

CASE STUDY

Advanced intelligent Clear-IQ Engine (AiCE) Permits Diagnosis Using 1.5T Images That Are Comparable to Images Acquired at 3T

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Background

Shin Koga Hospital, which is located in Kurume city, Fukuoka, Japan, is a core hospital which provides advanced medical care and emergency medical services in the Chikugo region. Because the hospital is committed to providing "emergency care that is ready for patients 24/7", it operates a comprehensive lineup of medical equipment to support rapid diagnosis and treatment.

With regard to MRI diagnostic services, the hospital has selected a 1.5T MRI Vantage Orian to replace one of its 1.5T scanners and has also installed Advanced intelligent Clear-IQ Engine (AiCE), an advanced noise reduction reconstruction technology incorporating AI for use in routine clinical practice. This first-hand report describes the benefits of AiCE in actual clinical use at Shin Koga Hospital.

Image quality comparable to that of 3T MRI

AiCE, which is one of the most outstanding features of Vantage Orian, achieves noise reduction by employing a reconstruction technique based on deep learning. Because the signal-to-noise ratio (SNR) is improved by this noise reduction reconstruction technique, scan conditions usually considered suitable only for a 3T scanner can be set without worrying about degradation

of the SNR. Our decision to purchase a Vantage Orian system was mainly based on the benefits of performing examinations using a 1.5T scanner that offers outstanding clinical performance and operational efficiency as well as extremely high image quality previously achievable only with a 3T scanner, and the system more than met our expectations. Figure 1 shows images acquired using the same scan conditions as those for a 3T scanner. Images with a high SNR can be acquired in a short scan time.

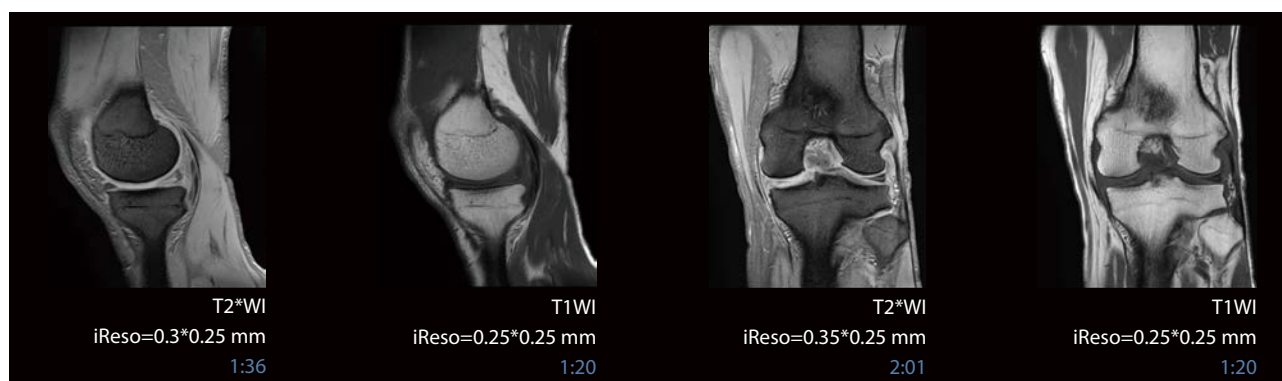


Figure 1

More efficient operation with AiCE

In addition to our 1.5T Vantage Orian, we operate two other MRI systems (a 3T scanner and a 1.5T scanner). Because we have several MRI systems, it is a great benefit for us to be able to obtain images of comparable quality using our 1.5T and 3T scanners. Previously, we often found it troublesome to decide whether we should use a 1.5T or 3T scanner to perform a particular examination. Since the installation of AiCE in our Vantage Orian, because the image quality is now comparable to that of our 3T scanner, we no longer need to select a specific scanner when scheduling examinations. Of course, some specialized examinations such as brain tractography require use of the 3T scanner, but most examinations can now be performed using any of our scanners. This has resulted in more efficient operation and shorter examination times. Installation of Vantage Orian has therefore been a great benefit to our hospital.

It should also be noted that, compared to 3T scanners, 1.5T scanners suffer from fewer problems related to artifacts and the specific absorption rate (SAR). We are extremely pleased with our 1.5T Vantage Orian scanner because it can provide high-quality images comparable to those acquired at 3T. Figure 2 shows images of the brainstem. For head imaging as well, the quality of the images acquired by Vantage Orian is comparable to that of images acquired at 3T.

Easy parameter setting and simple system operation

The term "deep learning" may sound a little intimidating, but when conducting an actual clinical examination, the operator can turn AiCE on or off as easily as filter processing. In addition, AiCE can be set as a part of the scan sequence. This allows AiCE to be easily applied in routine examinations without any difficulties. Furthermore, because the degree of noise reduction can be adjusted for previously acquired images in order to provide the desired noise reduction effect, it is possible to adjust the images according to the preferences of the interpreting physician. Any differences in SNR between patients can be eliminated by adjusting the degree of noise reduction after the images have been acquired, thus ensuring a consistent level of image quality.

Technologies applicable to a wide variety of examinations

At our hospital, we perform examinations of all regions of the body, and we choose to employ AiCE in almost all cases. There are no limitations with regard to the coils that can be used or the image planes that can be selected. There are also no restrictions on the use of AiCE in combination with the compressed sensing technique or 3D high-speed scanning technique (Fast 3D mode). The technology is therefore very efficient and extremely versatile. The improvement in SNR is a great benefit, resulting in both shorter scan times and higher resolution. Taking full advantage of the above features, we employ AiCE for short-time wide-area imaging, for high-resolution imaging of the pelvis, and for many other types of imaging based on the specific diagnostic objectives of each examination.

Future prospects of AiCE

We expect the usefulness of Vantage Orian with AiCE to further expand in many fields in which a 1.5T scanner has sufficient performance capabilities. We have not yet had an opportunity to perform examinations of all regions of the body since the installation of our Vantage Orian, but we are aware that AiCE can be particularly useful in the field of cardiology for performing examinations such as MR coronary angiography (MRCA), cine MRI, and so on. We expect that our 1.5T Vantage Orian scanner will create new value that would be difficult for a 3T scanner.

We also plan to expand the applications of Vantage Orian to include non-contrast MRA for which we anticipate a strong increase in demand as well as whole-body examinations with short scan times, such as diffusion-weighted whole-body imaging.



Clinical Images

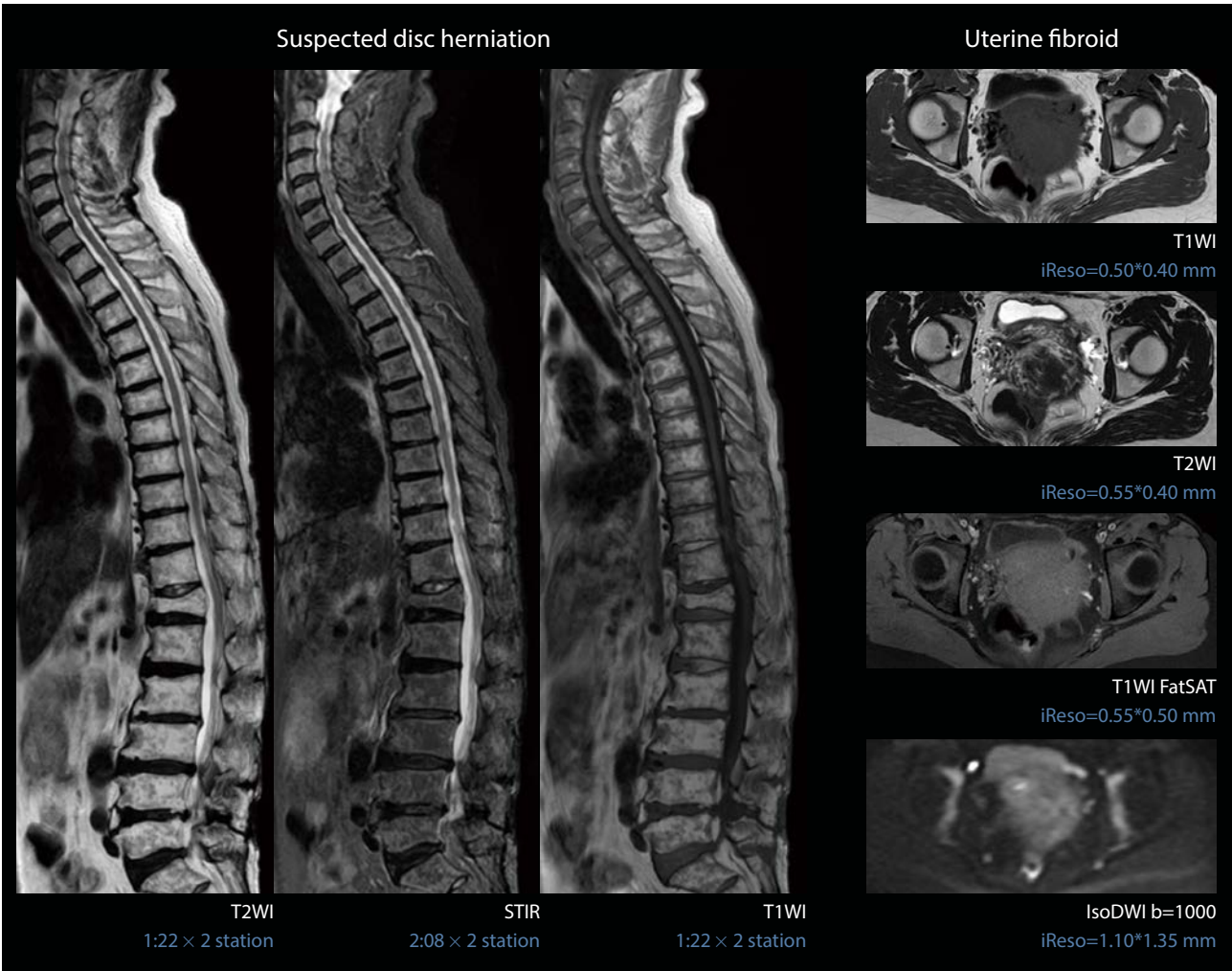


Figure 2

Disclaimer: The clinical results, performance and views described in this document are the experience of the health care providers. Results may vary due to clinical setting, patient presentation and other factors. Many factors could cause the actual results and performance of Canon's product to be materially different from any of the aforementioned.

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