Key differentiators

MAGNETOM Sola

↗ **siemens-healthineers.us/magnetom-sola**

Contents

SIEMENS
Healthineers

Magnet & BioMatrix Tuners

The all new design of MAGNETOM Sola incorporates both a short magnet with a 157 cm system length (cover to cover), plus a patient-friendly, 70 cm Open-bore. The magnet maintains excellent homogeneity over a large 50 x 50 x 50 cm3 field of view (FOV). The unique BioMatrix Tuners, CoilShim and SliceAdjust, further enhance homogeneity by applying patient-specific and region-specific shim optimization in critical regions. This results in robust and reliable fat saturation throughout the entire imaging volume, especially important for: abdominal, off-center, large-FOV and long bone imaging. In addition, the system provides active shielding and zero helium boil-off technology.

**Features a large
50 x 50 x 50 cm³
field of view**

Gradients

The MAGNETOM Sola gradient amplifier comes in a modular and highly compact design with ultra-fast, solid-state technology and low switching losses. Depending on your clinical needs, two gradient power versions are available:

• XJ: 33mT/m max. amplitude with a maximum slew rate of 125T/m/s
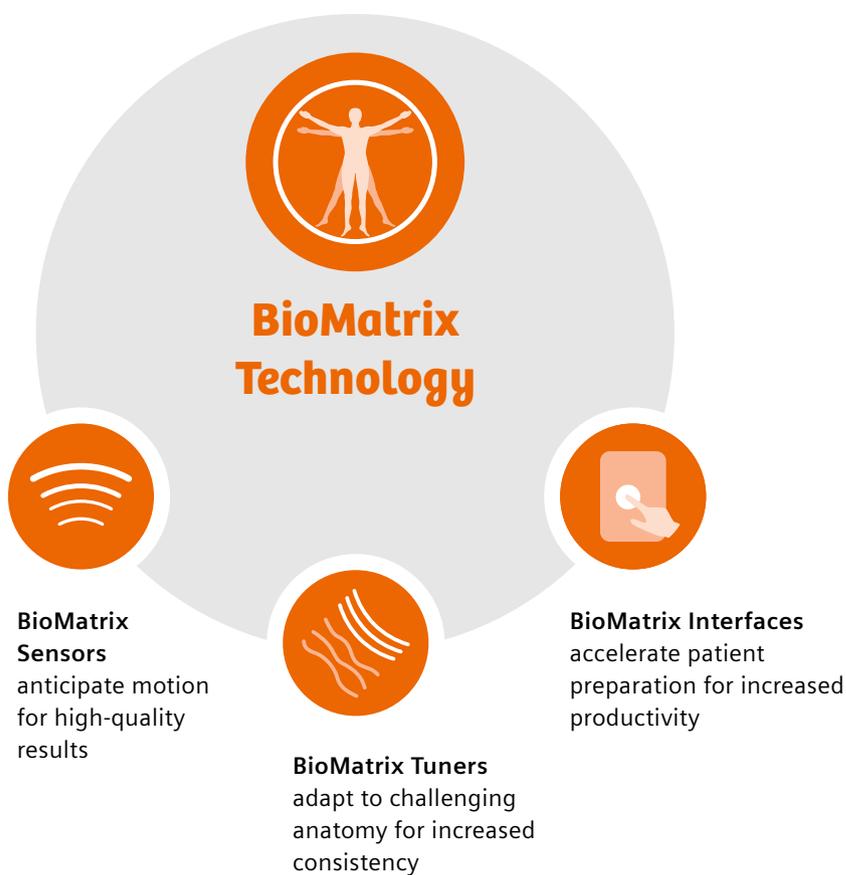• XQ: 45mT/m max. amplitude with a maximum slew rate of 200T/m/s

The scanner uses passive and active shimming. A special MAGNETOM Sola Cardiovascular Edition with XQ gradients is available for installations where cardiac will be the primary focus.

**Powerful gradients
XJ: 33 mT/m @ 125 T/m/s
XQ: 45 mT/m @ 200 T/m/s**

BioMatrix

Patients have unique, individual characteristics—biovariability. Different physiologies and anatomies—and how each patient interacts with the MRI technology—may cause variations in the imaging results. BioMatrix Technology helps to overcome these challenges by automatically adjusting to patient biovariability. By embracing human nature in this way, we can personalize the MRI examination and help expand precision medicine.

The three key pillars of the BioMatrix family that drive consistency and efficiency in the face of biovariability are BioMatrix Sensors, BioMatrix Tuners and BioMatrix Interfaces.

BioMatrix Technology

BioMatrix Sensors anticipate motion for high-quality results

BioMatrix Tuners adapt to challenging anatomy for increased consistency

BioMatrix Interfaces accelerate patient preparation for increased productivity

BioMatrix Sensors
Anticipate motion for high-quality results

The unique Respiratory Sensors in the BioMatrix Spine coils automatically detect breathing patterns as soon as the patient lies on the table. This speeds up patient setup especially when respiratory triggering is needed for image acquisition. There is no need for an additional respiratory bellows or belt. The detected respiratory motion is immediately displayed on the BioMatrix Interface as a respiratory curve.
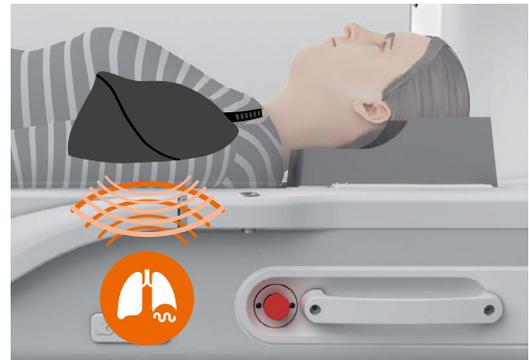
BioMatrix Tuners
### Adapt to challenging anatomies for reliable exams

CoilShim*

Integrated into the new BioMatrix Head/Neck coils, CoilShim increases diagnostic quality and reduces the need for repeat scans by delivering improved fat saturation, better DWI and TSE quality in the neck region. Additional shim elements directly integrated into the BioMatrix Head/Neck coil perform region-specific shimming for a more homogeneous B0 field in the challenging head and neck region.
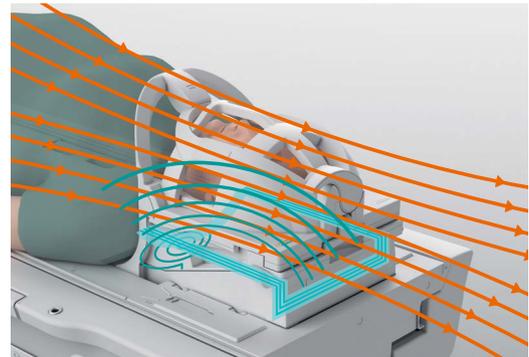
SliceAdjust

In a typical MR scanner, B0 field inhomogeneity resulting from a patient's anatomy is corrected by the standard volume shim. However, for multi-station exams, volume shimming has its limitations, for example, at station boundaries. This typically leads to "broken spine" artifacts in whole-body DWI or impaired fat saturation in multi-station TSE. With BioMatrix SliceAdjust, precise slice-by-slice shimming is performed to eliminate the inaccuracies of a conventional volume shim. SliceAdjust delivers excellent DWI quality, providing excellent correlation to anatomical scans and improving fat saturation in TSE scans.

No broken spine artifacts – Excellent correlation with anatomical scans

1st volume shim

2nd volume shim

3rd volume shim

Conventional volume adjust

SliceAdjust
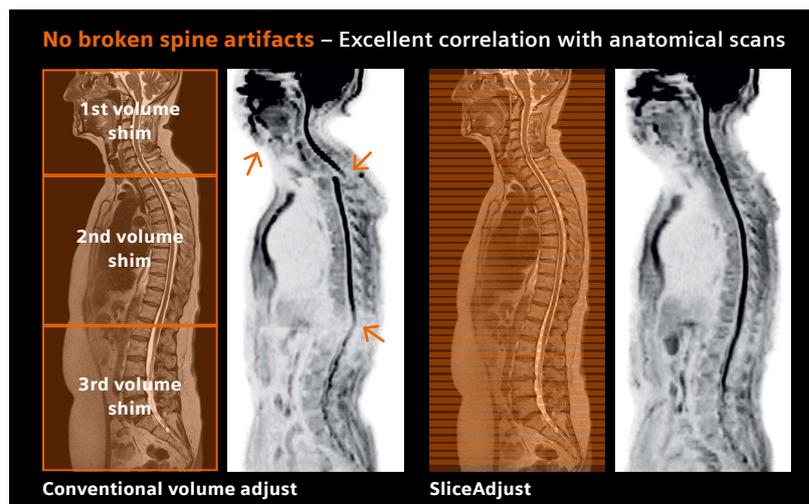
*Optional for the 32CH Sola

BioMatrix Interfaces
Accelerate patient preparation for increased efficiency

Select&GO

With one-touch positioning using the Select&GO display, based on the underlying BioMatrix Body Model, artificial intelligence is used to accelerate patient positioning by up to 30%.[1] The body region to be scanned is automatically displayed on the touch display depending on which set of coils is plugged into the table. As soon as the body region of interest is selected, the patient is moved to iso-center without activating the laser light. Delays due to incorrect positioning can now be avoided.

BioMatrix Select&GO accelerates patient positioning—powered by AI
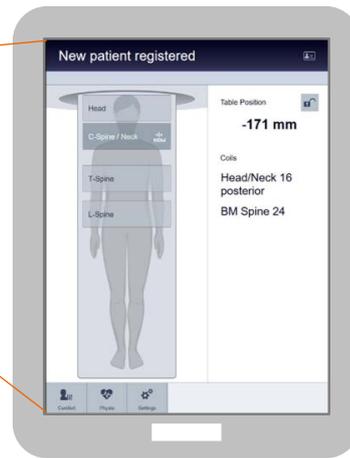
Dockable Table[2]

The BioMatrix Dockable Table enables fast and easy patient setup. The multi-directional navigation wheel and 360-degree flexibility make patient handling easy. Also, the possibility to lower the table to 52 cm guarantees an easy patient transfer. The fast, automated push-button AutoDock functionality allows maneuvering without peddles. The receiving port guides the table for easy alignment into the scanner. The optional eDrive support provides motorized assistance so that even the heaviest patient can be moved effortlessly to and from the MRI scanner.

Easy and intuitive interface	Effortless maneuverability with eDrive assistance	Easy docking with AutoDock
Sensitive to user touch	Up to 550 lbs	No pedals required

[1]*Data on file.*
[2]*Optional*

Tim 4G Technology
Deliver exceptional image quality and speed with Tim 4G

Tim is the integrated coil technology that revolutionized MRI. Tim 4G is now in its 4th generation.

Tim 4G features DirectRF, a fully digital system of RF receive and RF transmit. This is unique in the market. Both the receivers and the transmitter are situated directly at the magnet. This ensures a very close relationship between all critical components (receiver, transmitter, body coil, gradient coil) with real-time feedback loops that result in tight control of all components simultaneously, for the highest accuracy.

On the receive side, care was taken to have the receivers as close to the receiving coils as possible—but not on the coils themselves, where they would only add weight and bulk and make the coils more expensive, without providing any clinical benefit. Additionally due to the integrated pre-amplifiers, the full SNR is preserved.

The most relevant differentiator of our RF systems is the number of independent RF channels working in combination with the high element density coils. Together they maximize use of the channels. For example, Tim 4G with the MAGNETOM Sola offers up to 64 independent RF channels. Sola also provides coils and coil combinations with the highest element density in the market to augment the 64 channels.

What is the benefit of high coil element density? High coil element density combined with a high number of RF channels allows for higher SNR and higher speed with higher PAT factors. The figure below demonstrates up to 205 cm of total scan range with the Tim 4G's unique coils.

Highest channel count up to 204 channels connected simultaneously

Example coil coverage from a MAGNETOM Sola [204 x 64]

TIM 4G Coil Solutions

With one of the broadest coil portfolio's in the industry—the ultra-lightweight coils drive functionality and solve key clinical and workflow needs:
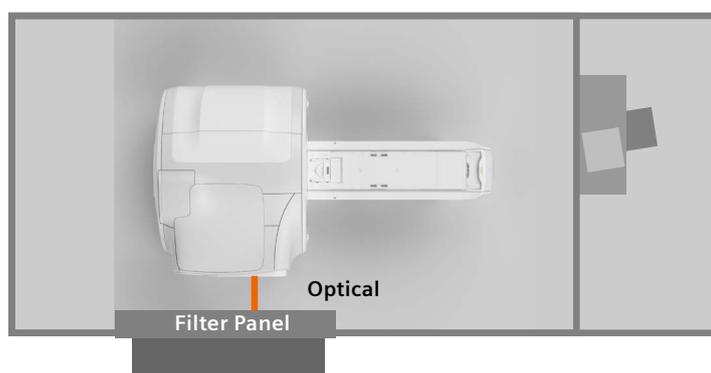
DirectRF

As discussed earlier. Direct RF provides integration of all transmit and receive components at the magnet, enabled by the unique digital-in and digital-out design with fiberoptic cables between the magnet and equipment room.

• Enabler for real-time feedback loops

• Higher signal purity and improved stability

• Enhanced image quality, less noise

• Easier siting

DirectRF
• **Better image quality, less noise**
• **Higher signal purity and improved stability**
• **Easier siting**

Optical
Filter Panel

DirectConnect and SlideConnect

DirectConnect and SlideConnect technology enable one-hand operation. This results in easy handling and helps to speed up the workflow even further.

Your advantages:

• Up to 40%* faster body imaging with Tim 4G due to its ultra-high coil element density, enabling more SNR and speed.

• Maximum 205 cm scan range without repositioning the patient when large coverage is required.

• Light-weight coil design for fast setup and increased patient comfort.

• Accelerated workflow with DirectConnect, cable-less coils for spine, head/neck and foot/ankle and SlideConnect technology on all other coils for easy one-handed operation.
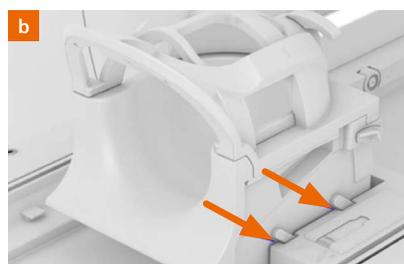
(a) Light-weight Body 18 coil on the integrated Spine 32 coil; easy-to-use and fast coil connection with (b) DirectConnect and (c) SlideConnect.
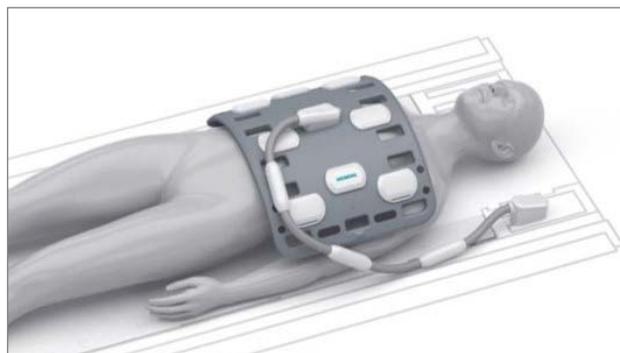
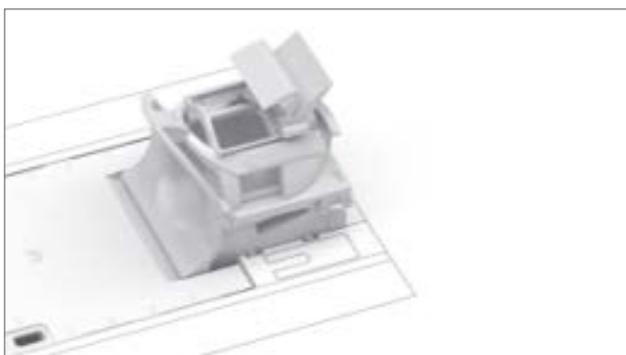*Data on file.*

Flexible and Patient Friendly Coils

A comprehensive set of coils included
Designed to Support All Your Imaging Needs
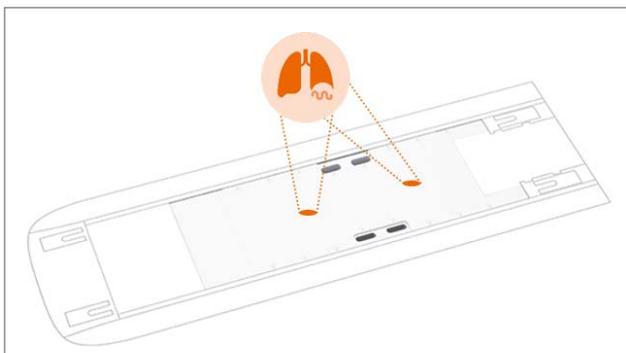
BioMatrix Spine 24, 32 & Spine 48
with Respiratory Sensors[3]

BioMatrix Body 12[5]/Body 18[2]

**BioMatrix Head/Neck 20** Tiltable and with Coilshim[4]

Flex 4 Large/Small

Wide Portfolio of Optional Coils

UltraFlex 18 Coils (Small & Large)[1]

The UltraFlex 18 coils provide a light-weight, blanket-like feel with the added benefit of breathability. The flexible coils adapt to the patient's anatomy (no fixation straps needed), easily contouring to their body, reducing anxiety.

• Dual-Density Signal Transfer enables the ultra-high density coil design by integrating key RF components into the UltraFlex 18

• Dedicated positioning Aids for shoulder, knee, elbow and foot/ankle for easy and comfortable patient positioning

• 18-channel design

• iPAT-compatible

• Stackable with the Body 12 or Body 18
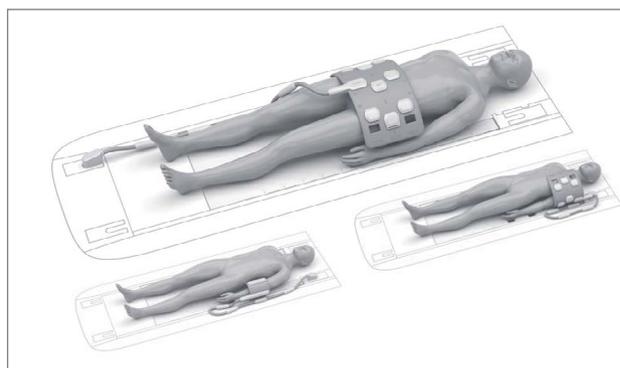
[1]Optional
[2]Prerequisite: Tim [204 x 48] or higher.
[3]Pre-Requisites: BioMatrix Spine 24 is [204 x 32],
 BioMatrix Spine 32 is [204 x 48], BioMatrix Spine 48 is [204 x 64].
[4]Optional for Tim [204 x 32], standard for Tim [204 x 48] or higher.
[5]Standard for Tim [204 x 32].

	UltraFlex Large 18[1]	UltraFlex Small 18[1]
Weight	4 lb	3.1 lb
Dimensions (L x W x H)	11.4 in x 23.2 in x 0.55 in	7.5 in x 16.1 in x 0.55 in

BioMatrix Body 18[2]

The BioMatrix Body 18 expands the coil portfolio as a patient-friendly, flexible, and high element density coil. With an integrated Beat Sensor[3], the breathable coil also incorporates the SlideConnect feature as well as exchangeable cable design for efficient positioning.

- **Integrated Cardiac Beat Sensor[3]**
- **Can be combined with additional BioMatrix Body 18 coils for larger coverage**

Contour 24/48[1]

Contour 24 & Contour 48 are soft and flexible Tim 4G coils that adapt to the patient's anatomy and body contour. The coils improve efficiency and reduce anxiety as fixation straps are not needed. Depending on application need, the coil can be used on either side as well as any orientation.

- **No fixation straps needed**
- **Can be used in any orientation**

16 Ch Ortho Coils[1]
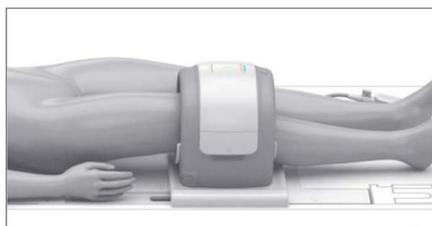
Accommodate more patients with a flared opening

Tx/Rx Knee 18

Full hand and wrist coverage

Hand/Wrist 16
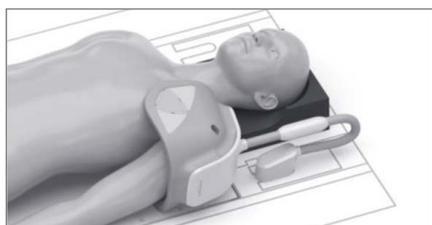
Optimal fit to patient anatomy with flexible coil elements

Shoulder Shape 16

Secures the anatomy for motion free imaging

Foot/Ankle 16

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[1]*Optional*

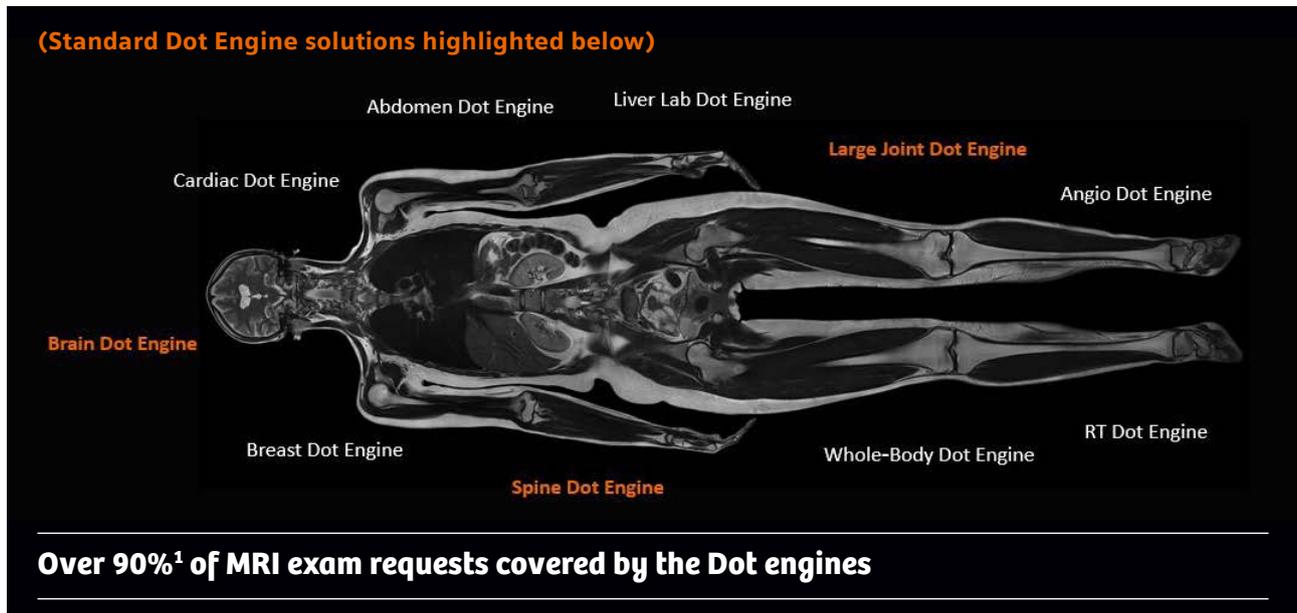[2]*Prerequisite: Tim [204 x 48] or higher, otherwise optional.*

[3]*The Beat Sensor is designed for automatic cardiac triggering. The Cardiac Triggering functionality is still under development and not commercially available yet. Its future availability cannot be ensured. The Cardiac Triggering functionality is planned to be activated with a future software update.*

DotGO

10 Dot Engines deliver consistent, reproducible results from head to toe

MAGNETOM Sola Dot Engines[1]

(Standard Dot Engine solutions highlighted below)

Abdomen Dot Engine · Liver Lab Dot Engine · Large Joint Dot Engine · Cardiac Dot Engine · Angio Dot Engine · Brain Dot Engine · Breast Dot Engine · Whole-Body Dot Engine · RT Dot Engine · Spine Dot Engine

Over 90%[1] of MRI exam requests covered by the Dot engines

DotGO combines the workflow tools of the Dot engines with the ability to manage your Dot protocols via the Dot cockpit.

Ten unique Dot Engines, tailored to different body regions, provide highly automated scan procedures for more than 90%[1] of all MRI exams. Each Dot Engine offers comprehensive guidance and predefined scan strategies. AutoAlign, powered by artificial intelligence (AI), delivers automatic placement of imaging slices to achieve reproducible scan results—every time.

With the Dot Cockpit, easily manage your protocols while a scan is ongoing.

Find the information you need, where you need it—at the scanner and at the console, completely customizable to your standards of care. Increase the consistency of your exams independent of user.
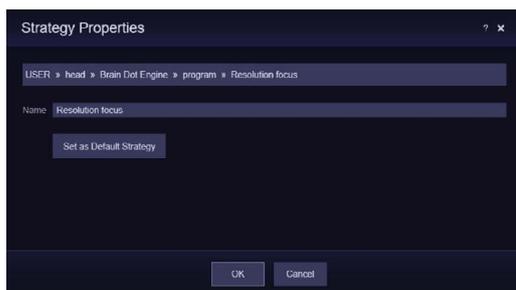
One-click adaption to patient conditions and clinical questions is convenient, especially when conditions change during an ongoing exam.

[1]*Evaluation of 9 million Siemens MR exams, 2014.*

Additionally, Slice positioning can be fully automated, resulting in faster workflow and higher reproducibility. This includes:
• Autoalign – Automated alignment of slices for different indications using Artificial Intelleigence (AI)
• AutoCoverage – Automated coverage of appropriate body region
• AutoFoV – Automated FoV proposal

DotGO minimizes complexity, increases consistency, and maximizes efficiency for each MRI exam at your institution.
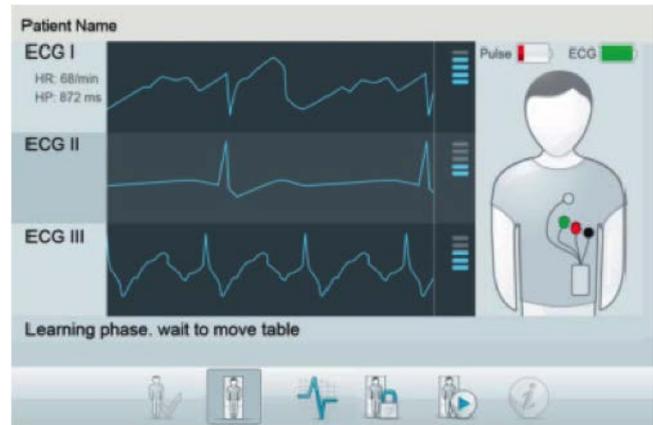
Guidance Example: Cardiac positioning and ECG display.

DotGo Applications

GO Applications are push-button, high-resolution exams that deliver reliable quality at exceptional speed.
The protocols are clinically validated to maximize MRI scanner productivity while improving patient care.
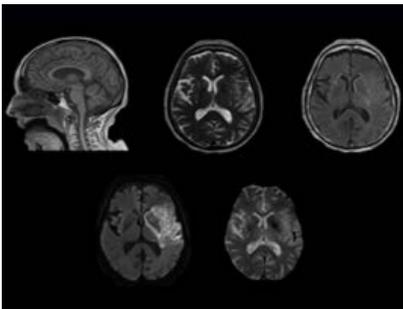
GOBrain/ GOBrain+:
Push-button, diagnostic brain exam in 5 minutes or, including post-contrast imaging, in 10 minutes[1]
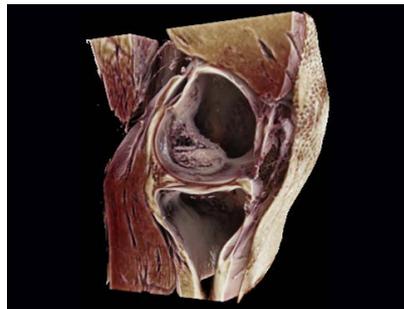
GOKnee3D:
Push-button, high-resolution 3D knee exam in 10 minutes[1]
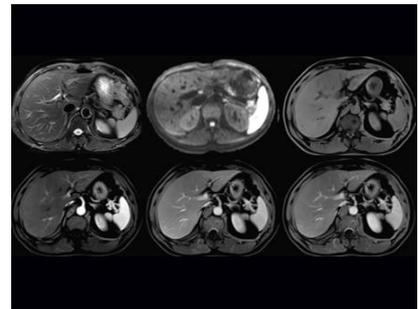
GOLiver[2]:
Push-button, diagnostic abdominal exam in just 12 minutes[1]

[1]Data on file.
[2]Optional

Speed

Simultaneous Multi-Slice[1]

SMS is a revolutionary method to significantly reduce imaging times for TSE, diffusion, and BOLD imaging through simultaneous excitation and readout of multiple slices. It is the only acceleration technique that does not result in SNR-related losses due to subsampling as opposed to iPAT. Implementation includes a multiband pulse coupled with the blipped CAIPIRINHA technique to minimize g-factor-related SNR penalties.

SMS for the TSE sequence reduces scan times, and/or increases slice coverage/resolution at similar scan times. SMS TSE is unique and is particularly beneficial in MSK imaging, which accounts for a major proportion of daily routine exams.

SMS RESOLVE (REadout Segmentation Of Long Variable Echo trains) delivers high-resolution, low-distortion, diffusion-weighted imaging (DWI) for accurate depiction of lesions. Additionally, this technique is largely insensitive to susceptibility effects, providing detailed, anatomy-true diffusion imaging of the brain, spine, breast and prostate.

Compressed Sensing[1]

Compressed Sensing is an acceleration technique that incorporates sparse, incoherent subsampling followed by iterative reconstruction. Compressed Sensing in static imaging includes Compressed Sensing SPACE, Compressed Sensing Time-of-Flight (ToF), and Compressed Sensing SEMAC for metal artifact reduction[2]. Compared with other static exams, these Compressed Sensing applications benefit from intrinsic sparsity, which allows higher acceleration factors.

[1]Optional

[2]The MRI restrictions (if any) of the metal implant must be considered prior to patient undergoing MRI exam. MR imaging of patients with metallic implants brings specific risks. However, certain implants are approved by the governing regulatory bodies to be MR conditionally safe. For such implants, the previously mentioned warning may not be applicable. Please contact the implant manufacturer for the specific conditional information. The conditions for MR safety are the responsibility of the implant manufacturer, not of Siemens Healthineers.

Turbo Suite Packages

To maximize value for our customers, we created three Turbo Suite packages consisting of a combination of various acceleration techniques. Each package is optimized and suitable for different sequences and body regions.

Turbo Suite Essential

Turbo Suite Essential comprises established acceleration techniques such as iPAT, iPAT[2], T-PAT, and the unique CAIPIRINHA to maximize productivity for all contrasts and orientations in routine imaging from head to toe. CAIPIRINHA can be applied to volumetric 3D imaging that supports iPAT[2] for body, neuro, or MSK imaging.

Turbo Suite Essential provides unique parallel imaging techniques for routine examinations in 10 – 15 minutes[2] scan time

Turbo Suite Excelerate[1]

Turbo Suite Excelerate comprises cutting-edge acceleration techniques such as Simultaneous Multi-Slice (SMS) and Compressed Sensing for static 2D and static 3D imaging applications in Neuro, MSK, and Body MRI.

Turbo Suite Excelerate enables time savings, for all contrasts, orientations, and body regions by up to 50%[2]

Turbo Suite Elite[1]

Turbo Suite Elite comprises cutting-edge Compressed Sensing applications for advanced abdominal and cardiovascular imaging with dynamic 2D and dynamic 3D applications. It includes Compressed Sensing GRASP-VIBE, Compressed Sensing Cardiac Cine, as well as TWIST, TWIST-VIBE, and StarVIBE.

Turbo Suite Elite provides unique Compressed Sensing for dynamic and full freebreathing liver and cardiac examinations

Turbo Suite **Essential**	Turbo Suite **Excelerate**	Turbo Suite **Elite**
Routine exams in 10–15 minutes	**Up to 50% time savings**	**Expand clinical capabilities**

Turbo Suite Essential

iPAT
CAIPIRINHA
VIBE
CAIPIRINHA
SPACE

Turbo Suite Excelerate

SMS DWI
SMS TSE
SMS RESOLVE
CS ToF
CS SPACE
CS SEMAC

Turbo Suite Elite

CS Cardiac Cine
CS GRASP-VIBE
FREEZEit + TWIST

[1]Optional
[2]Data on file.

Conventional

PD TSE, PAT 2
0.4 x 0.4 x 3 mm¹
TA 2:14 min
1aaaa1659

DWI, PAT 3, b800
1.6 x 1.6 x 6.0 mm¹
TA 3:09 min
1aaaa1528
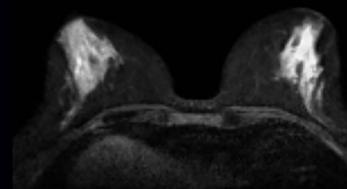
RESOLVE, b800
1.6 x 1.6 x 6.0 mm¹
TA 5:22 min
1aaaa3233
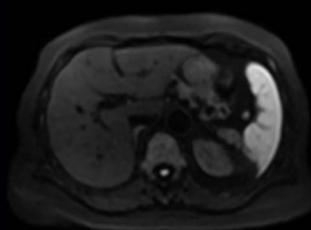
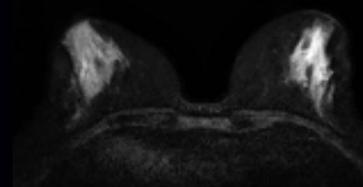**53% reduction**   **50% reduction**   **45% reduction**

**Turbo Suite
Excelerate with
Simultaneous
Multi-Slice and
Compressed
Sensing**

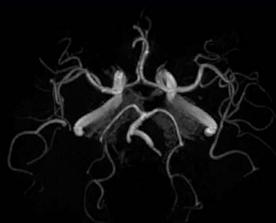**PD TSE SMS, PAT 2, SMS 2**
0.4 x 0.4 x 3 mm¹
TA 1:03 min
1aaaa1659

SMS DWI, PAT 2, SMS 2, b800
1.6 x 1.6 x 6.0 mm¹
TA 1:35 min
1aaaa1528

SMS RESOLVE, SMS 2, b800
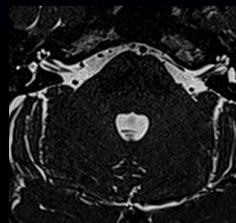**1.6 x 1.6 x 6.0 mm¹**
TA 2:58 min
1aaaa3233

¹*Subject to variability based on region specific requirements.*
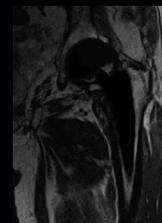
3D TOF MIP
0.5 mm iso
TA 6:40 min
1aaaa2930

T2 SPACE MIP, MRCP, PAT 3
0.5 x 0.5 x 1.0 mm¹
TA 5:51 min
respiratory triggered
1aaaa2793

T2 SPACE, PAT 2
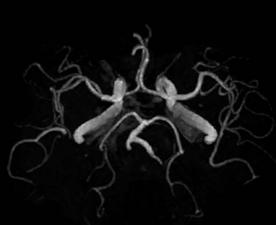**0.3 x 0.3 x 0.6 mm¹**
TA 5:13 min
1aaaa3016

SEMAC², PAT 3
0.9 x 0.9 x 3.0 mm¹
TA 6:54 min
1aaaa2956

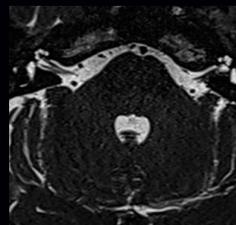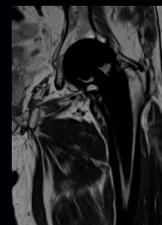**70% reduction** **96% reduction** **55% reduction** **56% reduction**

3D CS TOF Angio MIP
0.5 mm iso
TA 2:00 min
1aaaa2930

T2 SPACE MIP, MRCP, CS 23
0.5 x 0.5 x 1.7 mm¹
TA 0:15 min
breath-hold
1aaaa2793

CS T2 SPACE, CS 6
0.3 x 0.3 x 0.6 mm¹
TA 2:20 min
1aaaa3016

CS SEMAC², CS 8
0.9 x 0.9 x 3.0 mm¹
TA 3:03 min
1aaaa2956

¹Subject to variability based on region specific requirements.

²The MRI restrictions (if any) of the metal implant must be considered prior to patient undergoing MRI exam. MR imaging of patients with metallic implants brings specific risks. However, certain implants are approved by the governing regulatory bodies to be MR conditionally safe. For such implants, the previously mentioned warning may not be applicable. Please contact the implant manufacturer for the specific conditional information. The conditions for MR safety are the responsibility of the implant manufacturer, not of Siemens Healthineers.

Improving the MRI patient experience – with comfort, speed, and entertainment

Most patients who undergo an MRI scan experience some level of anxiety. Help patients overcome anxiety by turning MRI into a comfortable, fast, and entertaining experience.

- **Calm patients with a relaxing atmosphere**
- **Create a patient comfort zone**
- **Ease patients' anxiety**

Bring patient experience solutions to life with augmented reality
Explore how our solutions improve the MRI patient experience with augmented reality (AR). Configure the solutions in your environment and display them in life size directly on your smart mobile device.

Calm patients with a relaxing atmosphere[1]
Patients arriving for an MRI examination are often anxious and stressed. Help them relax the minute they enter the room with our scanner MoodLight. You can also design a calming theme for your scan room using scanner skins, projections, or wall coverings.

Quiet Suite – Imaging is to be seen, not heard
Offer patients quiet examinations of the brain, spine, and large joints —without compromising image quality or scan time. Quiet Suite benefits your patients by providing a 99%[2] reduction in sound pressure for neurological and orthopedic MRI exams.

Noisy and boring MRI exams are a thing of the past with Innovision[3]
Innovision[1] redefines the patient experience using a revolutionary in-bore infotainment solution. Patients are engaged by an impressive sound and video experience as soon as they lie on the table. The patient display keeps patients informed about their remaining scan time and displays predefined or custom content.

MAGNETOM Mini Scanner Mock-up[1]
Let patients see, hear, and feel an MRI scan with our MAGNETOM Mini Scanner Mock-up. The MAGNETOM Mini Scanner Mock-up comes with a sliding table top that can be manually moved in and out of the bore. The MAGNETOM Mini Scanner Mock-up also features two buttons that, when pressed, will play pre-recorded sounds of three different MRI sequences.

[1]*Optional*
[2]*Data on file.*
[3]*Innovision is still under development and not commercially available yet. It is not for sale in the U.S. Its future availability cannot be ensured.*

MRI Life Design

Short installation time
Thanks to its compact system design, MAGNETOM Sola has a typical installation time of less than 10 working days, helping reduce costs from the very start.

Small footprint
Minimum total space requirement: ~300 ft^2 for magnet, electronics, and console room. The system complies with the standard ceiling height of 94.5 in. An integrated water cooling cabinet eliminates the need for dedicated cooling of the entire equipment room.

Zero Helium boil-off magnet technology
During operation, the magnet windings must be cooled below their critical temperature using liquid helium. Equipped with Zero Helium boil-off technology, MAGNETOM Sola requires no helium refill in normal use. Depending on the frequency and type of applications used, overall savings of up to 1,300 liters of liquid helium are possible[1].

Product take back
Most of the materials used to produce MAGNETOM Sola are recyclable. 92% (by weight) can be recycled for material content and 8% for energy. We refurbish systems and reuse components and replacement parts whenever possible through our Refurbished Systems business.

Power-saving technology
Intelligent technology for higher energy efficiency: optimized sequences for less gradient switching, and self-adapting components, that switch off automatically when not needed.

System start timer
Timer clock that can be installed together with the MAGNETOM Sola to start the system automatically at user-definable times, eliminating waiting times during system boot up. It allows the definition of three different startup times for different days.[3]

Advance. Now Evolve
The Advance.Now Evolve when included in a service agreement, elevates your imaging solutions to the head of the pack. Get the latest versions of your equipment's software as it becomes available—as well as systematic hardware upgrades—so your imaging systems remain state-of-the-art for years to come.

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[1]Data on file.
[2]Source: https://www.bloomberg.com/news/articles/2013-01-31/helium-rises-to-highest-since-1995-in-fallout-from-shale-boom.
[3]University Hospital Freiburg, Germany. The statements by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results. This statement was provided by a person who or whose institution is engaged in a collaboration with Siemens Healthineers.

At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey toward expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare.

An estimated 5 million patients globally benefit every day from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics, and molecular medicine, as well as digital health and enterprise services.

We're a leading medical technology company with over 120 years of experience and 18,500 patents globally. With about 50,000 dedicated colleagues in over 70 countries, we'll continue to innovate and shape the future of healthcare.

The outcomes and statements provided by customers of Siemens Healthineers are unique to each customer's setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, and level of service/technology adoption), there can be no guarantee that others will achieve the same results.

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