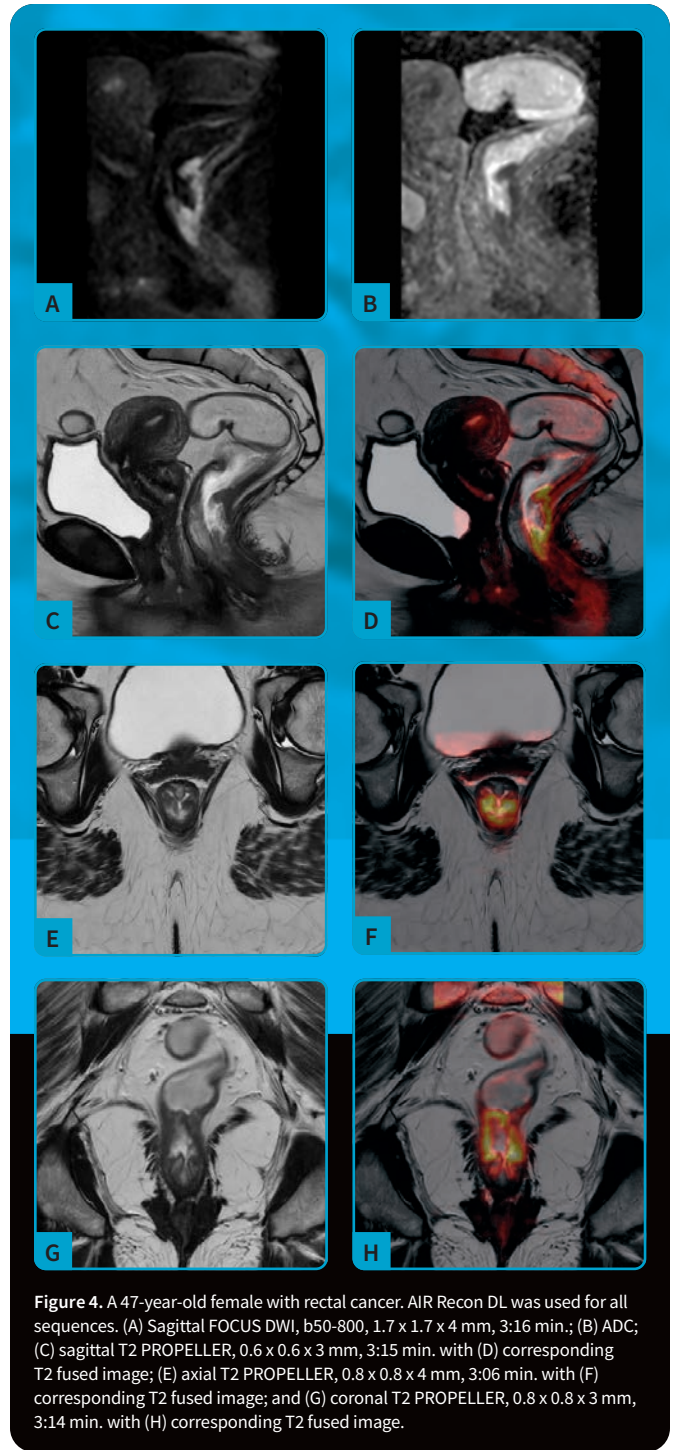
The reduced need for repeat scans also frees up valuable time for the technologists to focus on other patients' needs and administrative tasks. Overall, the SIGNA Victor has raised the bar for Istanbul University and Istanbul School of Medicine Radiology Department, allowing them to deliver exceptional care and achieve remarkable results.

"The scanner is excellent, the GE HealthCare team is great and the images are fantastic," Professor Ertürk says. "The robust engineering of SIGNA Victor combined with the software and AI algorithms are the winning hand for the seeable future." **S**
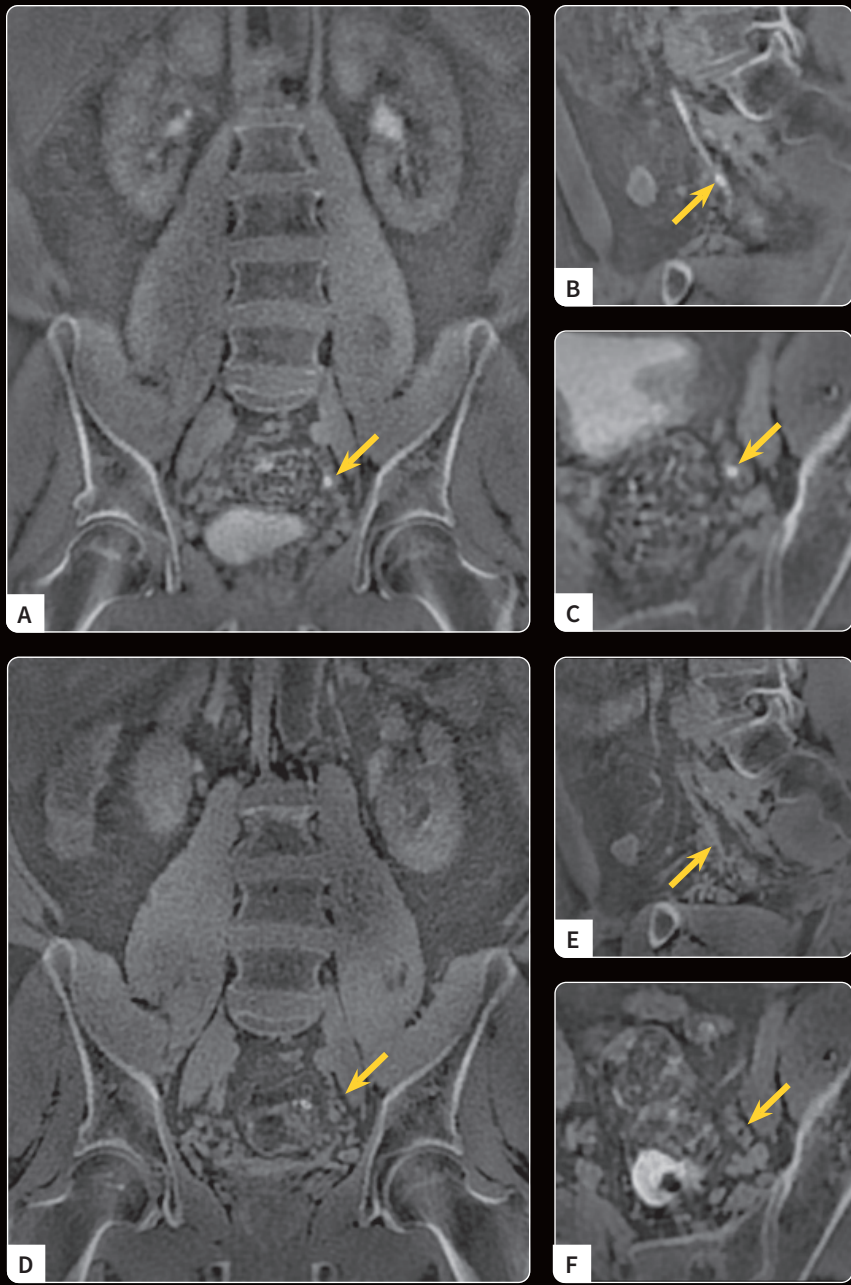
Figure 5. A 52-year-old male with urinary stones. (A-C) oZTEo was utilized for initial diagnosis. Patient was referred for extracorporeal shock wave lithotripsy (ESWL) treatment. (D-F) oZTEo images one month after ESWL treatment.