



**Embrace
human nature at 1.5T**
MAGNETOM Sola
with BioMatrix

Our journey to precision medicine

The world's population will grow by 30% to 9.6 billion by 2050, with life expectancy increasing by 10%.¹ A higher number of ill patients and chronic disease cases will lead to greater cost pressure on healthcare systems. Each and every patient, as well as their disease states, is different and individualized treatment paths are necessary.

The future of healthcare can be precision medicine: the right treatment for the right patient at the right point of time.

In order to pave the way for precision medicine in MRI, one of the greatest challenges – the variability of the individual patient – needs to be addressed. Only by reducing unwarranted variations in MRI examinations by adjusting to patient biovariability healthcare institutions can provide standardized results.

Standardization means robust, consistent results are made available, aiding in diagnosis. In the future, this will enable treatment decisions and therapy response assessment based on quantitative tissue characterization with MRI.

This will enable healthcare providers to deliver individualized therapy, as well as more accurately predict treatment success. MRI will play a major role in this context.



“BioMatrix as a core technology on MAGNETOM Sola will make MRI even more consistent and robust. This is key for taking the next step to quantification, as well as for future artificial intelligence guided systems and clinical decision support.”

Christoph Zindel, M.D.
Senior Vice President, General Manager
Magnetic Resonance, Siemens Healthineers



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MAGNETOM Sola

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Embrace human nature with BioMatrix

Patients have unique, individual characteristics. Their different physiologies and anatomies – but also the way we interact with them and with technology – cause unwarranted variations.

These unique human characteristics – biovariabilities – pose significant challenges in MRI: Inconsistent exams. Poor image quality. Increased need for rescans. Unpredictable scheduling. They all can negatively impact the quality and cost of the care you provide.

BioMatrix technology helps to overcome these challenges with a whole new approach: by

embracing human nature. Instead of expecting patients to adjust to the technology, BioMatrix automatically adjusts to the patient. BioMatrix Sensors, Tuners, and Interfaces allow you to anticipate motion, adapt to the patient, and to simplify and accelerate patient preparation – no matter who comes next.

“To provide our patients with individual therapies, we need every piece of information available. In imaging, this means we need robust, standardized, and reproducible image data, always of the same quality regardless of the patient or user. BioMatrix Technology gives us this data quality and comprehensive image information and is helping us on our way to quantitative radiology.”

Professor Konstantin Nikolaou, M.D.
University Hospital Tübingen, Germany



BioMatrix Technology



Anticipate motion for high-quality results with BioMatrix Sensors.



Adapt to challenging anatomies for reliable exams with BioMatrix Tuners.



Accelerate patient preparation for increased efficiency with BioMatrix Interfaces.

Embrace human nature at 1.5T with MAGNETOM Sola

MRI needs to provide high-quality results – cost-effectively and consistently. Therefore, it needs to better handle patient variability, to deliver robust results for all patients and in every scan.

.....●
First 1.5T BioMatrix system, reducing unwarranted variations

.....●
New 1.5T magnet, 70 cm Open Bore and large 50 x 50 x 50 cm³ FoV

.....●
New BioMatrix Sensors capture respiratory, cardiac, and head motion for increased consistency

.....●
Expanded BioMatrix Tuners adapt to challenging body regions to provide excellent homogeneity

.....●
Enhanced BioMatrix Interfaces ease patient preparation and accelerate patient positioning by 30%²



MAGNETOM Sola, the first 1.5T system with BioMatrix technology, turns challenges into opportunities, delivering a whole new level of consistency, efficiency and new clinical capabilities.



-
Free-breathing exams with Compressed Sensing
improve the patient experience
-
Push-button exams and GO technologies powered
by artificial intelligence increase patient throughput
-
New accelerated applications with Simultaneous
Multi-Slice reduce scan time of entire MSK exams
by up to 46%²
-
New anatomy-adaptive coils for improved
patient comfort
-
New user environment with syngo MR XA platform
offers intuitive handling
-
Cost-efficient energy management with EcoPower

Embrace consistency at 1.5T

with BioMatrix Technology

MAGNETOM Sola, the first 1.5T system with BioMatrix technology, turns challenges into opportunities, delivering a whole new level of consistency. Overcome unwarranted variations with BioMatrix by automatically adjusting to patient variability. BioMatrix Sensors, Tuners, and Interfaces allow you to anticipate motion, adapt to any patient's body shape, and to accelerate patient positioning. The result: higher diagnostic confidence, fewer rescans, predictable patient scheduling, and consistent, high-quality personalized exams.



Anticipate motion for high-quality results with BioMatrix Sensors

Motion is a challenge in MRI, as it can dramatically decrease image quality, limiting consistency in scans and leading to costly rescans. Deeply embedded in the system architecture, BioMatrix Sensors capture respiratory, cardiac³ and head⁴ motion for increased consistency. This allows the user to choose the optimal exam strategy, and ensure consistent high-quality results.



.....
[siemens.com/
BioMatrix-Sensors](https://www.siemens.com/BioMatrix-Sensors)

See how it works
.....

BioMatrix Beat Sensors



The Beat Sensor³ is seamlessly integrated into the BioMatrix Body 12. It is designed for automatic cardiac triggering – without the need for ECG leads.



BioMatrix Beat Sensor – designed to capture heart motion



Segmented cine 4-chamber
acquired without ECG



Segmented cine short axis
acquired without ECG

1a0001457

BioMatrix Kinetic Sensor

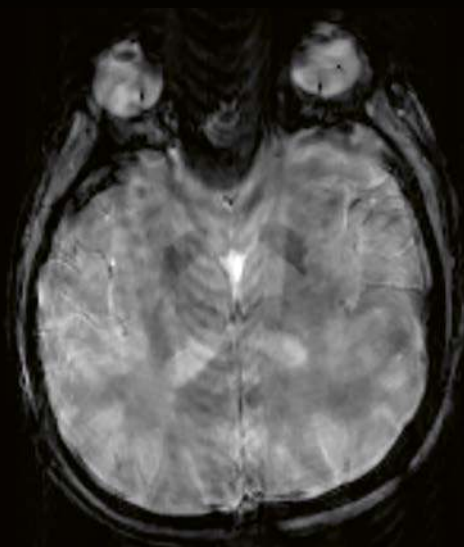


The Kinetic Sensor⁴ in the scanner bore records real-time head motion information. It is designed for prospective motion correction for high-quality exams.

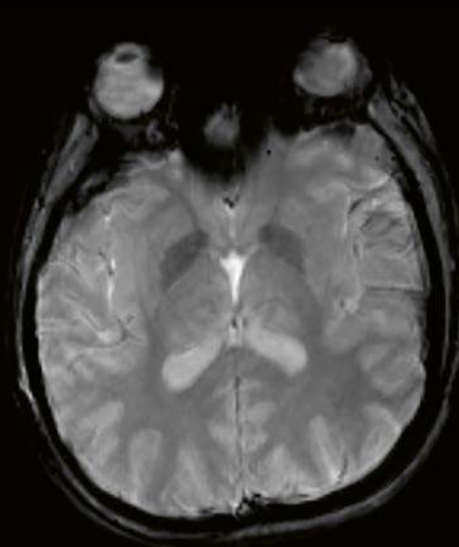


When used together with a marker that is positioned on the patient nose, the Kinetic Sensor allows for prospective motion correction.

Motion correction with Kinetic Sensor – designed to improve diagnostic quality of imaging



Without motion correction



With motion correction

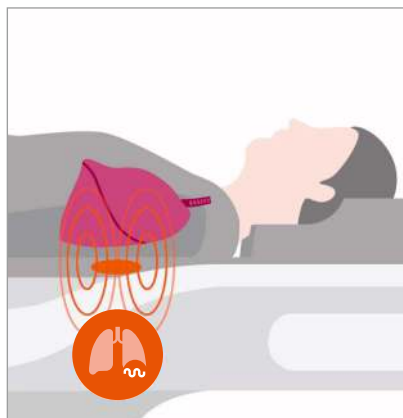
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University of Hawaii / KinetiCor

BioMatrix Respiratory Sensors

“The BioMatrix Respiratory Sensor adds value to my daily clinical work, as I can now easily monitor the patients’ breathing and breath-holds during the exam – without any additional setup.”

Marieke Van Gelder
Jan Yperman, Ieper, Belgium



The Respiratory Sensors automatically detect breathing patterns as soon as the patient lies on the table. This provides a simplified workflow as respiratory triggered scans can be performed without additional user interaction. (See images below.)

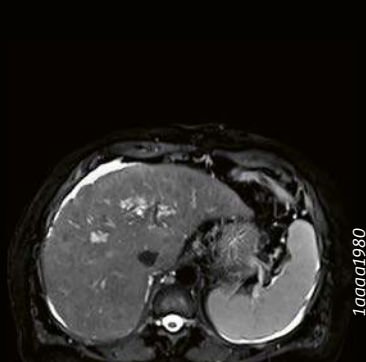


Display of patient's respiration data, acquired by BioMatrix Sensors.

Respiratory triggering with Respiratory Sensors – no navigator setup, no breathing belt



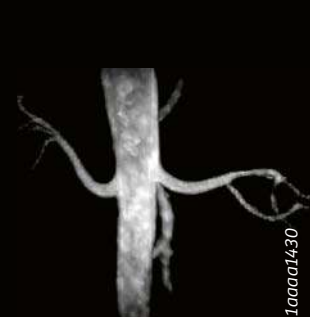
MRCP T2 SPACE MIP –
respiratory triggered with
Respiratory Sensors



T2 HASTE in a patient
with ascites – respiratory
triggered acquisition



T2 HASTE –
respiratory triggered with
Respiratory Sensors



NATIVE –
respiratory triggered with
Respiratory Sensors

Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium



siemens.com/
BioMatrix-Tuners

See how it works



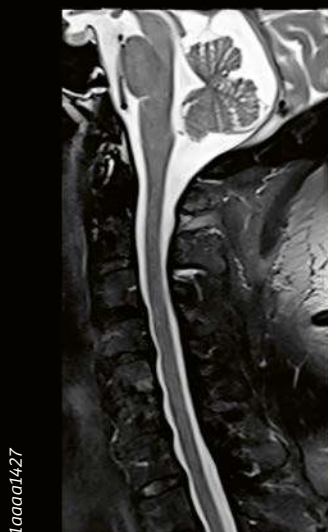
Adapt to challenging anatomies for reliable exams with BioMatrix Tuners.



BioMatrix Tuners adapt to challenging anatomies, such as the head/neck area, the spine and the abdomen, for reliable exams. Even for difficult scan regions, our intelligent coil technology consistently delivers excellent homogeneity and fat saturation – driving robustness and reproducible high-quality imaging – for every patient, every time.

BioMatrix Head/Neck 20, tiltable (0° / 9° / 18°)
with CoilShim

Significantly improved fat saturation and image quality with BioMatrix Tuner CoilShim



Conventional Shim



With 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 and better DWI quality in the neck region. CoilShim technology ensures that the challenging area is automatically and optimally shimmed for reproducible quality in every patient.

Improved image quality in the entire imaging volume with BioMatrix Tuner SliceAdjust



1a00a1666

Conventional Volume Adjust



With SliceAdjust

SliceAdjust technology provides reliable fat saturation for both TSE and DWI sequences, as well as distortion-free whole-body DWI scans. It avoids broken spine artifacts in whole-body DWI for excellent correlation with anatomical scans.



Conventional Volume Adjust

1a00a1654



With SliceAdjust
Integrated in Multi-concatination TSE acquisitions

NEW
SliceAdjust
with TSE



siemens.com/
BioMatrix-Interfaces

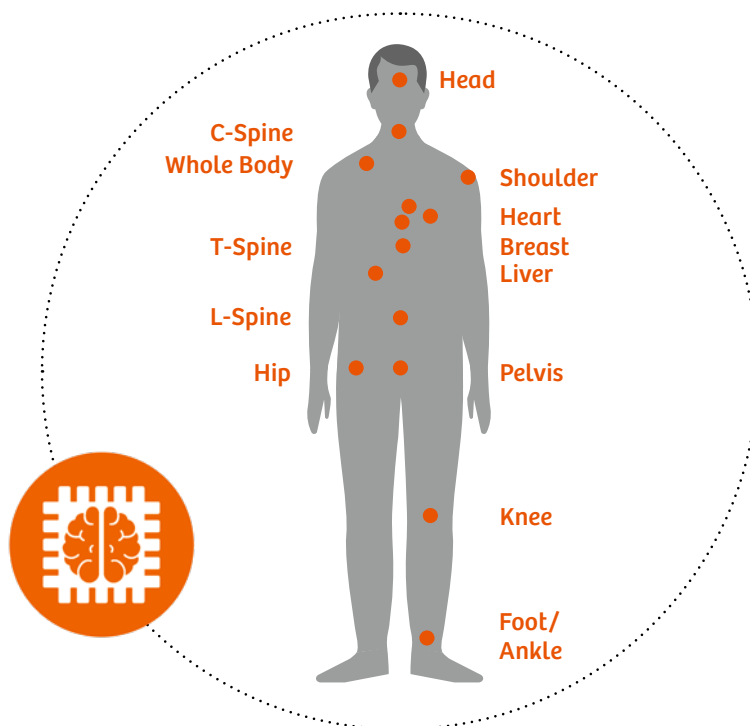
See how it works



Accelerate patient preparation for increased efficiency with BioMatrix Interfaces.

BioMatrix Interfaces simplify how the user interacts with the scanner and the patient, accelerating patient preparation in order to increase quality and improve cost-effectiveness. No matter how tall, big, or mobile a patient is – or how experienced the technologist is – BioMatrix Interfaces speed up the workflow for increased efficiency.

The BioMatrix dockable table with eDrive support provides motorized assistance so that even the heaviest patient can be effortlessly moved to and from the scanner.



With one-touch positioning on the Select&GO touch display based on the BioMatrix Body Model patient positioning can be accelerated by up to 30%² through Artificial Intelligence. Delays due to incorrect positioning can now be

avoided. The user simply selects the region or organ to be scanned on the touch display and the patient is automatically and precisely positioned for the respective scan.

“With the push-button positioning of the BioMatrix InterfaceSelect&GO, the patient setup is fast and consistent – for every user.”

Dr. Johan Dehem
Jan Yperman, Ieper, Belgium



Simplify and speed up patient transportation with BioMatrix Interfaces and eDrive support.



Fast and easy positioning with the Select&GO display.

Embrace efficiency at 1.5T

with GO technologies and Simultaneous Multi-Slice

For routine MR examinations, reimbursements are falling and referrals are increasing due to changing demographics. MAGNETOM Sola, with new *syngo* MR XA user environment, embraces efficiency at 1.5T and makes push-button examinations a clinical reality. GO technologies help you accelerate the entire workflow from patient positioning to result distribution, powered by artificial intelligence. New speed technologies such as Simultaneous Multi-Slice TSE can dramatically reduce scan times for routine examinations. Enhance your efficiency to optimize clinical operations.



Preparation with Select&GO:

BioMatrix Select&GO enables exam positioning with one touch on the display – by anyone, on any patient.



Acquisition with DotGO:

An intuitive Dot workflow with automatic placement of the imaging slices, e.g. using AI powered AutoAlign Spine, turns whole-spine imaging into a push-button exam.

Spine examinations – as an example – can pose a challenge as a result of varying anatomies, such as scoliosis and kyphosis. This can often cause delays and lead to diminished image quality.

GO technologies accelerate workflow beyond scan time reduction, enabling higher throughput and robustness in clinical routine.



Reconstruction with Recon&GO:

Recon&GO automatically performs postprocessing steps in the background. For example: vertebrae in the sagittal, axial, and coronal views are automatically labeled in all contrasts.

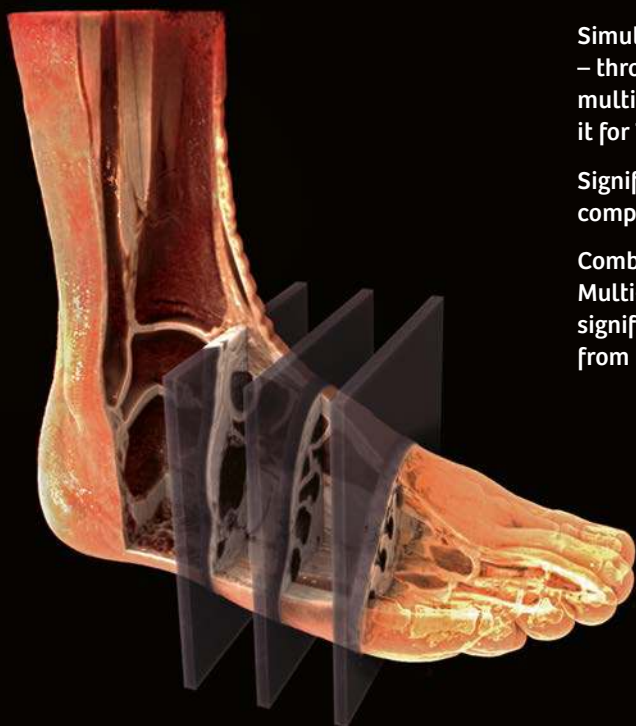


Distribution with MR View&GO:

Dual screens allow the user to control scans on the left monitor while checking the results on the right monitor in real time.

Simultaneous Multi-Slice TSE

Accelerate anatomical imaging.



Simultaneous Multi-Slice speeds up imaging significantly – through the simultaneous excitation and readout of multiple slices. Now we expand its footprint introducing it for TSE.

Significantly accelerate anatomical imaging and make complete MSK exams almost twice as fast.

Combined with Simultaneous Multi-Slice for DWI, achieve significant time savings from head to toe.

**Up to 46%
scan time
reduction for
entire
MSK exams⁴**

PAT 2



13:15 min

PAT 2 + SMS 2



7:08 min



**New accelerated applications with Simultaneous Multi-Slice
reducing scan time without compromising image quality.**



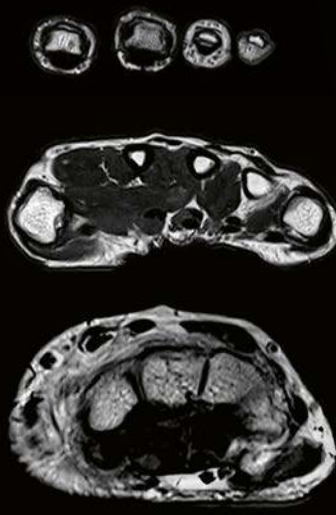
Fast knee imaging with
homogeneous fat saturation in
a patient with adipositas PD TSE
28 slices in 2:12 minutes

*Courtesy of Jan Yperman Ziekenhuis,
leper, Belgium*

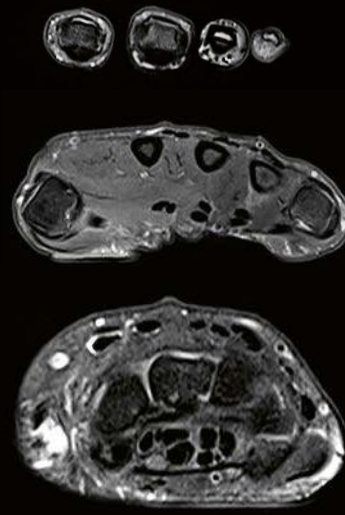
**Full hand coverage in less than 5 minutes –
with thinner slices and all relevant contrasts.**



T1 TSE tra
60 slices, PAT 2 + SMS 2
 $0.3 \times 0.5 \times 3.0 \text{ mm}^3$
TA 1:43 min

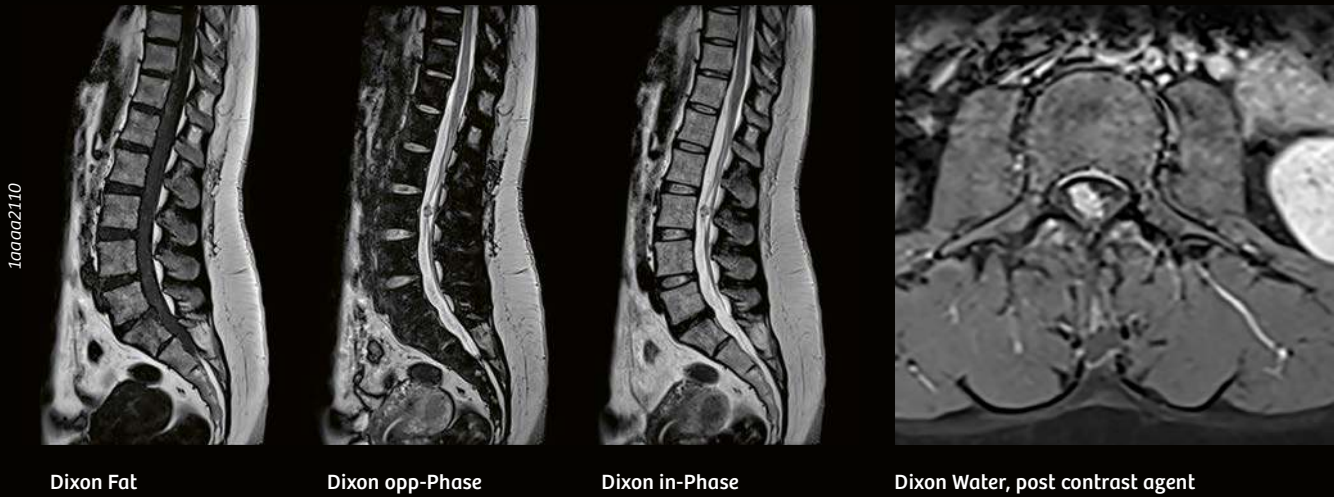


T2 TSE axial
60 slices, PAT 2 + SMS 2
 $0.3 \times 0.5 \times 3.0 \text{ mm}^3$
TA 1:35 min



PD TSE FS tra
60 slices, PAT 2 + SMS 2
 $0.4 \times 0.5 \times 3.0 \text{ mm}^3$
TA 1:36 min

High efficiency with fast spine imaging at high-resolution –
Four contrasts in one measurement, only 2:50 min

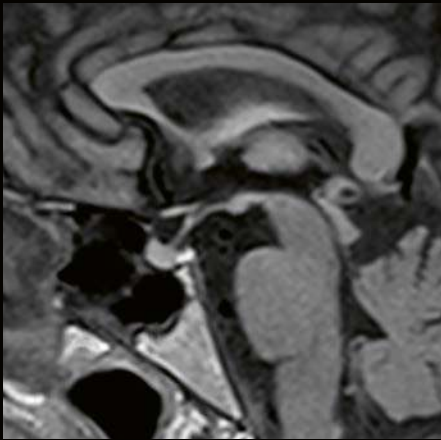


Fast, patient-friendly setup with off-center
elbow measurements with UltraFlex 18 Small

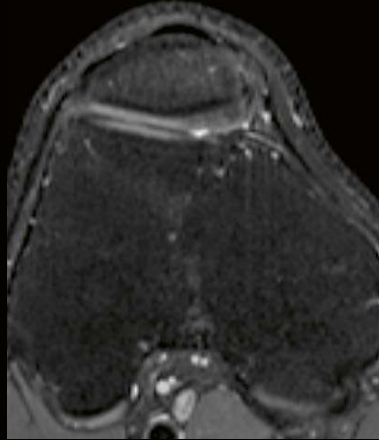


Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium

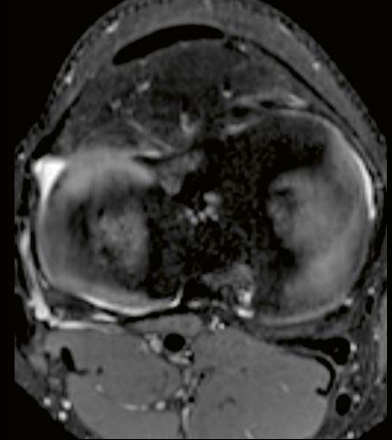
Fast acquisition at 3D isotropic, high-resolution with CAIPIRINHA SPACE



T1 CAIPI SPACE, 1 mm isotropic resolution
Small FoV reconstruction



PD CAIPI SPACE with fat saturation
Flexible reconstruction of different regions

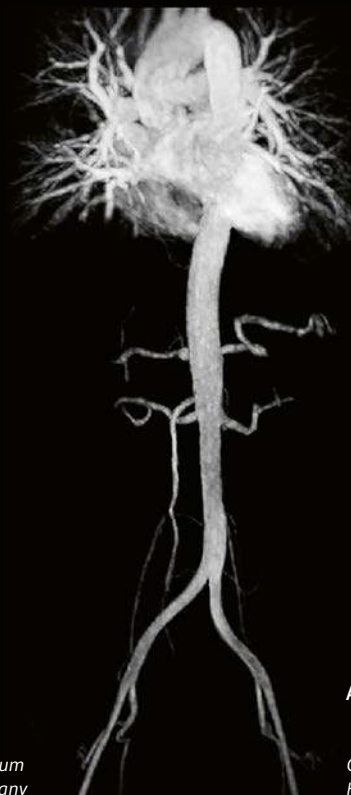


The 50 cm field-of-view enables large coverage quickly



T2 HASTE

Courtesy of
Universitätsklinikum
Mannheim, Germany



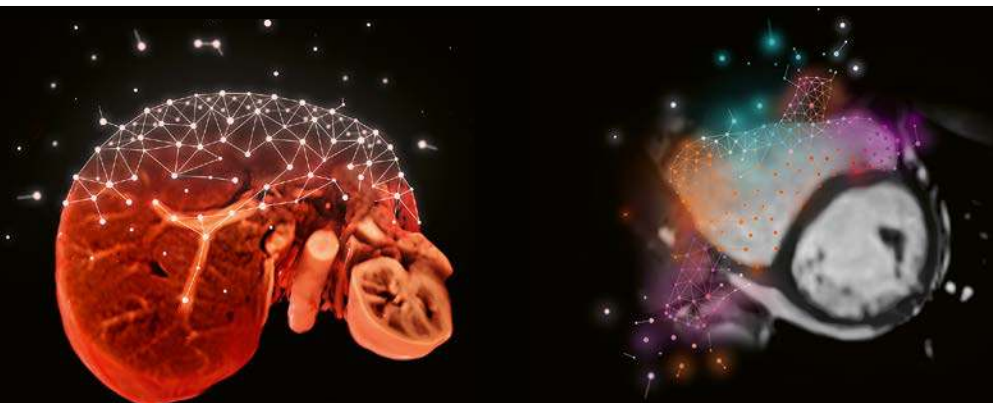
Angio of the thorax

Courtesy of Radiologie
Halle-Neustadt, Germany

Embrace new clinical capabilities at 1.5T

with Inline Compressed Sensing

With MAGNETOM Sola, grant patients access to MRI that previously had to be excluded because of their medical condition or due to the exam's complexity. Free-breathing Compressed Sensing applications help improve the patient experience, while extending your range of services. Significantly simplified procedures with automated workflow strengthen clinical fields with growth potential such as whole-body MRI.



Compressed Sensing GRASP-VIBE

Dynamic contrast-enhanced imaging is a key exam for the characterization of abdominal lesions. Yet, it is often challenging for many patients, because it requires several breathholds over a short period of time, with correct timing of contrast agent administration. For patients who cannot hold their breath for the whole duration of the scan, the result is often a non-diagnostic image.

Compressed Sensing Cardiac Cine

MR cardiac function imaging is the gold standard for the diagnosis and prognosis in a variety of cardiac diseases, but it is time-consuming and requires a challenging number of breathholds. Image quality is impaired in particular for patients with arrhythmia.

**Beyond
speed.**

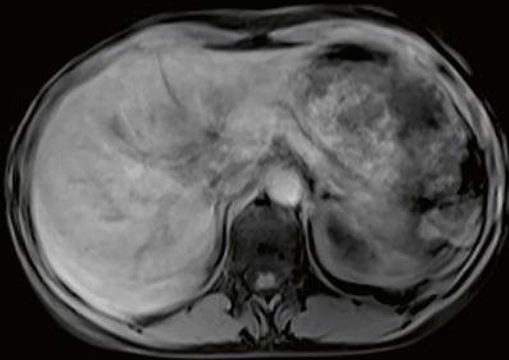
Beyond speed. Beyond motion. Compressed Sensing GRASP-VIBE⁵.

- Push-button, free-breathing liver dynamics – reliable also in patients previously excluded from MRI
- Resolves timing challenges and automatically recognizes the relevant phases of liver contrast-enhanced imaging

"I use Compressed Sensing GRASP-VIBE in more than a half of my patients, it is a game changer for patients that move, cannot hold their breath or simply cannot cooperate, as it still provides high quality results."

Dr. Johan Dehem
Jan Yperman, Ieper, Belgium

Free-breathing acquisitions with Compressed Sensing GRASP-VIBE make a difference for patients with limited or no breath-hold capabilities.



Free breathing – conventional



Free-breathing
Compressed Sensing GRASP-VIBE



Free-breathing liver dynamics in a 58-year-old patient
with hepatocellular carcinoma

Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium



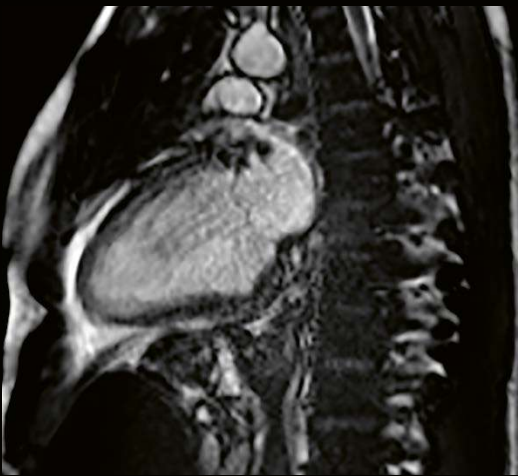
Motion-robust Uterus imaging with Compressed Sensing
GRASP-VIBE

Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium

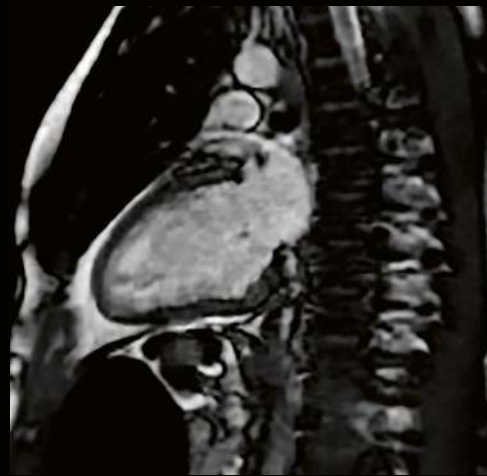
Beyond speed. Beyond breath-holds. Compressed Sensing Cardiac Cine.

- Cardiac function evaluation can now be offered to all patients – even those with arrhythmia.
- Acquire high-resolution Cardiac Cine images and capture the whole cardiac cycle - in free-breathing instead of 7-14 breath-holds.

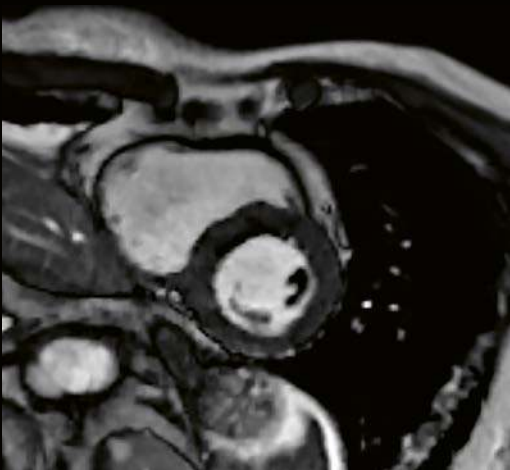
Free-breathing acquisitions with Compressed Sensing Cardiac Cine make a difference for patients with irregular heartbeats or limited breathhold capabilities



Conventional cine acquisitions are susceptible to breathing motion or irregular heart beats



Free breathing acquisition with Compressed Sensing Cardiac Cine



Free-breathing Compressed Sensing Cardiac Cine imaging in a 64-year-old patient after infarct

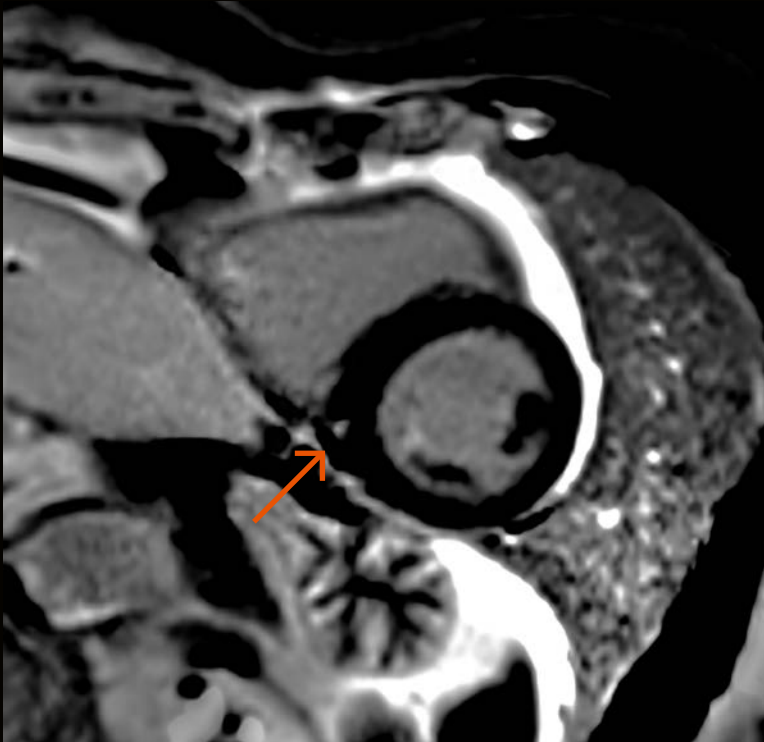
Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium



Real-time cine 2-chamber acquired with Compressed Sensing Cardiac Cine

Phase-sensitive inversion recovery with HeartFreeze.

Motion-robust, inversion recovery contrast imaging is now feasible in free breathing. With motion-corrected PSIR HeartFreeze.



PSIR HeartFreeze

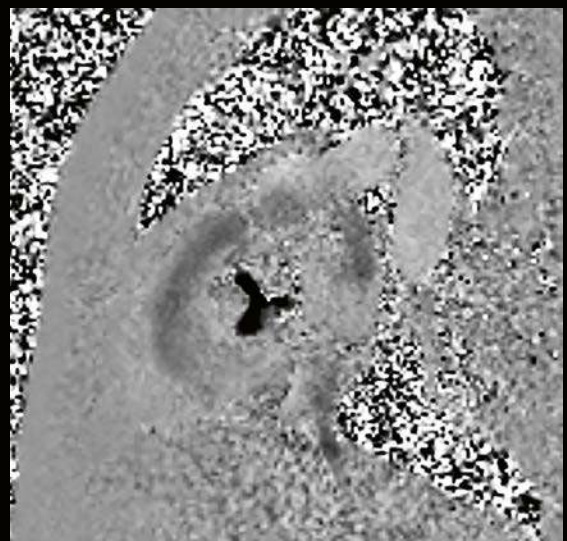
Courtesy of Jan Yperman Ziekenhuis, Ieper, Belgium

Advanced cardiac application are greatly simplified and standardized with the Cardiac Dot Engine, for instance with automated view positioning for flow measurements of the aortic or mitral valve.



Automated slice positioning with the Cardiac Dot Engine

Magnitude image of the aortic valve



Automated slice positioning with the Cardiac Dot Engine

Phase image of the aortic valve

Perform complete whole-body exams from head to pelvis in less than 30 minutes⁷

The new Whole-Body Dot Engine reduces the planning and execution of complex whole-body exams to a few clicks by simply selecting which regions need to be scanned, whether a focus region should be investigated, and setting a few patient-specific settings, e.g. breath-hold capability.

All core protocols for bone and lymph node metastasis detection are covered.



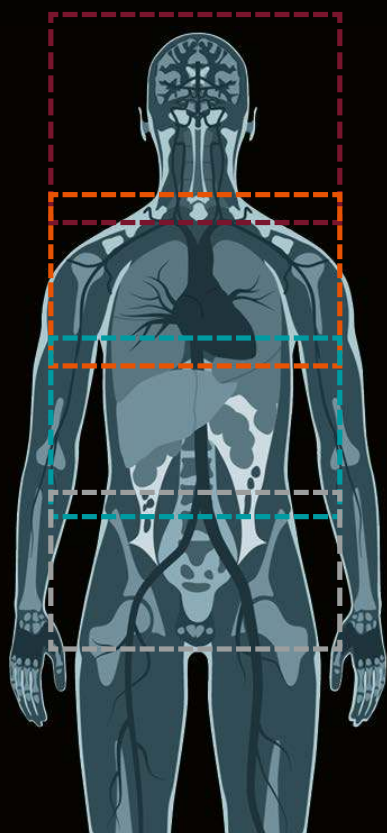
T2 HASTE STIR



VIBE DIXON Water image



DWI b800



General Parameters

Exam Strategy Standard

Focus Adaption BH + AutoCoverag

Auto Bolus Detection ☒

Auto ROI ☒

Breath-Hold Parameters

Breath-Hold Capability 20 s

Auto Breath-Hold Commands ☒ German (German)

Pause Between Breath-Holds 10 s

Coverage

Head

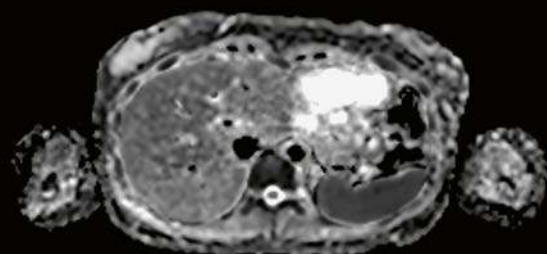
Chest Focus

Abdomen Focus

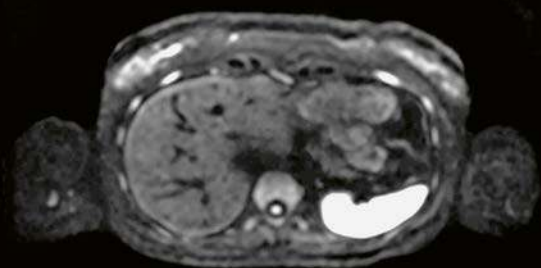
Pelvis Focus

Legs FastView

Whole-Body Dot Engine: intuitive and guided workflow



ADC map



DWI b800



T2 STIR



T1 TSE

Technical specifications

MAGNETOM Sola Technical specifications

Field strength	1.5 Tesla
Bore size	70 cm Open Bore design
System length	157 cm cover to cover
System weight (in operation)	4.2 tons
Minimum room size ⁷	28m ² / 302 ft ²
RF technology	
Maximum number of channels ⁸	204
Number of independent receiver channels that can be used simultaneously in one single scan and in one single FoV, each generating an independent partial image	32, 48, 64
Gradient strength	XQ gradients 45/200 simultaneously [2.03 MVA]
	XJ gradients 33/125 simultaneously [1.25 MVA]
Helium consumption	Zero Helium boil-off technology

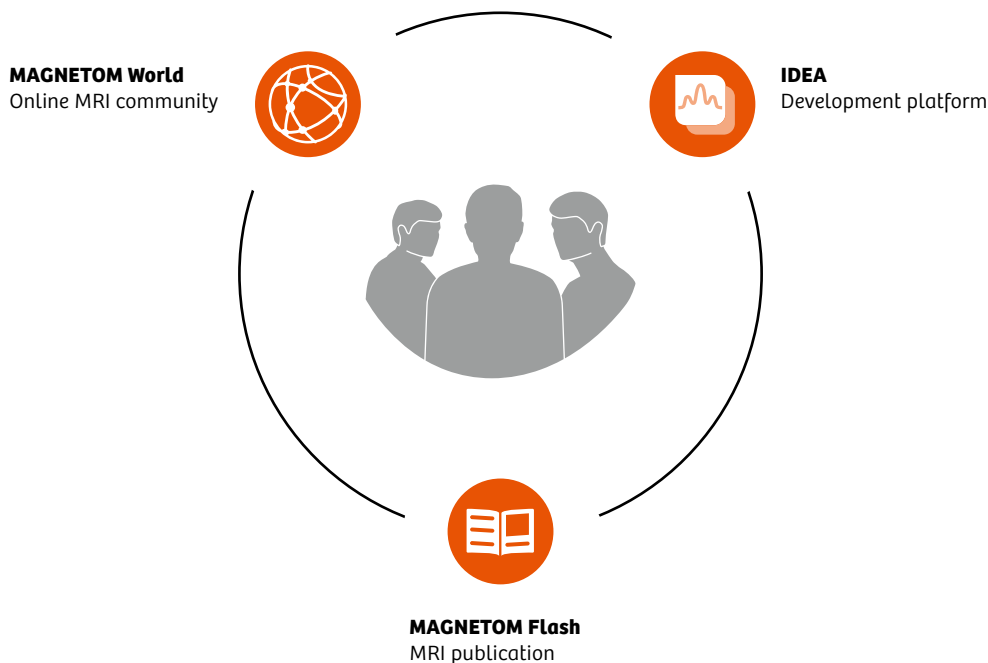




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Service and exchange – peer-to-peer information



MAGNETOM World

The global MRI community from Siemens Healthineers offers peer-to-peer support and information. Radiologists, cardiologists, technologists, and physicists have all contributed with protocols, presentations, application tips, case studies, and more – all freely available to you via this unique network.

www.siemens.com/magnetom-world

MAGNETOM Flash

MAGNETOM Flash is the MR magazine. Published quarterly, it features up-to-date clinical case studies, application tips, as well as technical and product information relevant to you. All content is carefully compiled by experts to meet the needs of today's MRI users in both clinical and research scenarios. In fact, 98.5% of readers report that MAGNETOM Flash is clinically relevant.⁹

siemens.com/magnetom-flash

IDEA

IDEA¹⁰ is an open development platform supporting the largest and most active MR research community in the world. It brings users from across the globe together and fosters innovation in the field of MRI. Members collaborate online at www.mr-idea.com

Service and exchange

Increasing value by partnering throughout the entire equipment lifecycle



Continuously adding value and caring for your equipment, your staff,

Equipment Maintenance & Monitoring

Reliably servicing your MRI system allows you to identify deviations from current norms to maximize equipment availability.

Equipment Options & Upgrades

Clearly defined upgrade paths take your MRI system to the next level, extending the lifespan of your equipment.

Education Management

Personalized education and training improves your staff's expertise as well as your equipment efficiency.

Fleet Management

A transparent overview of your fleet allows you to manage the performance and maintenance of your Siemens Healthineers equipment, 24/7.



Performance Management

An intelligible overview of your radiology and cardiology performance data helps you make prompt and well-informed decisions.

Asset Management & Planning

Access to innovative medical technology and equipment throughout the entire contract lifetime allows you to maximize focus on patient care.

Business Modelling & Financing

Customized business and financial models address your budgetary and enterprise needs enabling you to remain more competitive.

Departmental Layout Optimization

3D-Visualization and digital twin analysis create more efficient workflows and a more enjoyable working environment.

Why Siemens Healthineers?

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

An estimated 5 million patients globally everyday benefit 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 services¹¹.

We are a leading medical technology company with over 170 years of experience and 18,000 patents globally. With more than 48,000 dedicated colleagues in 75 countries, we will continue to innovate and shape the future of healthcare.

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The information in this document contains general technical descriptions of specifications and optional features which do not always have to be present in individual cases. Siemens reserves the right to modify the design, packaging, specifications, and options described herein without prior notice. Please contact your local Siemens sales representative for the most current information.

Note: Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

For accessories, please visit:
siemens.com/medical-accessories

- 1 *United Nations report by United Nations Department of Economic and Social Affairs, June 13, 2013, New York.*
- 2 *Data on file.*
- 3 *Cardiac Triggering is still under development and not commercially available yet. Its future availability cannot be ensured.*
- 4 *The motion correction framework and all associated sequences are still under development and not commercially available yet. Its future availability cannot be ensured.*
- 5 *Compressed Sensing GRASP-VIBE for other regions than liver is not for sale in the U.S.*
Intended Use: Compressed Sensing GRASP-VIBE (GRASP = Golden-angle RADial Sparse Parallel MRI) is intended to be used in dynamic and/or noncontrast liver examinations to support patients who cannot reliably hold their breath for a conventional breathhold measurement..
- 6 *Values for a 196 cm person.*
- 7 *Minimum total space requirement for magnet, electronics and console room.*
- 8 *Channels (coil elements) that can be connected simultaneously.*
- 9 *2013 MAGNETOM Flash reader survey. Data on file.*
- 10 *This website provided by Siemens AG may be used solely in accordance with the general terms and conditions of use, available prior to registration/login on the website itself.*
- 11 *Siemens AG, "Sustainable healthcare strategy – Indicators in fiscal 2014", pages 3-4.*

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