MRI / White paper

Canon Medical Group's Sustainability Initiatives

Case example with a 3T MRI System Vantage Galan 3T / Supreme Edition

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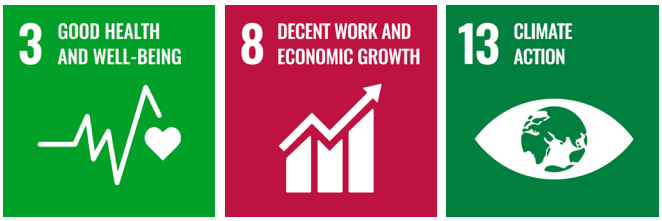
Introduction

Canon Medical Group aims to ensure the sustainability of our products and services so that the systems and solutions we provide play a vital role in improving the daily work of healthcare professionals and the lives of patients.
For us, sustainability is integrated into every stage of the product lifecycle, from design to the final stages of recycling and recovery. At each stage, we meticulously design our products to minimize environmental impact while maximizing value for both healthcare professionals and patients.
Furthermore, we strive to contribute to healthy and fulfilling lives for all by addressing the challenges faced by healthcare professionals and patients through our products, solutions, and services, transcending the boundaries of individual systems.
This paper introduces some of our efforts toward Green Radiology contributions, using our latest 3T MRI system (Vantage Galan 3T / Supreme Edition) as an example.

Sustainability Policy Employed by the Canon Medical Group

Underpinned by our 'Made for Life' philosophy, the management slogan of Canon Medical Operations, our aim is to provide medical professionals with the solutions they need to enhance the health and well-being of patients in all parts of the world. Through technological innovation, building partnerships, and sustainable business activities, we are contributing to the 3rd, 8th, and 13th Sustainable Development Goals (SDGs).
Toward this end, our key sustainability objectives for 2021-2025 are:

1. Achieve progress in current medical treatments with the support of medical imaging.
2. Support global initiatives in the medical field that have a positive impact on local communities.
3. Work to limit global warming by reducing our carbon footprint.



Our Material Issues and the SDGs

Canon Medical Group's material topics (five topics), which form the basis of our ESG approach to sustainability, were identified in 2021 through extensive consultations with stakeholders, including customers, employees, and government authorities.
While we have set further goals for each material issue, this document focuses on Material Issue 5: Protection and conservation of the global environment.

5.1 Contribute to the prevention of climate change.
5.1.1 Carry out CO_2 reduction activities following Canon Inc. standards in production bases with high environmental impact.
5.1.2 Decide quantitative CO_2 reduction targets in 2022 and develop activities from 2023.
5.2 Further develop activities to recycle waste and reduce chemical substance emissions, following Canon Inc. standards in production bases with high environmental impact.
5.3 Improve water use efficiency.
5.4 Pursue the protection and restoration of nature and its biodiversity globally.

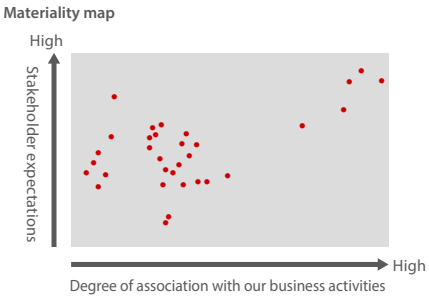
Canon Medical Group's Environmental Initiatives

The Canon Medical Group's Environmental Policy establishes the following three key objectives to reduce environmental impact in products and business processes:

1. Developing and providing products and services that reduce or eliminate environmental impact throughout their entire lifecycle.
2. Reducing the environmental impact of all business processes, including design and development, manufacturing, sales and distribution, servicing, and disposal, with a focus on the prevention of global warming, the efficient utilization of resources, and the control of chemical substances.
3. Promoting diversity conservation activities in cooperation with communities.

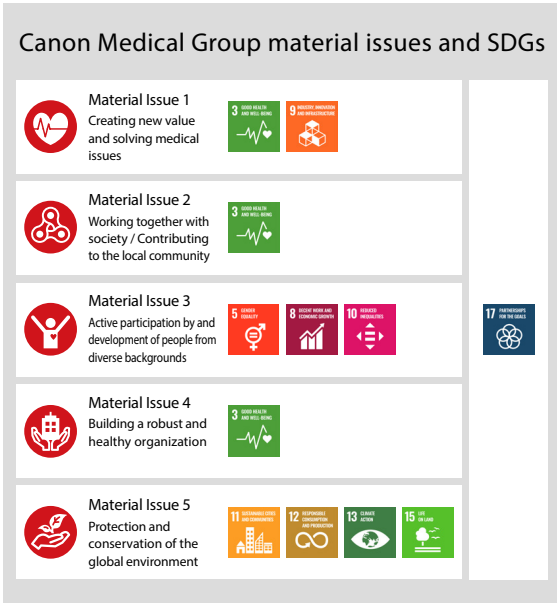
As one specific measure, we are implementing initiatives to minimize the impact on climate change. In December 2022, a medium-term plan for CO_2 emissions at Canon and its global group companies and business sites was formulated, setting a target to reduce Scope 1 and Scope 2 emissions by 42% by 2030 (compared

Candidates of Materialities (Extracted)
Promotion of workstyle innovation in healthcare
Provision of high-quality medical care
Responding to new medical needs
Provision of environmentally friendly products and services
Reduction of energy use
Solving social issues working together with our stakeholders
Creation of a comfortable working environment for everyone
Fostering of human resources
Efforts to ensure compliance (with requisite laws and ordinances)
Strengthening and maintenance of information security



Canon Medical Group top five materialities:

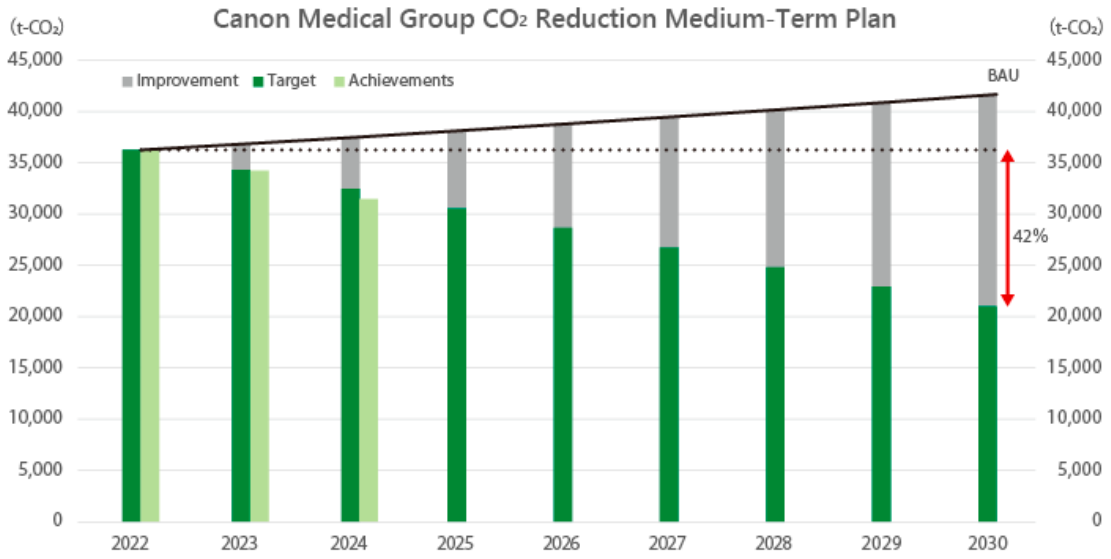
- Creating new value and solving medical issues
- Protection and conservation of the global environment
- Working together with society / Contributing to the local community
- Active participation by and development of people from diverse backgrounds
- Building a robust and healthy organization



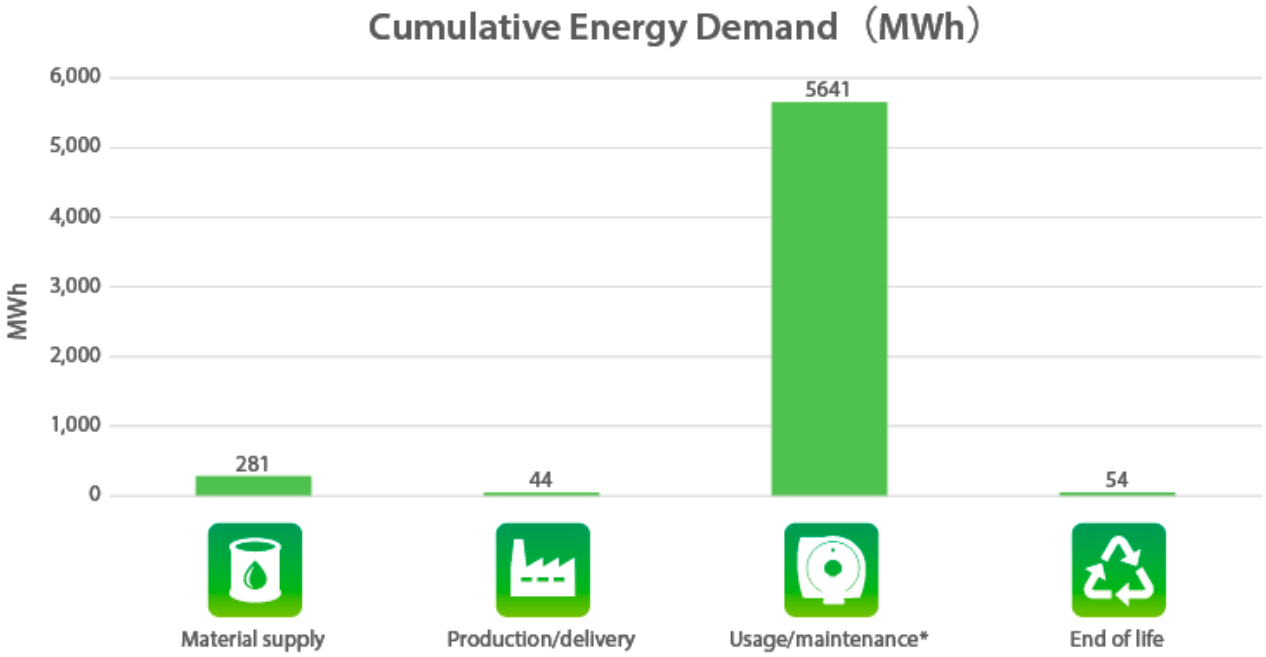
to our 2022 level). The plan will represent a solid and significant step toward achieving carbon neutrality. Furthermore, our products incorporate environmentally conscious design throughout every process of their lifecycle in order to deliver maximum value to healthcare professionals and patients while minimizing environmental impact.
Canon and its group companies and operation sites worldwide aim to reduce Scope 1 and Scope 2 emissions by 42% by 2030 (compared to our 2022 levels), and Scope 3 emissions, Categories 1 and 11, by 25% by 2030 (compared to our 2022 level). These reduction targets are certified by the Science Based Targets initiative (SBTi) as shown in Figure 1. In the long term, we are working toward achieving carbon neutrality.

Life Cycle Assessment

As mentioned earlier, we are committed to sustainable development and climate action throughout the entire product lifecycle.
We incorporate environmental considerations into our products by complying with requirements such as IEC 60601-1-9,* an international standard for the environmentally conscious design of medical devices. As part of this effort, we continuously assess environmental impact using energy consumption as a unified metric across four product stages: material/component procurement, manufacturing/ transportation, use, and recycling/disposal. Quantitative evaluation enables us to develop more reliable countermeasures and reduce environmental impact based on product characteristics.
The following presents the life cycle assessment information for the Vantage Galan 3T / Supreme Edition. The horizontal axis represents the stages: material/component procurement, manufacturing/ transportation, use, and recycling/disposal. The vertical axis indicates cumulative energy demand. Product specifications are based on a 10-year lifespan.



* IEC 60601-1-9: International Electrical Standard or requirements for environmentally conscious design to ensure compliance of medical devices with environmental regulations in different countries.9: International Electrical Standard or requirements for environmentally conscious design to ensure compliance of medical devices with environmental regulations in different countries.



Environmentally Friendly Manufacturing

To reduce energy consumption, we continuously implement measures such as installing LED lighting and motion-sensor lighting in offices, production sites, sales locations, and research facilities, as well as installing solar panels on warehouse roofs.
In product manufacturing, we prioritize sustainable material sourcing, reducing reliance on hazardous substances and minimizing resource consumption in our manufacturing processes.

Our Efforts in Transportation, Distribution, and Logistics

The Canon Medical Group promotes modal shifts from truck and air transportation to rail and ship transportation. This not only reduces CO_2 emissions from product transportation itself, but also lowers CO_2 emissions by improving logistics efficiency.
In addition, we are focusing on reducing packaging materials used for product transport by simplifying packaging processes and reducing the number of units per system.
We continuously strive to improve packaging efficiency while ensuring product safety for customers throughout the entire transportation process from shipment to local delivery. For equipment transportation, we are continuously advancing new initiatives such as using dedicated transport containers, environmentally conscious packaging materials (e.g., biodegradable fibers), and FSC-certified wood.

Our Efforts in Product Maintenance and Disposal

To ensure safe and reliable use of our products for an extended period, we provide replacement services for parts and consumables.
We also actively collect used and discarded product parts for reuse in new products. Equipment collected for parts reuse is recycled according to the Canon Medical Group's Rules for Recycling Residual Materials After Parts Collection. This approach aims to reduce environmental impact and enhance recycling effectiveness. The Vantage Galan 3T / Supreme Edition boasts a recycling rate of 88% at the end of product life.
As a resource-saving solution in the MRI business, we actively promote Encore Upgrades (known in Japan as Renewal Solutions), which upgrade peripheral electronic parts while leaving the magnet in place at the facility. This contributes to reducing construction costs and equipment downtime associated with replacements. We employ zero-boil-off magnets for the systems and implement various measures to minimize additional liquid helium fill at each stage, including transportation and equipment installation.

* Based on 10 years usage

Our Efforts with Vantage Galan 3T / Supreme Edition

The Vantage Galan 3T / Supreme Edition is an extremely environmentally friendly system designed to reduce installation requirements while delivering high energy efficiency. Below are several examples of sustainability incorporated into the product design.

1. Canon's new magnet and new gradient field system

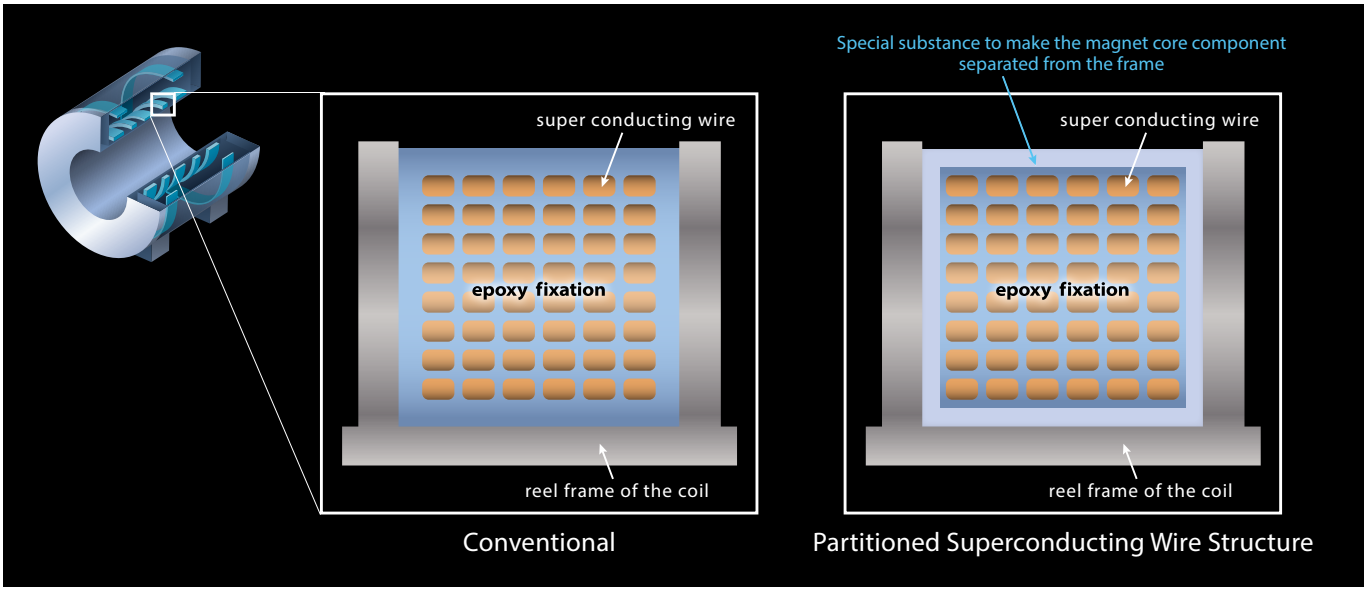
The new magnets used in the system are manufactured in Japan, where Canon is headquartered, enabling reduced transportation costs and energy consumption.
A "partitioned superconducting wire structure" maintains high magnetic field homogeneity while expanding the field of view (FOV), allowing more information to be acquired in a single scan while stabilizing image quality.
Furthermore, the new cross-pattern support gradient field coil improves gradient field stability and enables precise center frequency control, achieving image quality stabilization. This reduces heat generation and allows cooling at lower energy levels.

2. Introduction of ECO mode

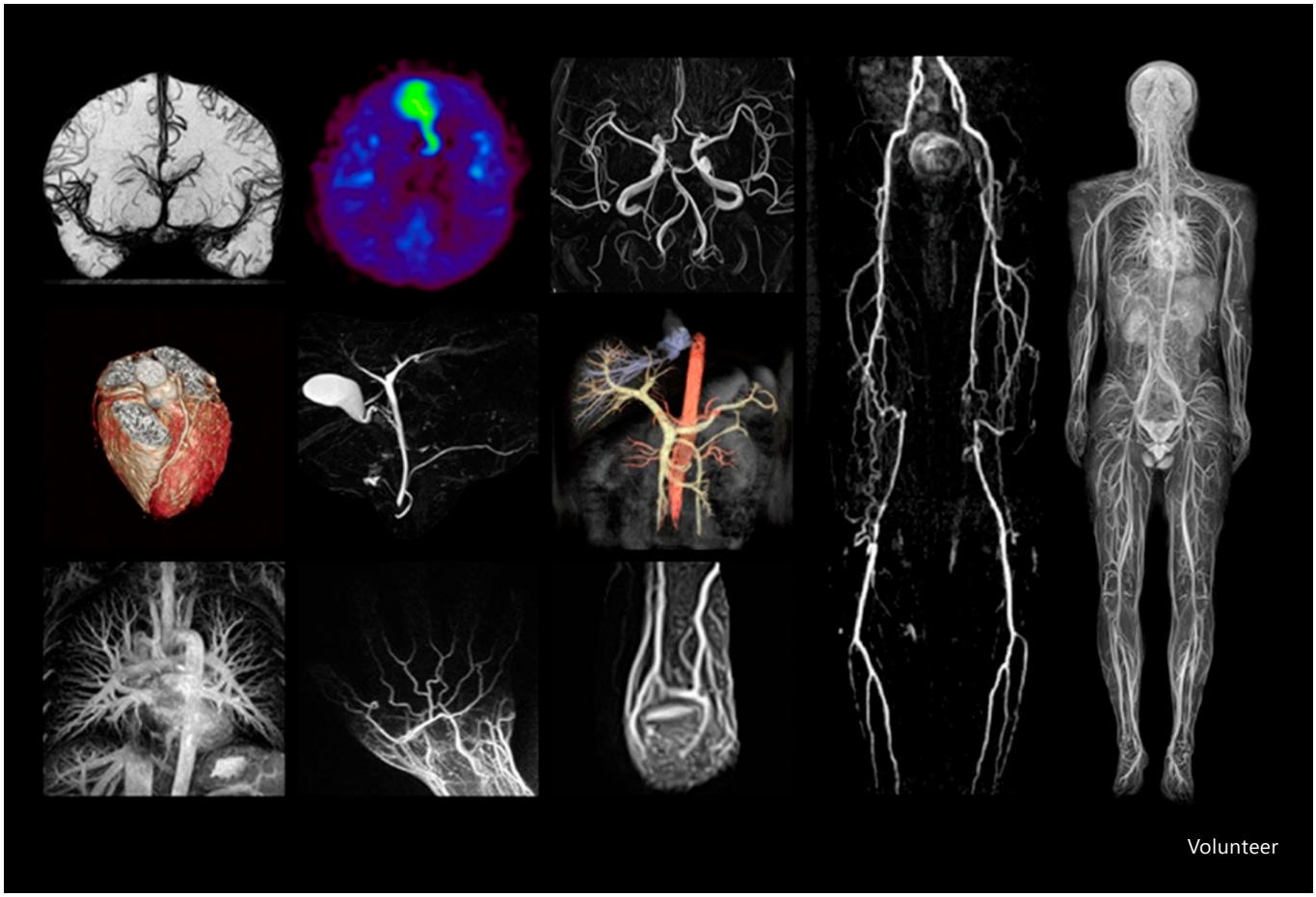
Our MR systems, including the Vantage Galan 3T / Supreme Edition, include ECO mode in the standard configuration. Enabling the ECO mode setting allows the gradient power supply unit to enter sleep mode when the system is not in scanning status, reducing power consumption during system standby. For example, power consumption for a head scan is 18.9 kVA, but ECO mode reduces this to 8.47 kVA. In ECO mode, the system can resume examination-ready status within just a few seconds, enabling seamless execution of emergency or unscheduled examinations.

3. Promoting non-contrast imaging

MR contrast agents contain gadolinium, a heavy metal. While these contrast agents aid diagnosis by enhancing the visibility of blood vessels and organs, they are excreted in urine and enter the water environment via sewage systems, causing water pollution and adding to the environmental burden.[1,2] Reducing the amount of contrast agent used is crucial for supporting the transition to more environmentally sustainable healthcare.
As pioneers of non-contrast MRA, we have promoted non-contrast MRA for over 25 years.[3] By offering numerous solutions for omitting contrast agents, we are contributing to the transition to environmentally sustainable healthcare.
In Flow-Spoiled FBI, the phenomenon in which the high-velocity systolic signal disappears during diastole is used to distinguish between arteries and veins. This significantly improves blood flow visualization in the lower extremities and in patients with poor circulation. Minimized acoustic noise utilizing UTE (mUTE*) used with the ASL method not only reduces susceptibility to pseudostenosis, which can be problematic in the conventional TOF method, but also enables dynamic observation by non-contrast 4D-MRA in a single scan. Furthermore, for patients at risk of systemic nephrogenic fibrosis, the use of paramagnetic contrast agents is contraindicated, making Time-SLIP a crucial examination method for renal artery assessment.[4]



* mUTE : minimized acoustic noise utilizing UTE



4. High-quality, short-time examinations utilizing deep learning

Our company pioneered the development of image reconstruction technology utilizing deep learning. We incorporated the noise reduction technology "Advanced intelligent Clear-IQ Engine (AiCE)"in our systems in 2019. The high-resolution enhancement technology "Precise IQ Engine (PIQE)", which evolved from AiCE, was introduced in 2023.

In MRI, there is a tradeoff between scan time, SNR, and resolution. Shorter scan times inevitably result in compromising on resolution or SNR. Using AiCE at this time enables improved SNR under a variety of exam conditions, even with shorter scan times. Furthermore, using PIQE enhances resolution up to 3 times in both in-plane direction. That of the originally acquired image while further improving SNR. As a result, high-quality images can be obtained even with short scan times, ultimately reducing system operating time.

For example, axial T2*-weighted shoulder images (resolution: 0.6 mm × 0.6 mm, slice thickness: 3 mm), which previously required 2 minutes and 44 seconds of scan time, can now be acquired in 1 minute and 14 seconds using the high-speed imaging technology Exsper. Despite the scan time being reduced by approximately half, AiCE enhances image quality, enabling acquisition of images comparable to those obtained with conventional scan times.

Additionally, the axial T2-weighted image of the head (matrix: 384 × 384, slice thickness: 4 mm), which previously required 2 minutes and 42 seconds of scan time, can now be acquired in 1 minute and 18 seconds using PIQE by reducing the matrix size. After reconstruction, it can be upscaled to a 960 × 960 matrix for higher resolution. This allows higher-definition images to be obtained, even with shorter acquisition times.

5. To also achieve patient comfort

While we have highlighted our environmental initiatives, we conclude this report by introducing the patient examination environment.

The Vantage Galan 3T / Supreme Edition features a wide patient bore with a diameter of 71 cm, designed to minimize patient discomfort from claustrophobia. Furthermore, Pianissimo Technology significantly reduces noise both inside and outside the MRI examination environment, regardless of the patient, sequence, or scan time. This is achieved by housing ultra-thin gradient coils, which suppress acoustic noise, within a vacuum chamber. Additionally, the Pianissimo Zen noise-reduction sequence reduces noise by up to 99%, making examinations even more comfortable and patient-friendly.

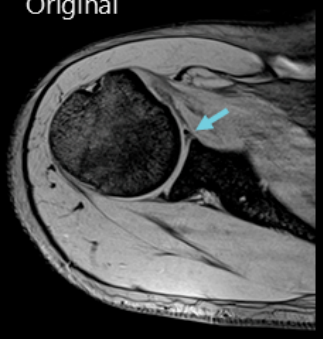
As described above, our solutions contribute not only to the global environment but also to the examination environment.

Arthro-labial injury

Reduced imaging time **with Exsper**

AiCE Integrated Intelligence Exsper

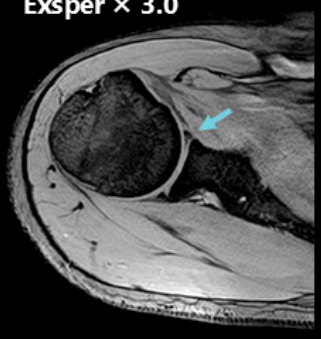
Original



Axial T2*w, 0.6×0.6 mm resolution,
3.0 mm slice
Scan time 2:44

50% Scan time Reduction

Exsper × 3.0

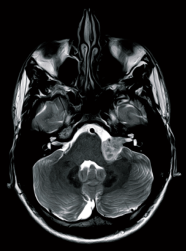


Axial T2*w, 0.6×0.6 mm resolution,
3.0 mm slice
Scan time 1:14

Courtesy of Fujita Health University Hospital

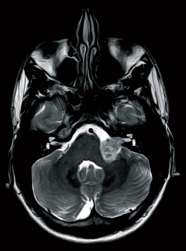
PIQE for Brain | Faster & higher definition

Conventional

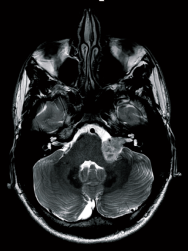


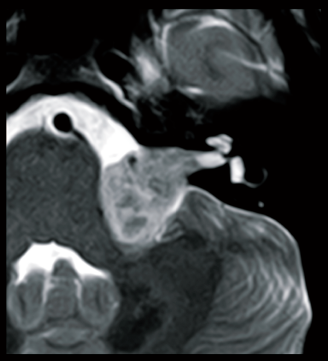
52% Scan time Reduction

Conventional

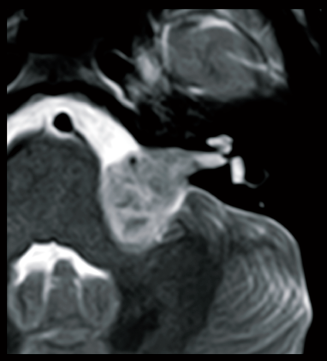


PIQE

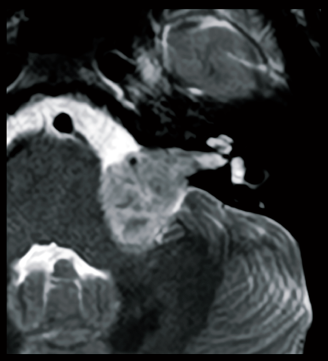




Axial T2w,
Acquisition matrix 384×384,
0.58×0.58 mm resolution,
4 mm, 2:42



Axial T2w,
Acquisition matrix 320×320,
0.7×0.7 mm resolution,
4 mm, 1:18



Axial T2w,
Reconstruction matrix 960×960,
0.46×0.46 mm resolution,
4 mm, 1:18

Courtesy of Hospital Foundation Adolphe De Rothschild, France

Conclusion

This report introduced some of Canon Medical Group's initiatives contributing to green radiology.

Canon Medical Group will continue to incorporate sustainability into all activities and steadily advance efforts toward a circular economy that reduces environmental impact throughout the entire product lifecycle.

References

1 Ebrahimi P, Barbieri M. Gadolinium as an emerging microcontaminant in water resources: threats and opportunities. Geosciences 2019;9(2):93.
2 Kaemer D, Schmidt K, Klimpel F, Rauch U, Ernst DM, Paul SAL, Haeckel M, Koschinsky A, Bau M. Tracking the distribution of persistent and mobile wastewater-derived substances in the southern and central North Sea using anthropogenic gadolinium from MRI contrast agents as a far-field tracer. Mar Pollut Bull. October 2024;207:116794.
3 Miyazaki M, Sugiura S, Tateishi F, Wada H, Kassai Y, Abe H. Non-contrast-enhanced MR angiography using 3D ECG-synchronized half-Fourier fast spin echo. J. Magn. Reson. Imaging November 2000;12(5):776-83.
4 Nomura CH, Time-SLIP (Time-Spatial Labeling Invertion Pulse) in the diagnosis of renal artery stenosis by Magnetic Resonance [pdf]. Canon Medical Systems Corporation. 2021.

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The AI technology was trained during the development phase. When implemented into the product, the AI function no longer self-learns.

CANON MEDICAL GROUP

Made For life