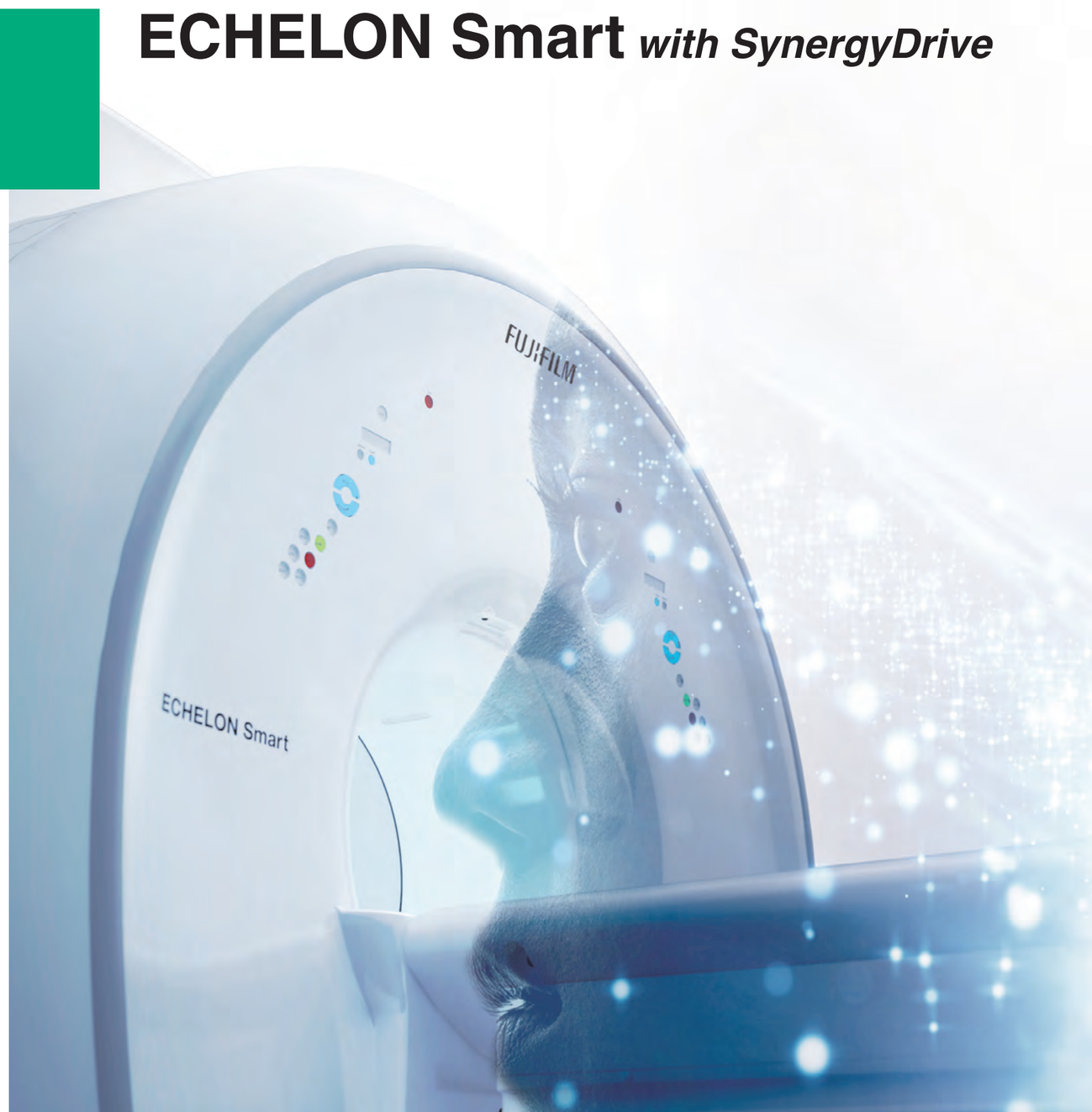
FUJIFILM
Value from Innovation

ECHELON Smart *with SynergyDrive*



ECHELON Smart *with SynergyDrive*

FUJIFILM

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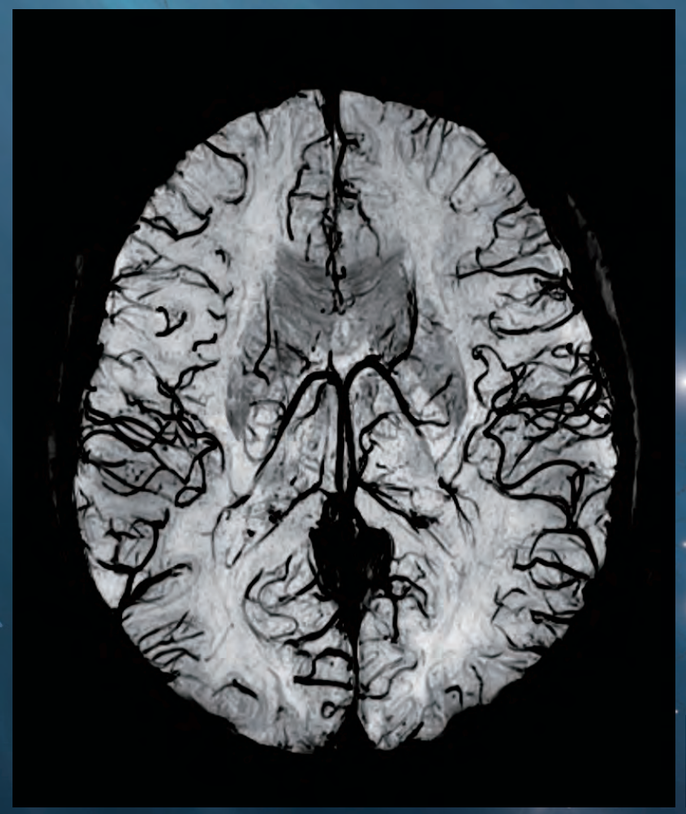
https://www.fujifilm.com/fhc/en

FCP-E523

Printed in Japan 2022-05-XK-(D)



The reduction of imaging time is a challenge
facing the field of MRI,
so, we applied high speed technologies to ECHELON Smart.

Is speed the only requirement?
What else can we provide?

FUJIFILM is dedicated to high quality diagnostic images
in the shortest possible time.

The next stage is now here.

IP-RAPID X
REALISE Plus

Concept of

ECHELON Smart

SynergyDrive

powered by REiLI

SynergyDrive* utilizes AI technology to achieve 3 Pluses.

High Speed

→ P.5

Speed Plus with IP-RAPID

Shortens the scan time while maintaining image quality by optimizing undersampling and iterative reconstruction.
A Speed Plus for exams with many sequences, image types and 2D/3D.

Shortened imaging time ensures time for Plus One Scan.

For your easier diagnosis.

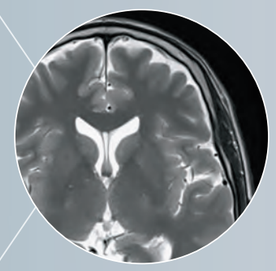
High Image Quality

Visibility Plus with REALISE Plus

High image quality solution promotes ease of diagnosis. A visibility plus from multiple denoising methods.

New denoising methods achieve high image quality with less noise.

Reduce radiologist workload



Automation

→ P.9

Flexibility Plus with Auto series

A single click is all you need to start the MRI exam, including complicated slice positioning and clipping.
A Plus of Flexibility for operation with automated solutions.

System supports complicated operations to provide extra flexibility.

Better patient care

*SynergyDrive is a generic term for technology related to workflow improvement.
It includes functions developed by utilizing Machine Learning, which is one of the AI technologies.
The performance and accuracy of the system does not automatically change after implementation.

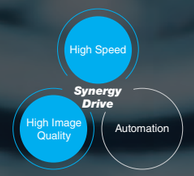
FUJIFILM AI technology brand

REiLI

Co-creation with AI technologies FUJIFILM looks ahead to the future.

Medical service is about to enter a new dimension, with deep learning, leveraging upon advancements in new AI technology. By merger of human experience and AI technology, we envision to build next level of medical service.
"REiLI" - New AI technology from FUJIFILM, together with varieties of AI's, produces a new value-creating platform to commence into a new territory.

REiLI is derived from a homonym in Japanese meaning clever and intelligent.



IP-RAPID × REALISE Plus**

Plus of "Speed" and "Visibility"

Fast imaging solution “IP-RAPID” has become the next generation standard. It shortens scan time, while maintaining image quality. The product also includes "REALISE Plus", a high-quality image solution, to promote ease of diagnosis. IP-RAPID and REALISE Plus can be freely selected to provide higher quality, higher speed or wider scan ranges.

SynergyDrive

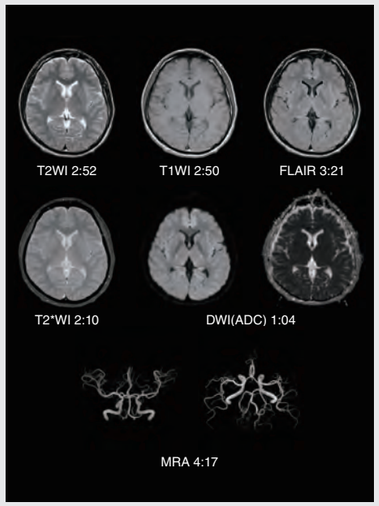
powered by REiLI

IP-RAPID × REALISE Plus achieves even faster and higher image quality

IP-RAPID high-speed solution merges undersampling and iterative reconstruction to shorten scan time while maintaining image quality.

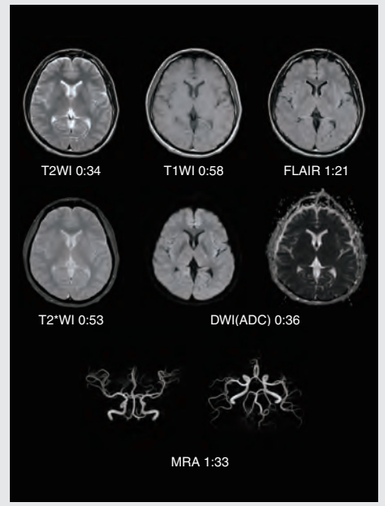
64* Reduction %

Normal



Total ScanTime
16:34

IP-RAPID × REALISE Plus

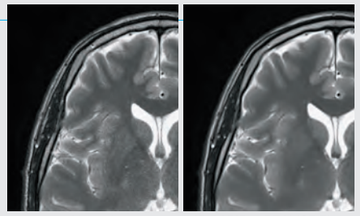


Total ScanTime
5:55

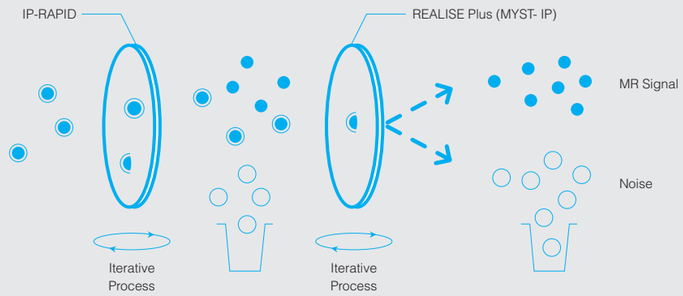
*Value is compared between the examples

IP-RAPID × REALISE Plus

REALISE Plus is a new noise reduction technology developed for IP-RAPID. REALISE Plus is able to separate noise and signal properly by further searching noise and signal (MYST-IP method) on the noise reduced data by IP-RAPID. In addition to the MYST-IP method, the combination of multiple denoising methods can improve SNR by up to 46%.



Normal　　IP-RAPID × REALISE Plus



46 UP %

IP-RAPID × REALISE Plus

Value by SynergyDrive

Four "Pluses" made possible by the high-speed and high-image quality solution.

IP-RAPID × REALISE Plus provide a "Plus" in Speed and Visibility.
These four Pluses will revolutionize various aspects in examination.
A variety of Pluses that can be freely selected according to the exam situation will improve the quality of exams.

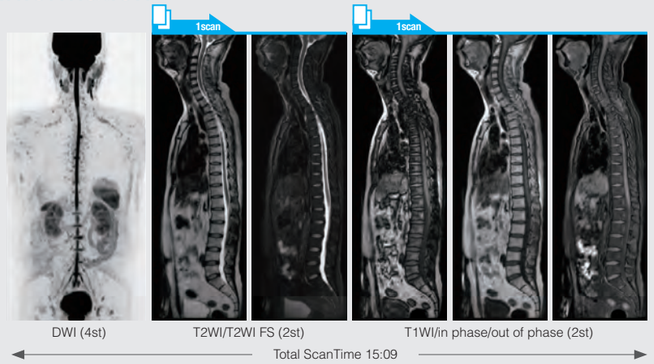
Plus
One Rank

Plus the amount of information

Wide Scan

IP-RAPID × REALISE Plus can be used with a wide variety of scan methods, including multi-contrast scanning, FatSep, and DWI.
Wide area DWI and time consuming wide area scanning such as whole spine exam can be performed simply and easily.

Wide



High Resolution Scan

In general, although image quality and scan time have trade-off, IP-RAPID × REALISE Plus enables to shorten scan time with no compromise image quality, thus high resolution scan enables within the current scan time.

High Resolution

Visibility Plus

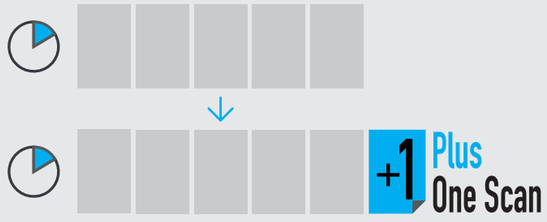
IP-RAPID × REALISE Plus can be used with wide variety 3D sequences in addition to 2D sequences.

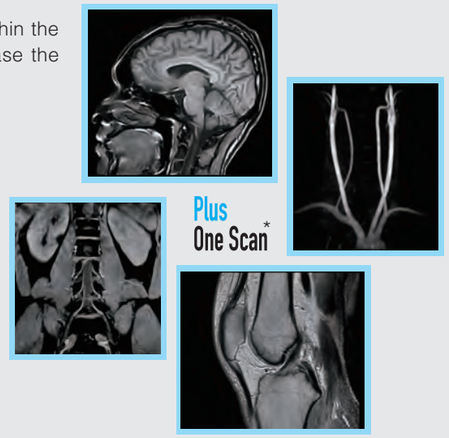
Volume

Plus
One Scan

Diagnosis information Plus

Thanks to shortened scan time, more scans can be performed within the same exam time. Additional imaging can be performed to increase the amount of information for making more accurate diagnosis.



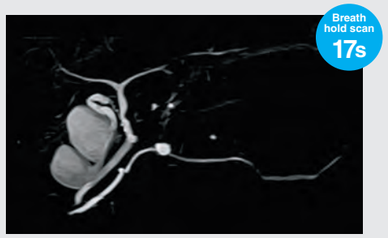


*An example of Plus One Scan.

Plus options

IP RAPID × REALISE Plus shortens the scan time of conventional time-consuming procedures such as respiratory gating scan and navigator measurement, and can be applied to exam with short scan time such as breath-holding scan.

ECHELON Smart enables various types of scanning to be selected according to the state of the patient.
Various options increase the range of MRI examination.



3D MRCP Breath Hold

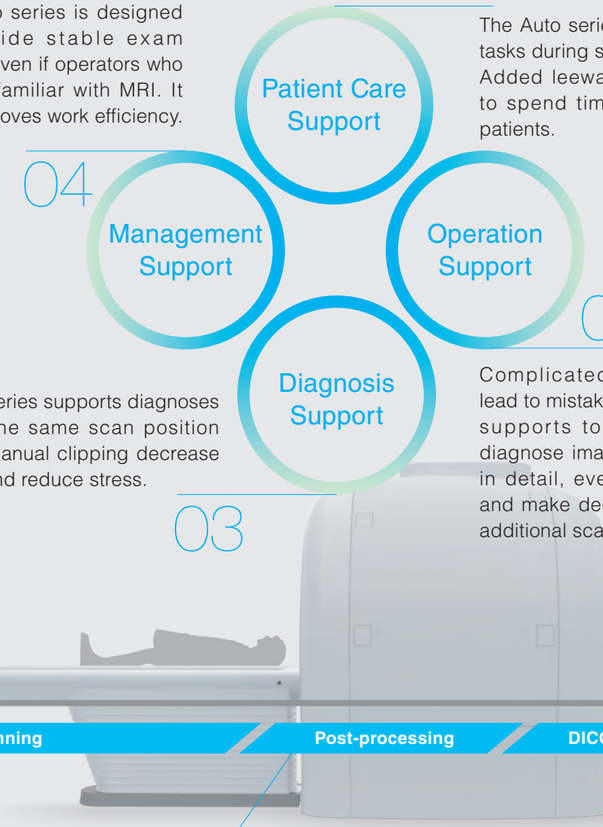
Varies according to the scan conditions and state of the patient.

Flexibility Plus with Auto series

ECHELON Smart improves the various workflows of MRI exams.
By allowing more "leeway" in the exam, it supports checking whether or not additional images are needed and providing tender care to the patient.

The Auto series supports MRI examination

The Auto series is designed to provide stable exam results, even if operators who are not familiar with MRI. It also improves work efficiency.

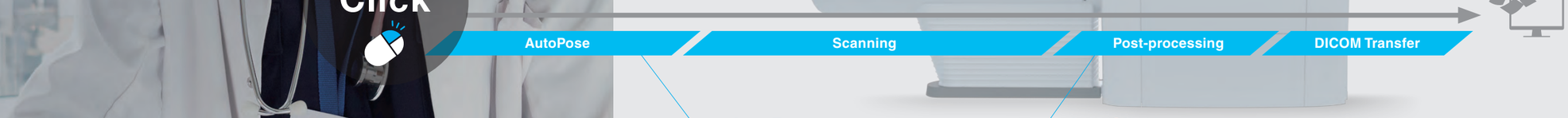


01
The Auto series supports simple tasks during scanning.
Added leeway makes it easier to spend time to take care of patients.

02
Complicated operations can lead to mistakes. The Auto series supports to provide time to diagnose images. Check image in detail, even it with artifacts and make decisions on whether additional scan is required.

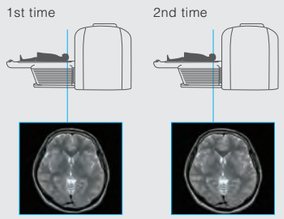
03
The Auto series supports diagnoses made at the same scan position and with manual clipping decrease variation and reduce stress.

04
Management Support



AutoPose

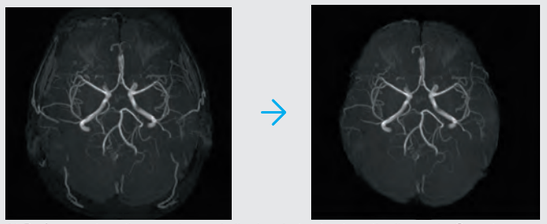
The slice line setting support function "AutoPose" sets the slice lines right after the completion of scanogram. In addition to the brain, spine and orthopedic regions such as knees and shoulders, the system is designed in consideration with the necessary reproductivity and reproductivity for examination.



AutoClip**

After MRA scan is complete, clipping is automatically performed on the brain MRA.*1 Automatic clipping identifies the area to clip based on the characteristics of vessel signal. Additional clipping can also be performed on the image after automatic clipping is performed.

95%*2



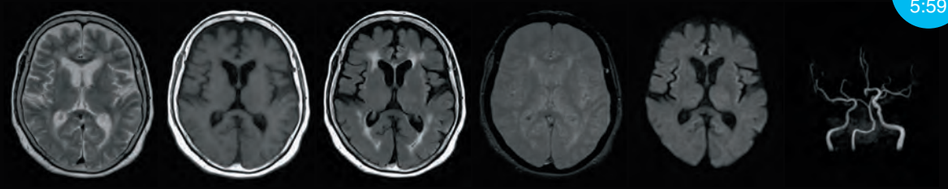
*1 Performs automatic scanning and clipping, but not automatic diagnosis. Operator checks are required.
*2 Percentage of MIPs and VRs that can be post processed without manual correction. Varies according to the state of scanning.

Smart IMAGE GALLERY

Speed & Plus One Scan

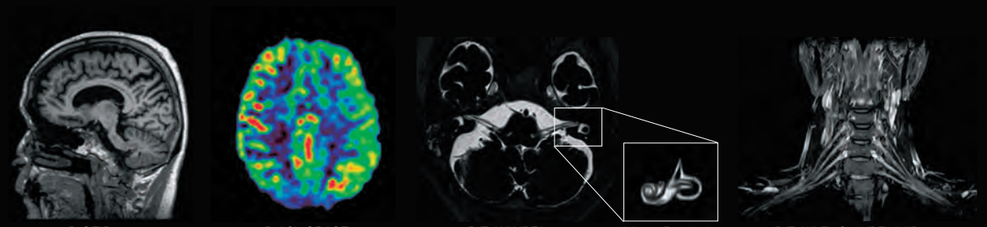
Speed Scan

Total ScanTime 5:59



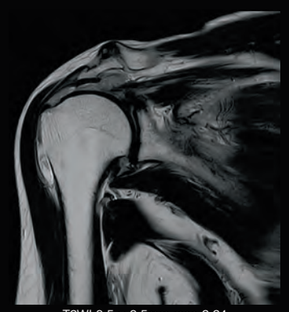
T2WI 0:40 | T1WI 0:53 | FLAIR 1:21 | T2*WI 0:48 | DWI 0:49 | 3D MRA 1:28

Plus One Scan

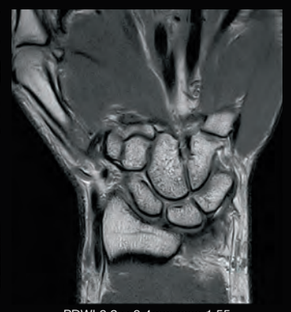


3D GEIR 5:33 | 3D ASL GRASE 3mm 48slice 2:03 | 3D T2WI VRFA 2:58 | Volume Rendering | 3D T2WI FatSat VRFA MIP 4:14

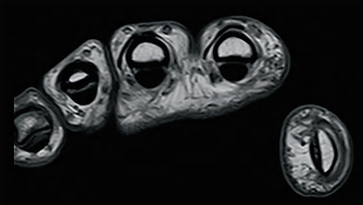
High Resolution



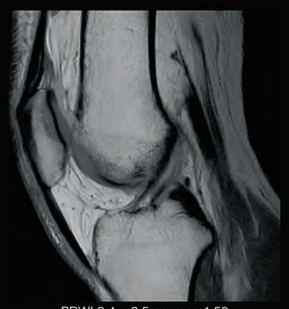
T2WI 0.5 × 0.5mm reso 2:24



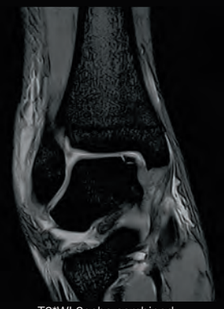
PDWI 0.3 × 0.4mm reso 1:55



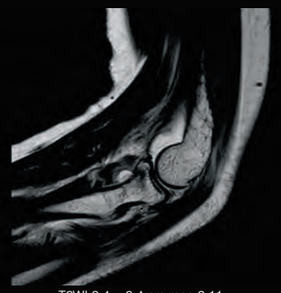
T1WI 0.4 × 0.5mm reso 2:36



PDWI 0.4 × 0.5mm reso 1:58

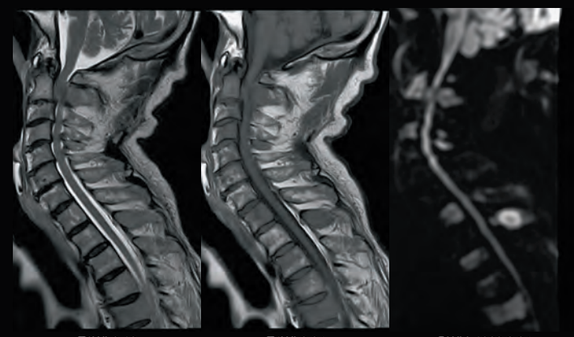


T2*WI 3echo combined 0.3 × 0.4mm reso 2:54

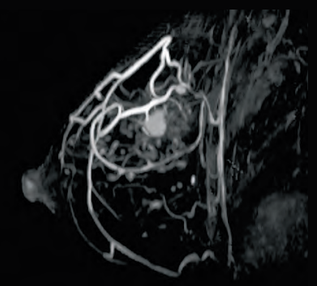


T2WI 0.4 × 0.4mm reso 2:11

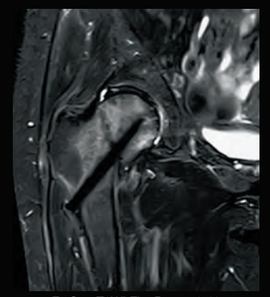
Various applications in whole body



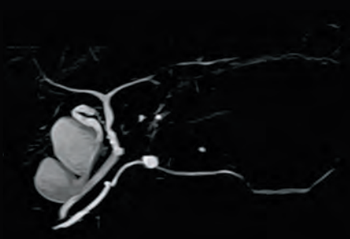
T2WI 2:13 | T1WI 2:34 | DWI b1000 3:34



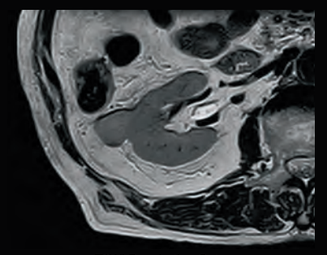
3D T1WI GrE dynamic MIP 1:39



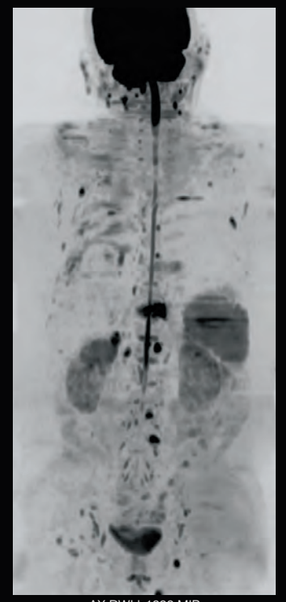
FatSep T2WI FineRecon 3:13



3D MRCP Breath Hold MIP 0:17

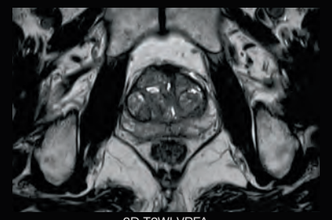


T2WI Respiration Gate 1.1 × 1.3 × 2.0mm reso 2:25

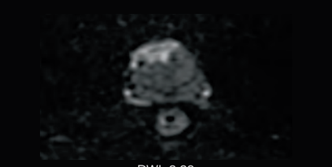


AX DWI b1000 MIP 2:07 × 3station

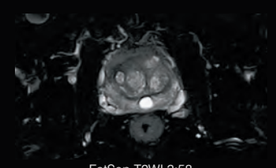
FatSep T2WI (MultiContrast) 1:53 × 2station



3D T2WI VRFA 0.6 × 0.6 × 0.8mm reso 4:55



DWI 3:38



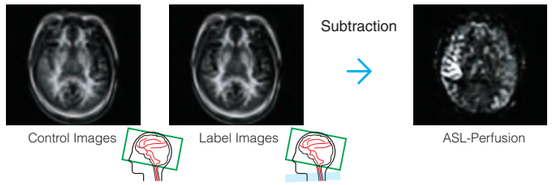
FatSep T2WI 3:58

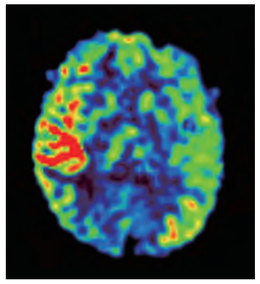
Application

Various applications increasing the value of MRI result for the diagnosis

ASL-Perfusion**

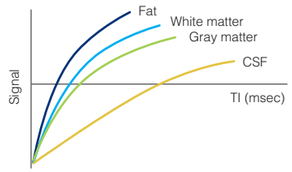
This function magnetically labels the arterial blood flowing into the brain tissue and uses a labeling pulse as a tracer to enable the non-contrast visualization of perfusion.



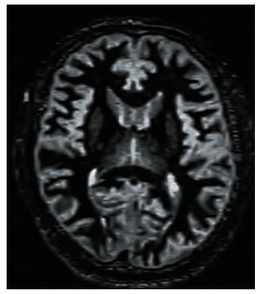

ASL-Perfusion

isoDIR**

Individual TIs can be set for the two IR pulses. By suppressing arbitrary tissue and post processing the resulting image, an image with the desired tissue enhanced/suppressed (WAIR, GAIR, fat suppression) can be obtained. Because this function can be used for isoFSE (isotropic FSE) with VRFA, the image contrast can be easily adjusted.



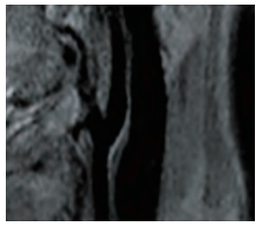
TI of tissues


3DisoDIR (WAIR) 3:31

isoMSDE**

These artifacts are suppressed via dedicated pre-pulse MSDE* including MPG pulses. Because this function can be used for isoFSE (isotropic FSE) with VRFA, the contrast of images can be easily adjusted.

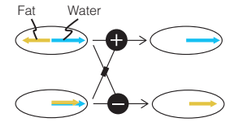
*Motion Sensitized Driven Equilibrium


3DisoMSDE 2:31

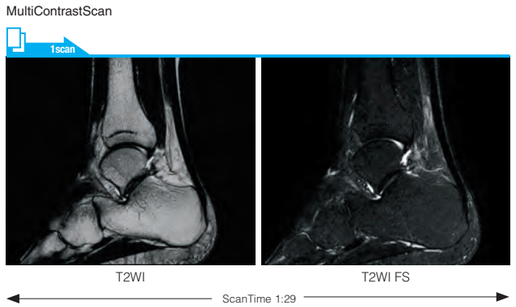
FatSep

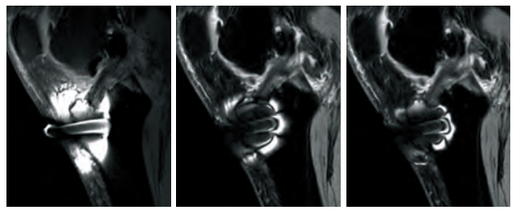
The difference in the resonance frequency caused by the chemical shift of water and fat protons is utilized to obtain both a water image and fat image with a single scan. By acquiring the MR signals of both water and fat when they are in-phase and out-of-phase, respectively, and then adding and subtracting them, multiple images can be obtained in a single scan, such as water image and fat image.

Principle of water-fat separation measurement
The difference in resonance frequency is used to obtain multiple images.



FatSep can output images according to the degree of change in magnetic susceptibility.
When there is stronger magnetic susceptibility, the Fine mode can be selected to improve image quality by making the phase map higher definition.




FatSat　FatSep Normal　FatSep Fine

All Around RADAR*

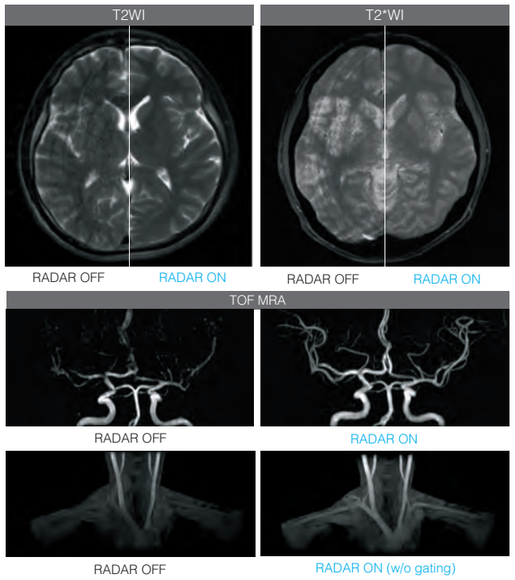
RADAR is a motion artifact reduction function that pursues ease-of-use, supports imaging with a large number of sequences, all receiver coils, and arbitrary cross sections, and can be used in combination with the RAPID high-speed imaging technology.
ECHELON Smart supports TOF sequences and GrE sequences to become "All Around RADAR" that can be used in combination with RADAR in almost all of the sequences required in brain routine exam.

Applicable with large number of sequences No limitation in coil/ oblique

Applicable with RAPID, high-speed imaging technology

Applicable with brain routine exams

*RADial Acquisition Regime



SmartCOMFORT

Designed in consideration with everyone involved in the MRI examination to provide space of "Comfort"

Workflow Coil System

Receiver coils are easily set and deliver high image quality

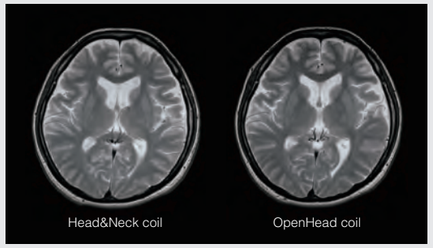
A design focused on ease of use while maintaining high image quality, reduces exam time by eliminating the need for coil replacement.

OPEN

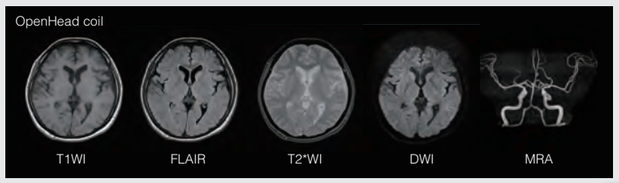
OpenHead coil

Open space Plus

The Head & Neck coil can be used with the anterior (front) coil removed to expand patient's field of vision reducing anxiety.
The posterior (rear) coil is designed to provide a stable brain scan and maintain the field of vision while providing depth for receiving signal.



OpenHead coil setting



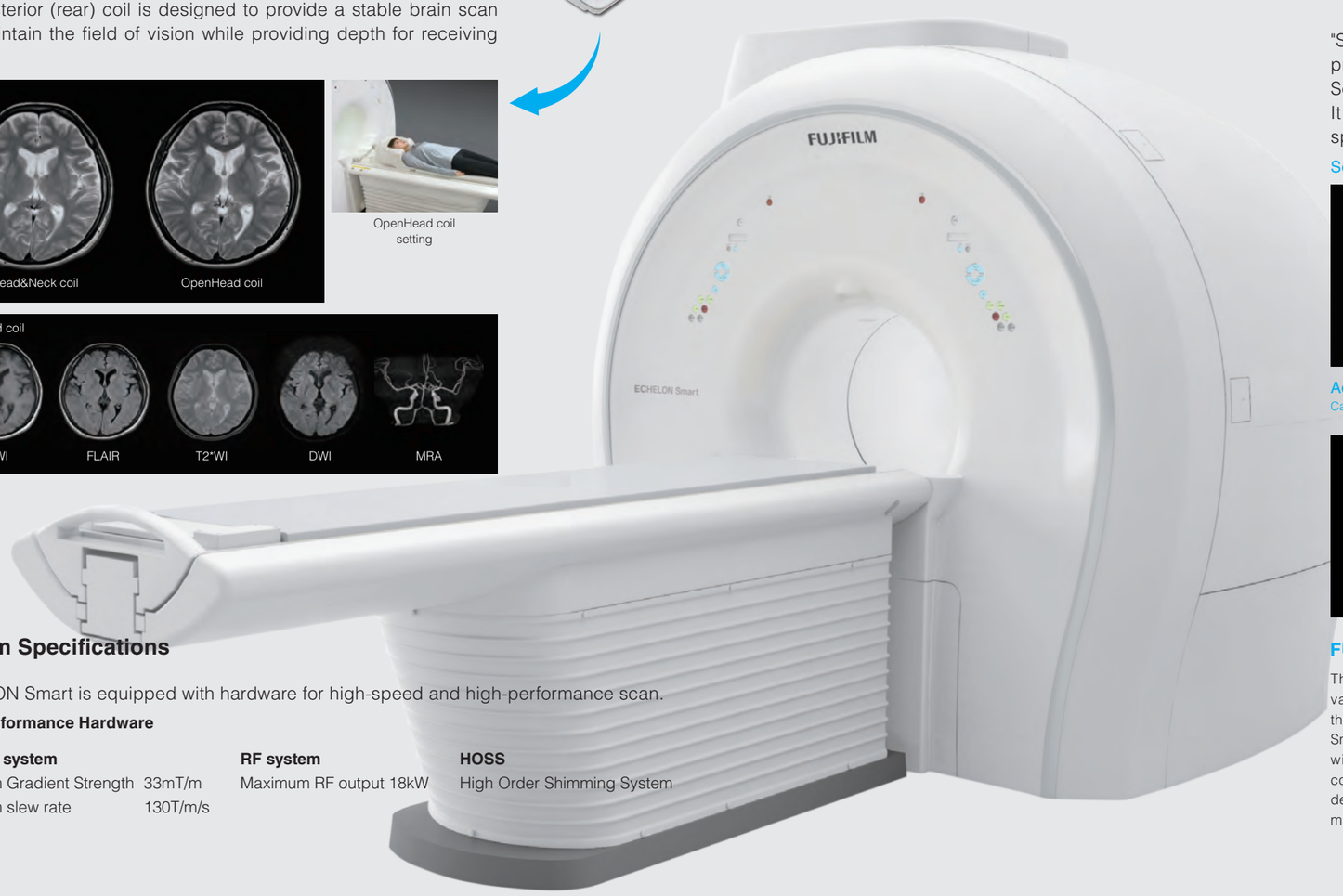
Workflow Coil System

[Head & Neck / Spine coil]
Frequently used Head & Neck / Spine coil can be kept on the patient table.

[Flex Body coil]
The Flex Body coil can be used combined with the Head & Neck / Spine coil without removing from patient table when it is required.

Head&Neck coil

OpenHead coil



System Specifications

ECHELON Smart is equipped with hardware for high-speed and high-performance scan.

High Performance Hardware

Gradient system		**RF system**	**HOSS**
Maximum Gradient Strength	33mT/m	Maximum RF output 18kW	High Order Shimming System
Maximum slew rate	130T/m/s		

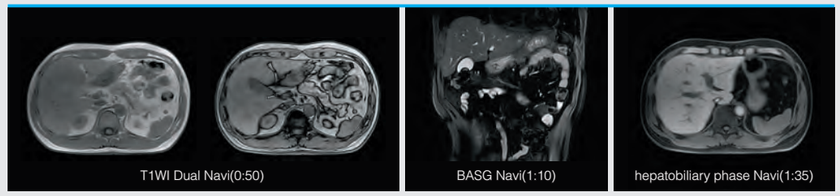
FREE

Free-breathing scan

Free-breathing examination Plus

In abdominal examinations, which often require breath-holding, free-breathing exams can be performed with many scanning methods.
By detecting the position of the diaphragm with the navigator pulse, the examination can be performed under free-breathing with no gate device.

Free Breath



SOFT

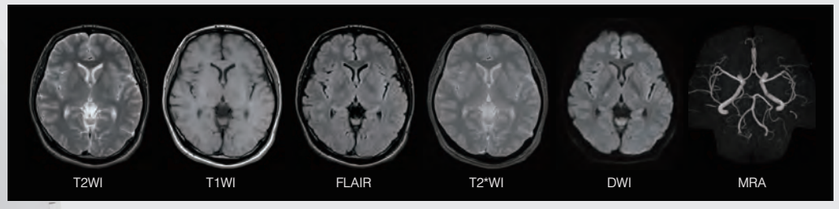
SoftSoundSuite

The comfort of silence in diagnosis Plus

96* Reduction %

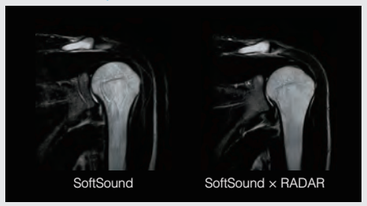
"SoftSound" silent scan technology reduces the scan noise by up to 96% (sound pressure) to provide a more comfortable sound quality.
SoftSound can be applied to a wide range of sequences for use in various situations.
It can also be used in combination with IP-RAPID × REALISE Plus, a solution for higher speed and higher image quality, and RADAR, a motion artifact reduction function.

SoftSoundSuite



AdvancedSoftSound
Can be also applied to Heavy T2*WI "BSI" and 3D T1 volume scan

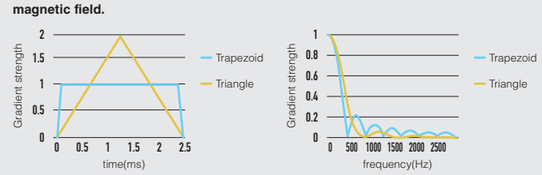
SoftSound × RADAR
SoftSound can be used in combination with RADAR in areas where hard to stay still



FUJIFILM SoftSound technology reduces the impact on image contrast and scan time.

The characteristics of the MRI sound varies depending on the waveform of the gradient magnetic field pulse.
SmartCOMFORT reduces the scan noise with almost no change in scan time, contrast, SNR, or spatial resolution by designing the waveform of the gradient magnetic field pulse.

Principle of scan noise reduction:
Frequency characteristics change due to waveform changes in the gradient magnetic field.



Gradient waveforms and frequency characteristics

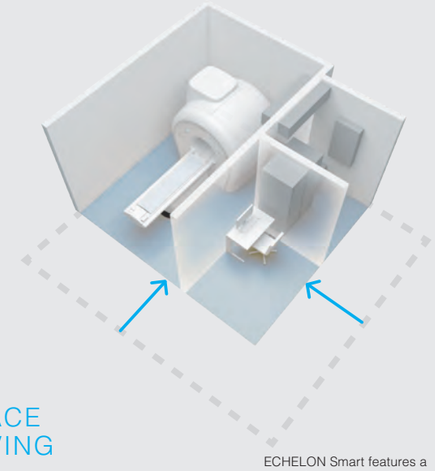
*Varies according to the scan conditions.

SmartSPACE**

Compact design for greater flexibility in installation

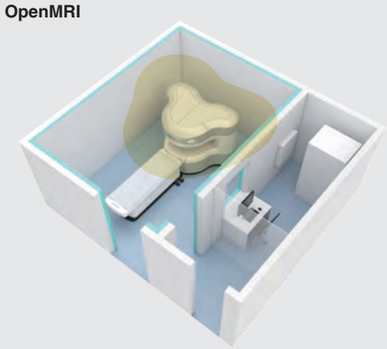
FUJIFILM designed ECHELON Smart based on its experience with compact open MRI.
Flexible installation enables limited space to be use effectively.
The installation space for the units in the equipment room has also been made more compact.
It saves 41% of space compared to conventional models.
This reduces the difficulty of MRI installation.

41 SPACE SAVING %

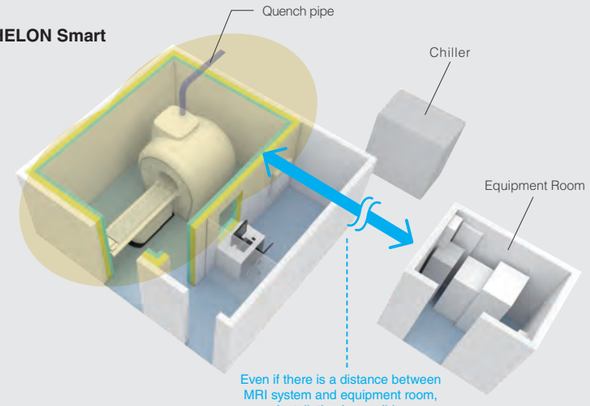


ECHELON Smart features a space-saving compact design.

OpenMRI



ECHELON Smart



[Flexible Site Plan]
An example of a equipment room installed in a vacant space.
The problem with installing a superconductive MRI system is securing enough space for the equipment room. ECHELON Smart enables the cable length to be extended for the MRI main unit and the power unit installed in the equipment room. This allows for a variety of installation layouts and reduces the difficulty of MRI installation.

*The distance varies according to the condition.
Please contact with sales personnel about installation.

SmartECO

17% LESS

Effectively reduces power consumption via intermittent cold head operation

Generally, superconductive MRI system is known with its high running cost. This cost is mainly due to the high power consumption of the cooling system necessary to maintain superconductivity.
The SmartECO, an energy saving function that can suspend the cooling system during periods of non-use. This function effectively reduces the power consumption while maintaining zero boiling off of the helium. SmartECO also reduces the amount of heat generated, which in turn reduces the power consumption of the chiller system.
This reduces the power consumption of ECHELON Smart by 17% compared to the conventional model and contributes to lower running costs.

Without SmartECO function
Cold head constantly operating

With SmartECO function
Cold head suspends appropriately

Zero-boil-off design eliminates liquid helium consumption

Sentinel Analytics 24 HOURS

Improving the uptime through predictive failure diagnosis

By building a new system that utilizes FUJIFILM'S "Predictive Failure Diagnosis Service" and analyzing the accumulated big data centering on system utilization, we have created "Sentinel Analytics", a predictive failure diagnosis service for superconductive MRI systems. The Sentinel provides 24-hour monitoring of the system status and with the failure sign diagnosis based on IoT*, the inspection and parts replacement cycles can be optimized and the system's up time can be improved.

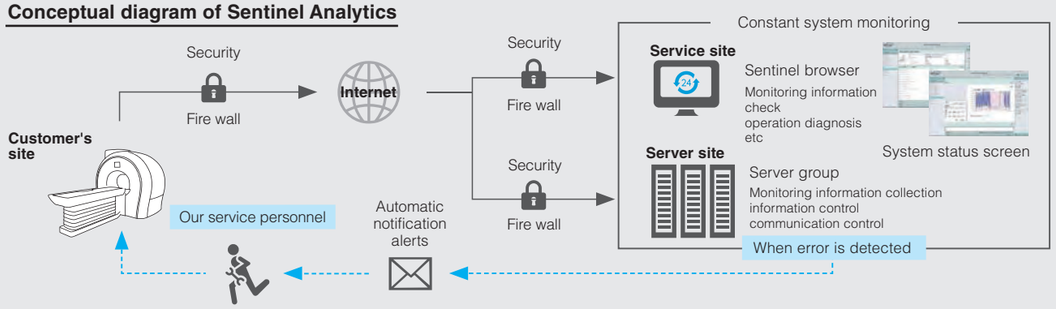
Major features and advantages of Sentinel Analytics

Constant system monitoring
The Sentinel provides 24-hour monitoring of the system status

Automatic notification feature
When the Sentinel detects either a malfunction or a lowered performance of the system, an alert is automatically reported to service site. This helps to prevent the occurrence of a unexpected malfunction. Furthermore, a corrective measure is quickly taken in case of malfunction

Security
Such features as encryption of communication data and communication based on mutual authentication are available to protect patient personal information. Furthermore, the specification does not allow recognition of patient personal information included in Patient Lists and images (such as an patient's name, sex, weight, age, and date of birth) on the Sentinel server and the Service Site

Conceptual diagram of Sentinel Analytics



*IoT (Internet of Things) : A system in which various devices with communication functions exchange information via the Internet to realize identification, monitoring, and control of such devices.