

MAGNETOM Terra

Translate 7T research power into clinical care

siemens-healthineers.com/terra

The clinical overlay is not that of the individual pictured.
It was modified for better visualization.



SIEMENS
Healthineers

Translate 7T research power into clinical care

MAGNETOM Terra is designed to let you explore new territories in MRI by enabling powerful 7T research and enhancing clinical care. Uncover a whole new world of clinical insights with double SNR¹ for more precision. Our advanced ultra-high-field (UHF) technology will keep you at the cutting edge of MRI, to attract the brightest minds to your facility, sharpen your competitive edge and strengthen your reputation. It delivers a fertile platform for unlocking research capabilities, publishing new insights first, and setting the pace in diagnostic imaging. Welcome to an exclusive research community. Welcome to a whole new world in MRI.

Welcome to clinical 7T.

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MAGNETOM Terra at a glance

Unique Dual Mode functionality²

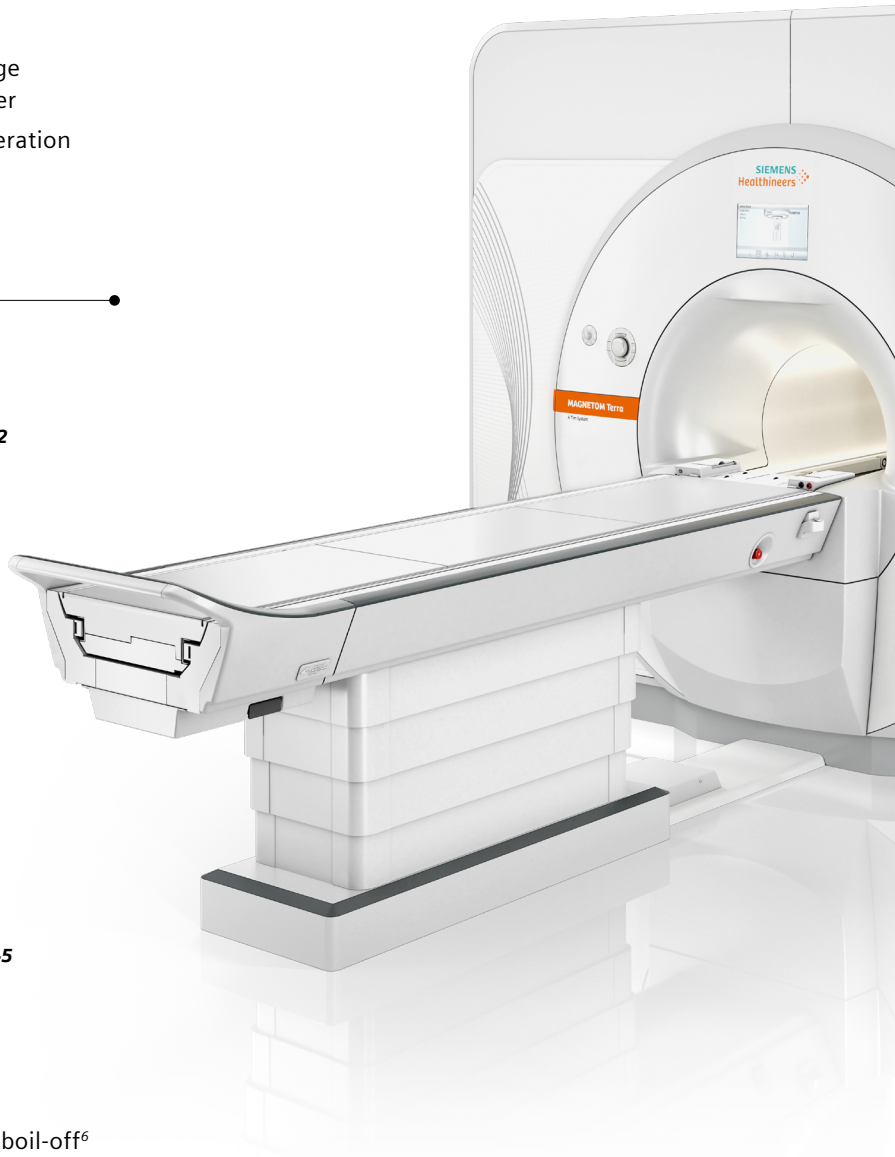
- Uncover a whole new world of clinical knowledge with the flexibility to get more from your scanner
 - Secure switch between research and clinical operation in less than seven minutes
 - Operating with two separate databases for clear research and clinical distinction²
-

80/200 gradients, 16-channel pTX² and up to 64 channels³

- More power for greater diffusion MRI and functional MRI with 80/200 gradients
 - Higher homogeneity for challenging body regions with up to 16-channel parallel transmit (in research mode)²
 - Higher acceleration factors with 64 receive channels⁴
-

50% lighter 7T magnet technology⁵

- Released for clinical use in Europe and the U.S.
 - Lower weight and cold-shipment for easier integration in clinical environments⁵
 - Reduced operating costs thanks to Zero Helium boil-off⁶
-





Double SNR for more precision¹

- 0.2 mm in-plane resolution to visualize previously unseen structures⁷
- 0.14 cm³ voxel sizes for metabolic brain mapping⁸ (in research mode)²
- Submillimeter BOLD fMRI precision to visualize sub-cortical activations⁹

Explore metabolism

- ²³Na MRI and ³¹P MRS for metabolic insights in clinical mode¹⁰
- Dedicated ²³Na head coil and ³¹P loop coil
- Broadband RFPA enabling X-nuclei MR with up to 10 nuclei in research mode²

> 75% global market share in 7T technology

- Over 75% of 7T and 100% of vendor-integrated > 7T MRI human scanners worldwide from Siemens Healthineers
- 7 of 11 leading U.S. hospitals with a 7T, (2018–2019), trust us when they decide for 7T investment¹¹
- 73% of ISMRM UHF abstracts in 2018 were based on data from Siemens Healthineers UHF systems¹²

The world's largest UHF community

- Largest installed base for exchanging ideas in a strong collaborative network
- An opportunity to enhance your reputation and competitiveness
- Incentive for the brightest minds in the MRI community to work with you



Uncover a whole new world of clinical insights

Discovering new ground in MRI can help you significantly enhance patient outcomes. Imaging at 7T offers more than double the SNR of 3T. This delivers potential for better lesion conspicuity, faster image acquisition to reduce motion artefacts, and earlier disease detection at submillimeter resolution. MAGNETOM Terra is released for clinical use within Europe and the US. Its Dual Mode lets you switch between clinical and research tasks, unlocking new opportunities and providing a solid, well-founded platform for innovative results.

“Based on higher resolution, 7T provides new insights into gray and white matter disease in the brain, such as multiple sclerosis, focal cortical dysplasia, and hippocampal sclerosis. Furthermore, functional MR benefits from 7T based on a clinically relevant increase in functional sensitivity and specificity. In musculoskeletal imaging, 7T enhances the visualization of small joint structures and subtle pathologies, such as small meniscal tears, triangular fibrocartilage lesions, and early stages of cartilage degeneration.”¹⁴

Professor Siegfried Trattnig
Director of the MR Centre of Excellence,
MedUni Wien, Vienna, Austria

Double SNR¹ for more precision with clinical applications in Dual Mode

Dual Mode flexibility²

MAGNETOM Terra is the first 7T scanner released for clinical use within Europe and the US. With the release for selected neurological and musculoskeletal scan protocols, it has potential to uncover a whole new world of clinical care. Its unique Dual Mode functionality lets you switch between research and clinical operation, giving you flexibility to get more from your scanner.

Ultra-fine anatomical resolution

In brain and musculoskeletal MRI, 7T reveals details previously unseen at lower field strengths. For example, cerebral cortex imaging at 0.2 mm in-plane resolution⁷ may detect changes in cortical structure indicating early dementia. It also helps visualize cortical microinfarcts and plaques in MS patients and delivers insight into the plaque-vessel relationship and iron accumulation.

Submillimeter fMRI⁹

The BOLD contrast increases linearly with field strength. In clinical use, this could mean higher precision in oncology compared to 3T applications, for example, through smaller voxel sizes. Potentially, this can increase the accuracy of neurological pre-surgical evaluation of eloquent areas before tumor removal, while keeping scanning times viable¹⁴.

Powerful image reconstruction

MAGNETOM Terra delivers improvements in workflow for easier operation and better patient handling. Leveraging the latest *syngo* MR E12 software platform, it lets you work in the same way as you do with cutting-edge 3T technology. What's more, it comes with the most powerful MaRS (Measurement and Reconstruction System) computing technology ever built.⁵

Physiology is at your fingertips

MAGNETOM Terra is the first 7T MRI scanner to unleash the full potential of the increased MR signal with multinuclear imaging and spectroscopy in clinical settings. The multinuclear option allows the use of two dedicated coils – a ²³Na head coil and a 31P loop coil, to explore metabolic insights¹⁰.

Dual Mode² offers the flexibility to switch from research to clinical tasks

Clinical Mode

- 1 transmit channel
- 11 kW RF power
- 2 1H coils (Head 32, Knee 28)
- 2 MNO coils (23Na Head 32, 31P Flex Loop)
- Neuro and MSK optimized clinical applications



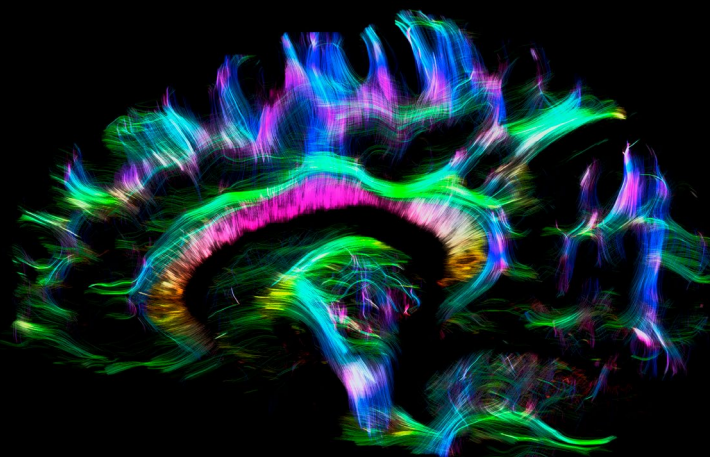
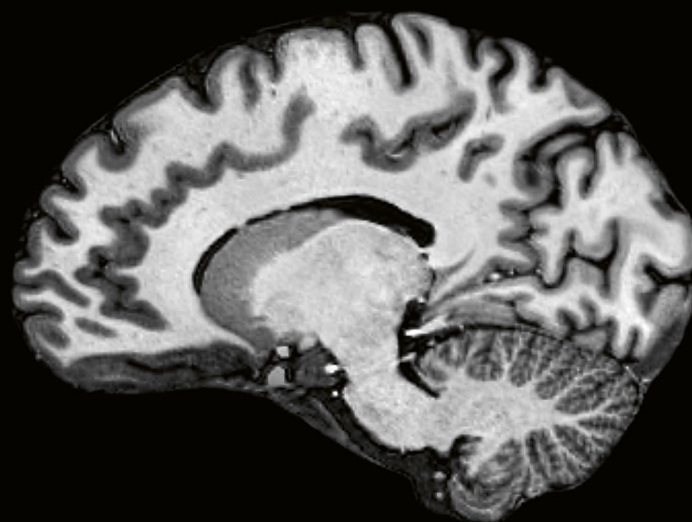
Dual mode

- *syngo* MR E12 software line
- XR Gradients 80/200
- Up to 64 receive channels
- Latest MaRS computer
- 3rd order shims



Research Mode

- single channel and up to 16-channel parallel transmit
- 16 x 2 kW RF power
- Wider range of RF coils
- Whole-Body WIP Applications
- Broadband RFPA for X-nuclei MR (10 nuclei)

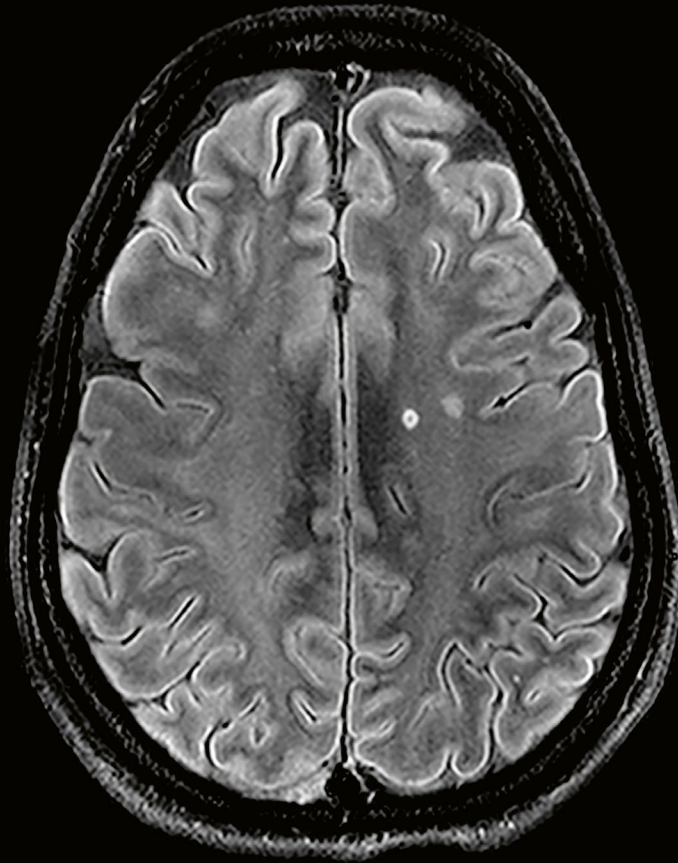


Clinical Mode – Multiple Sclerosis

Hyperintense MS lesion
with hypointense center

DarkFluid TSE

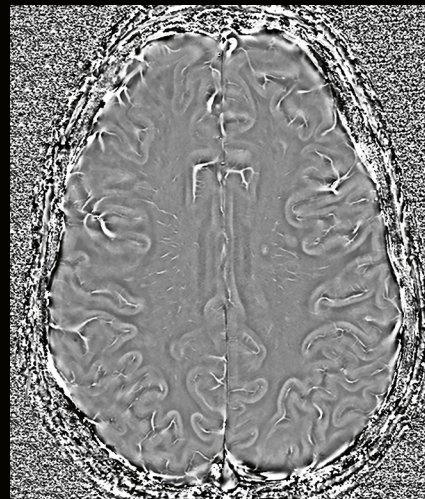
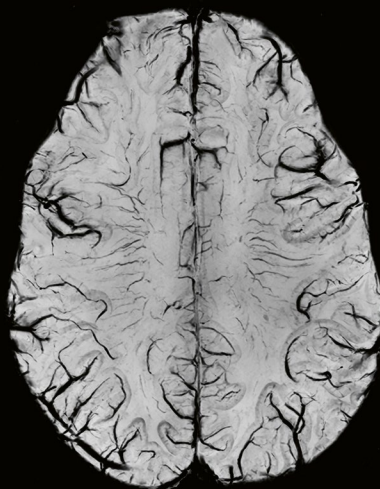
0.3 x 0.3 x 3 mm³,
5:59 min



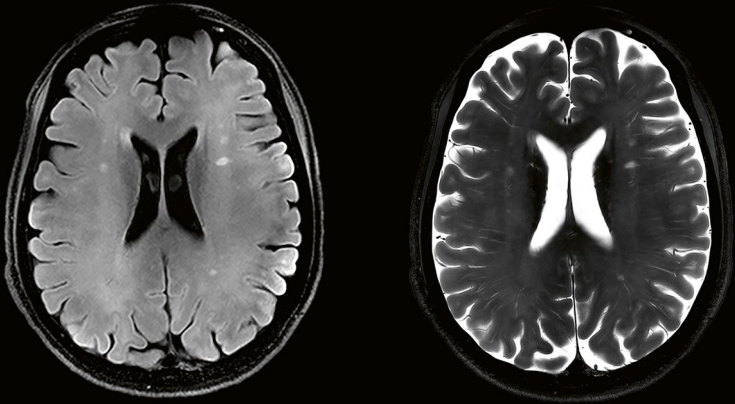
Typical central vein and perivenular demyelination is visible.

SWI minIP/phase

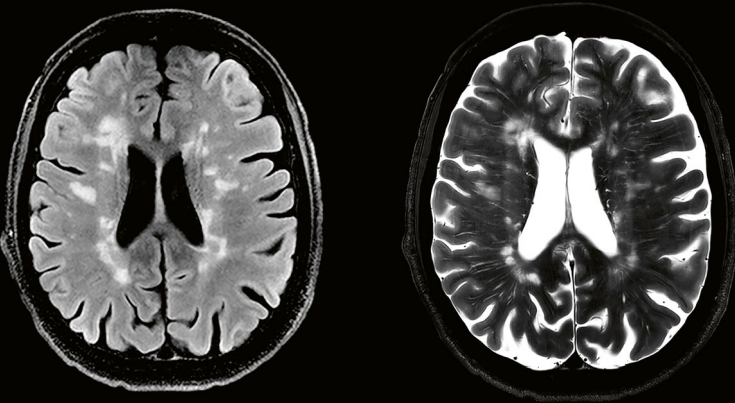
0.2 x 0.2 x 1.2 mm³,
5:38 min



Multiple Sclerosis
with low lesion load

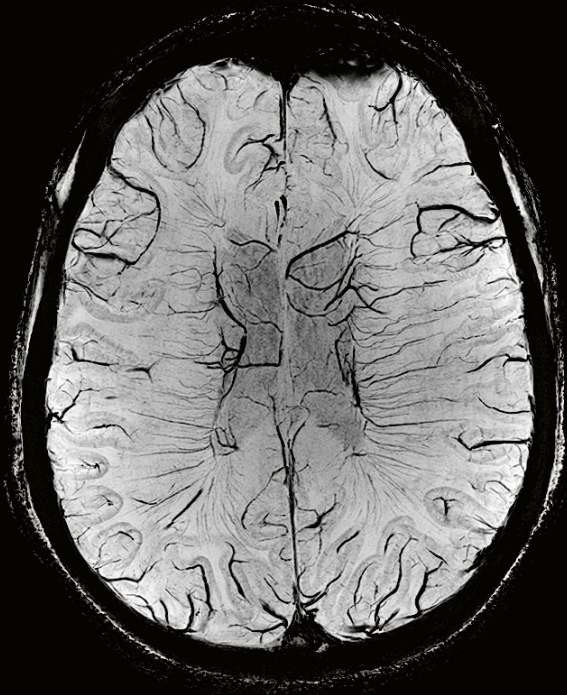


Multiple Sclerosis
with high lesion load



Dark Fluid TSE
0.3 x 0.3 x 3 mm³, 5:20 min

T2 TSE
0.2 x 0.2 x 3 mm³, 5:33 min



SWI
0.2 x 0.2 x 1.2 mm³, 5:38 min

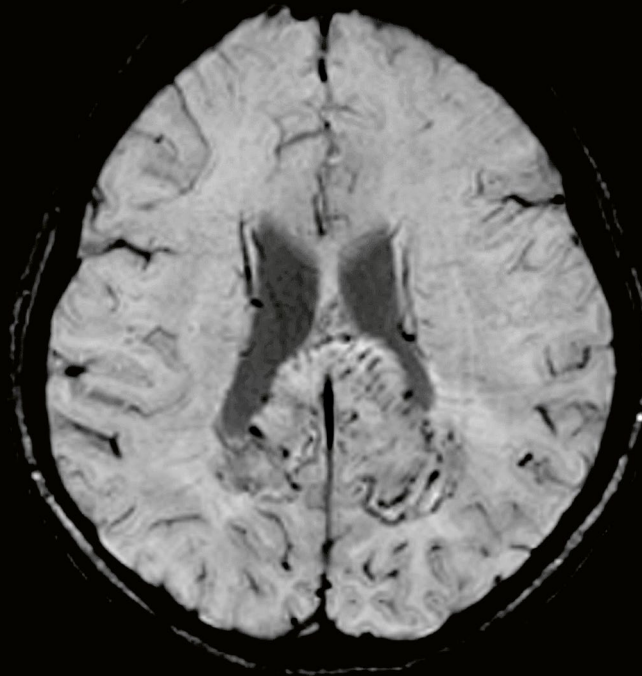
Clinical Mode – Tumor

3D SWI of Glioblastoma

3D SWI minIP provides superior assessment of the microvasculature.

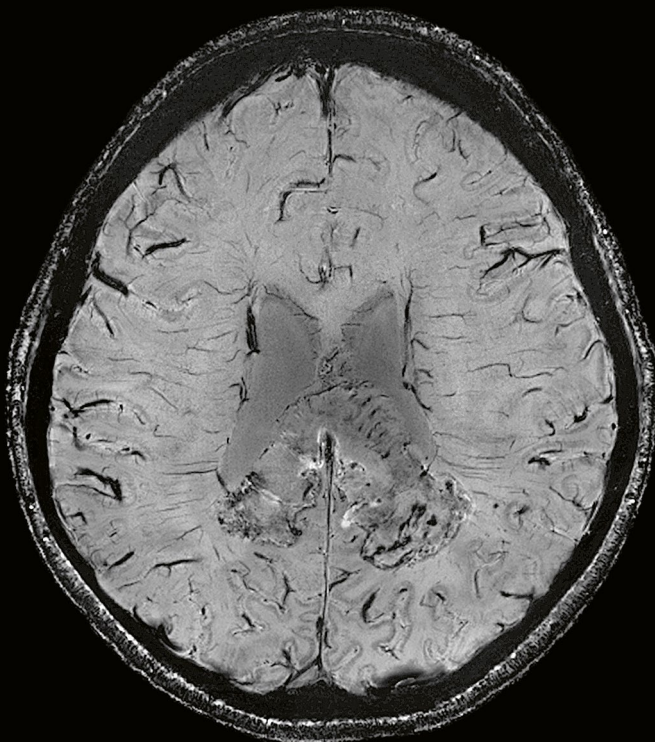
3 Tesla

0.85 x 0.72 x 2 mm³



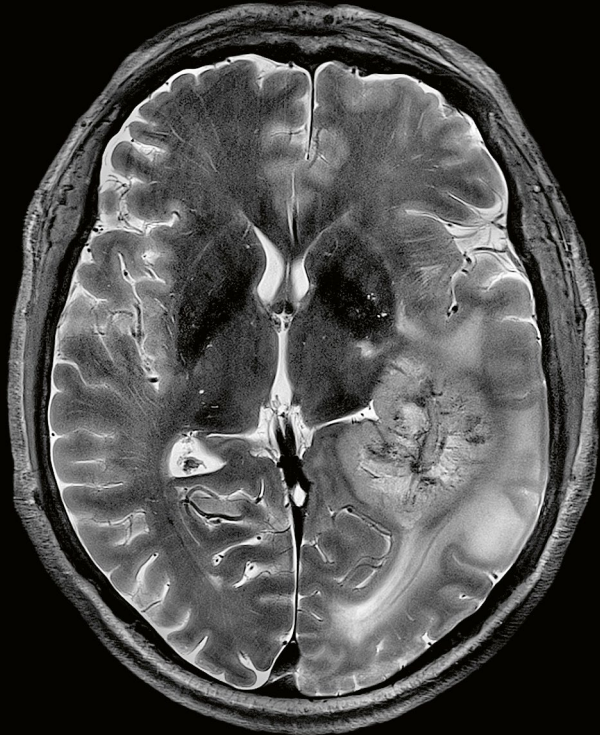
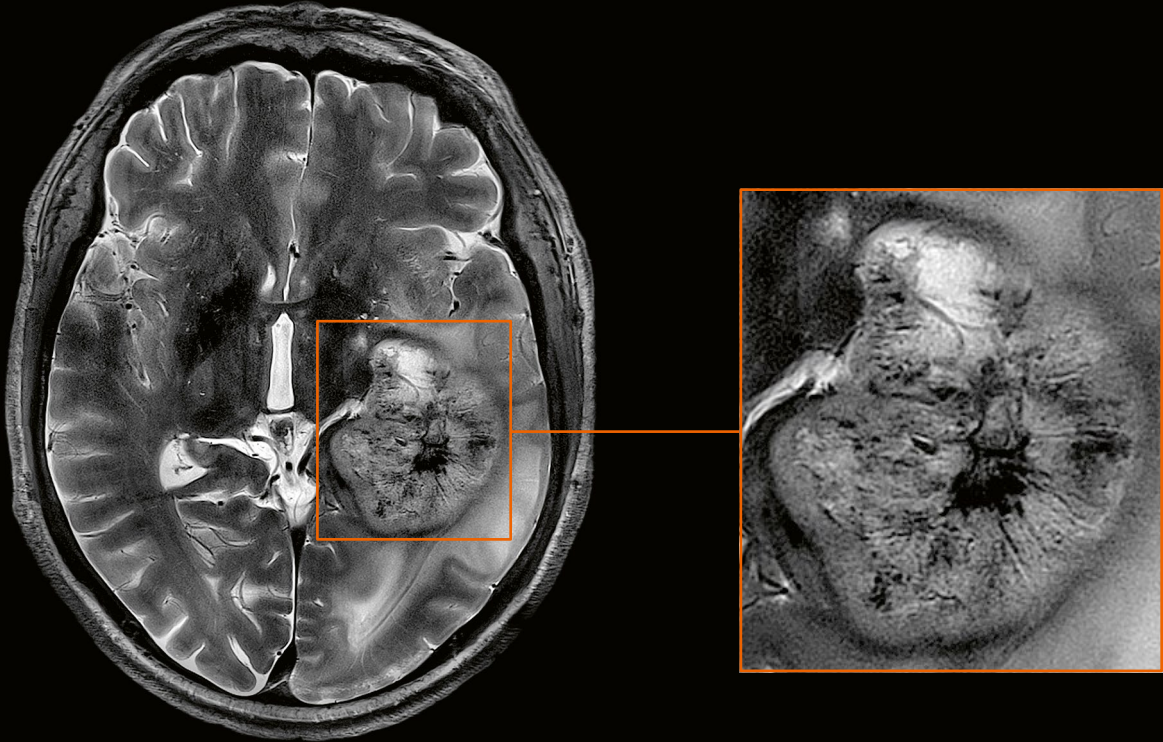
7 Tesla

0.25 x 0.25 x 1 mm³

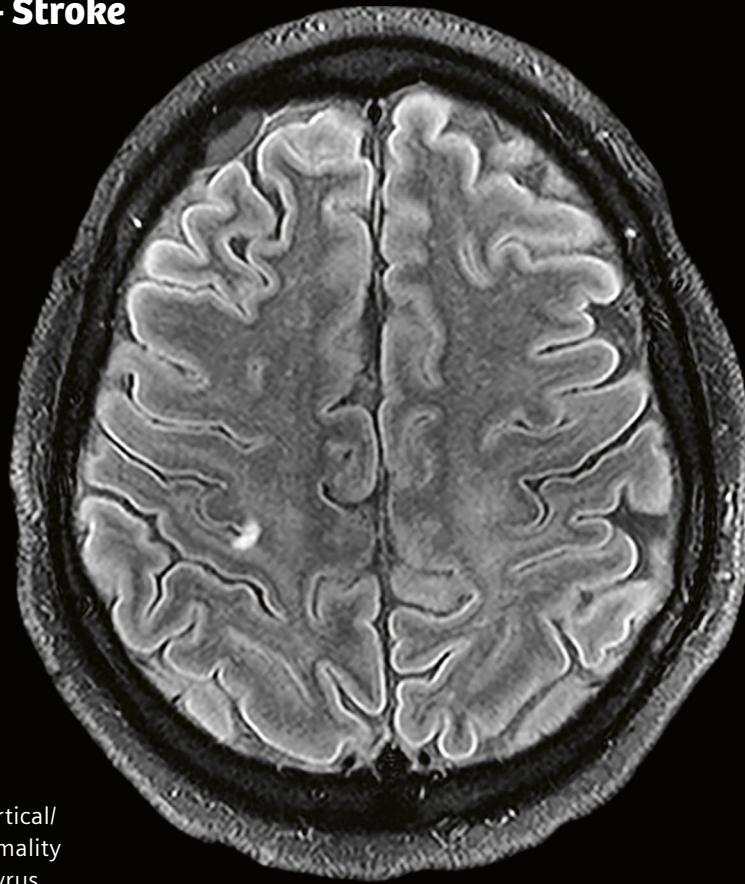


Glioblastoma

Higher SNR for ultra-high 0.2 mm in-plane resolution for imaging tumor vascularization.

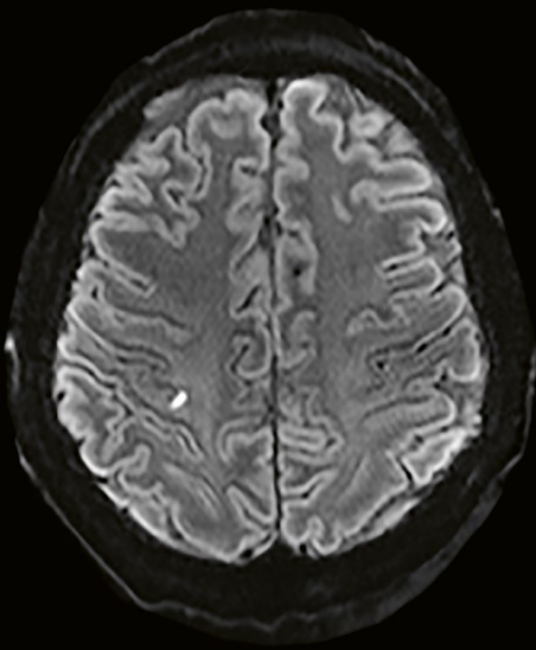


Clinical Mode – Stroke

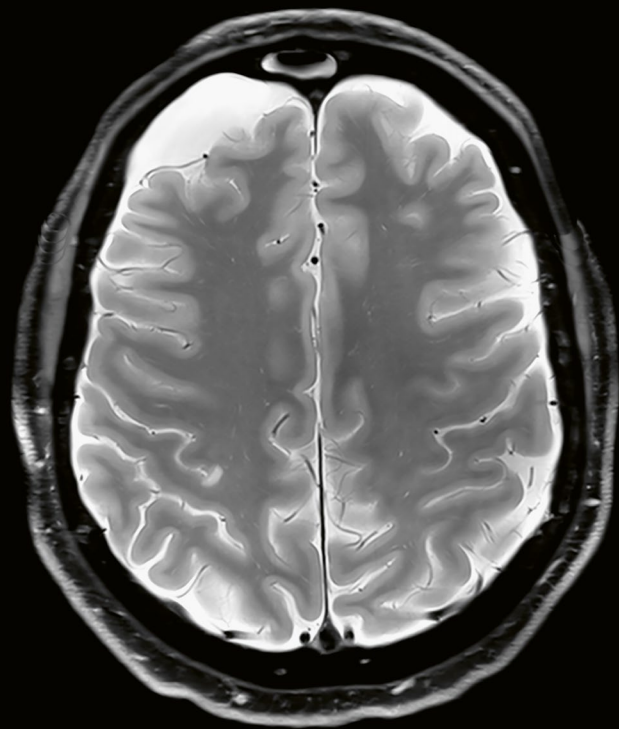


DarkFluid TSE
0.3 x 0.3 x 3 mm³,
5:59 min

Small focus of strong cortical/
subcortical signal abnormality
in the right precentral gyrus.

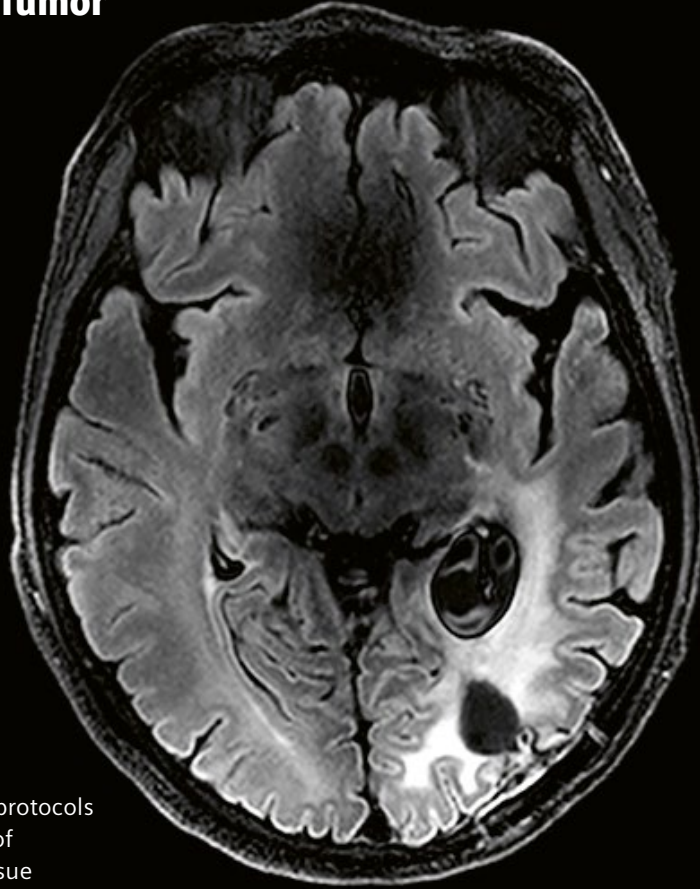


RESOLVE 1 x 1 x 3 mm³, 1:46 min



PD FS TSE 0.2 x 0.2 x 3 mm³, 5:14 min

Clinical Mode – Tumor



DarkFluid TSE
0.4 x 0.4 x 3 mm³,
4:22 min

High resolution standard protocols for detailed visualisation of pathologies, increased tissue contrast and high resolution at 7T.

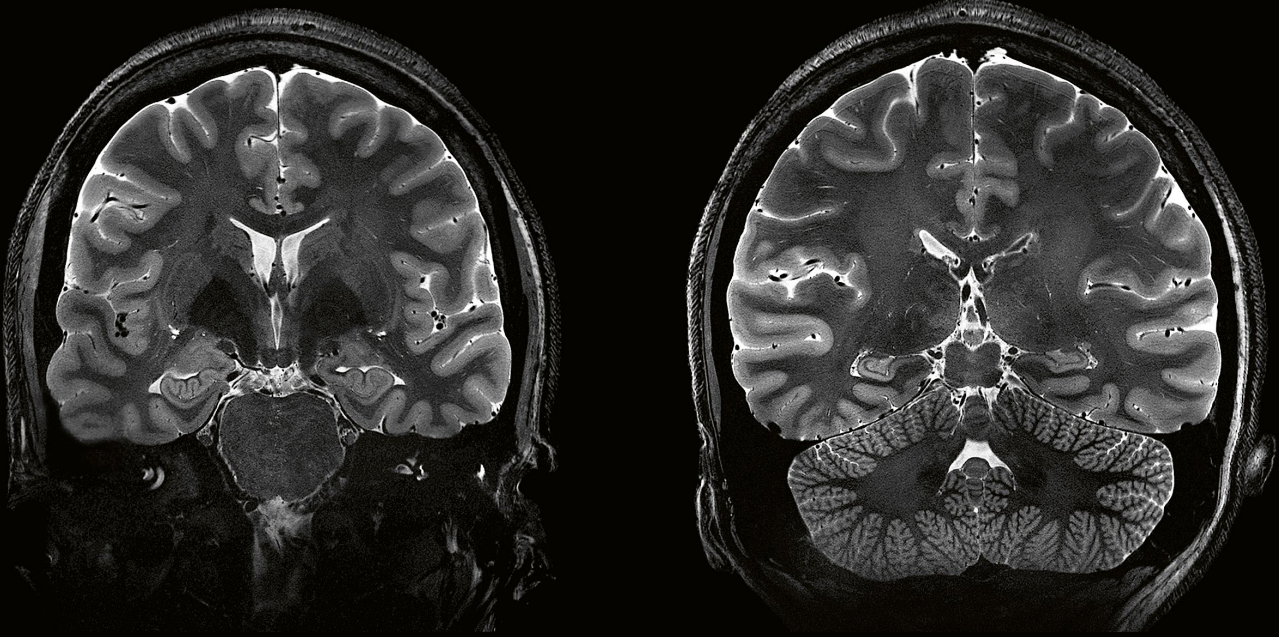


SWI minIP 0.2 x 0.2 x 3 mm³, 5:38 min



T2 TSE 0.2 x 0.2 x 3 mm³, 5:33 min

Clinical Mode – Healthy volunteer



Hippocampus imaging

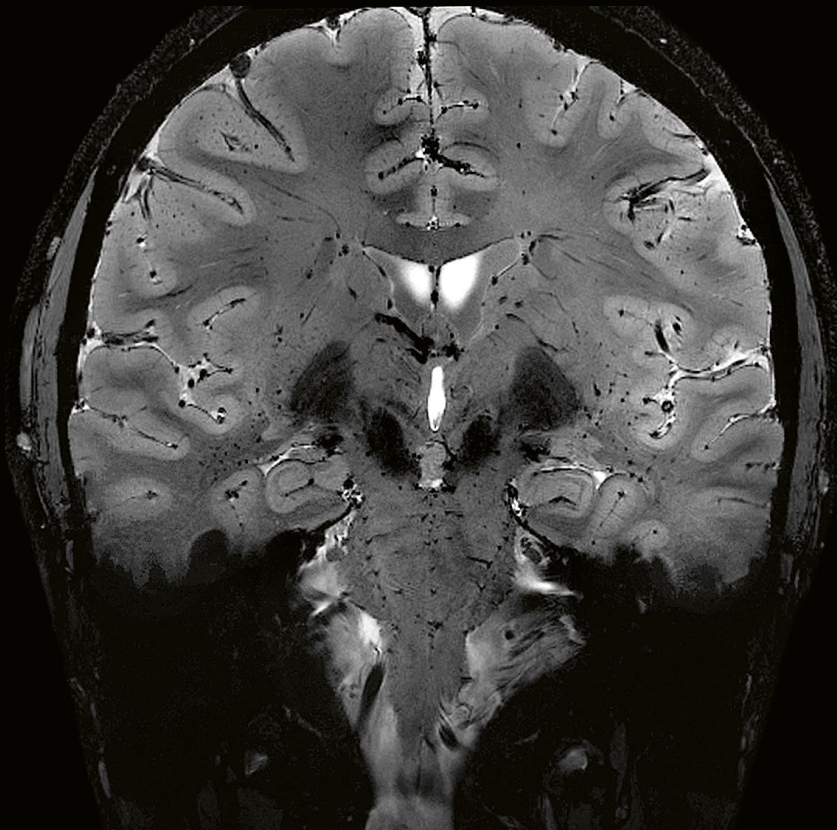
High-resolution imaging of the hippocampus at 0.25 mm in-plane resolution.

Scannexus, Maastricht, Netherlands

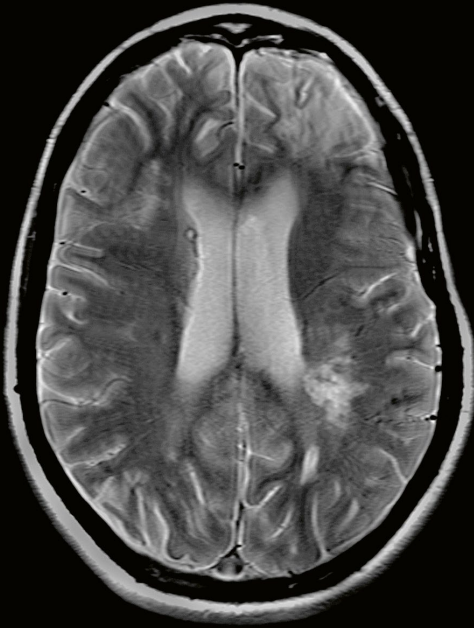
T2* weighted imaging

High-resolution imaging of the brainstem at 0.3 mm in-plane resolution.

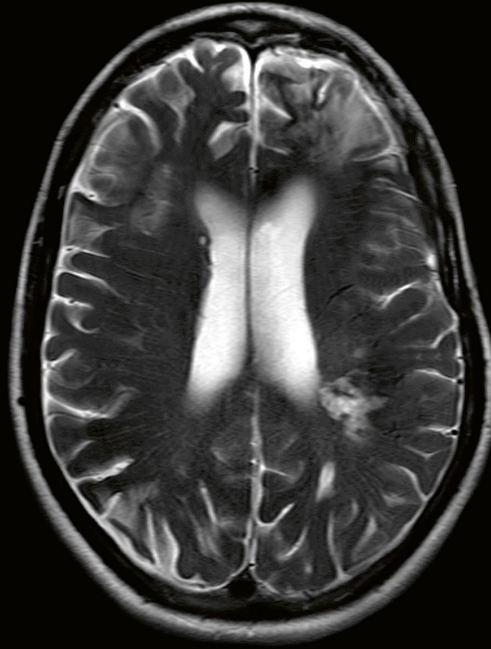
MGH, Boston, USA



Clinical Mode – Diffuse axonal injury



3 Tesla PD TSE, 0.7 x 0.4 x 5 mm³, TA 2:38 min



3 Tesla T2 TSE, 0.7 x 0.4 x 5 mm³, TA 2:38 min



7 Tesla PD PD TSE, 0.2 x 0.5 x 3 mm³, TA 3:09 min

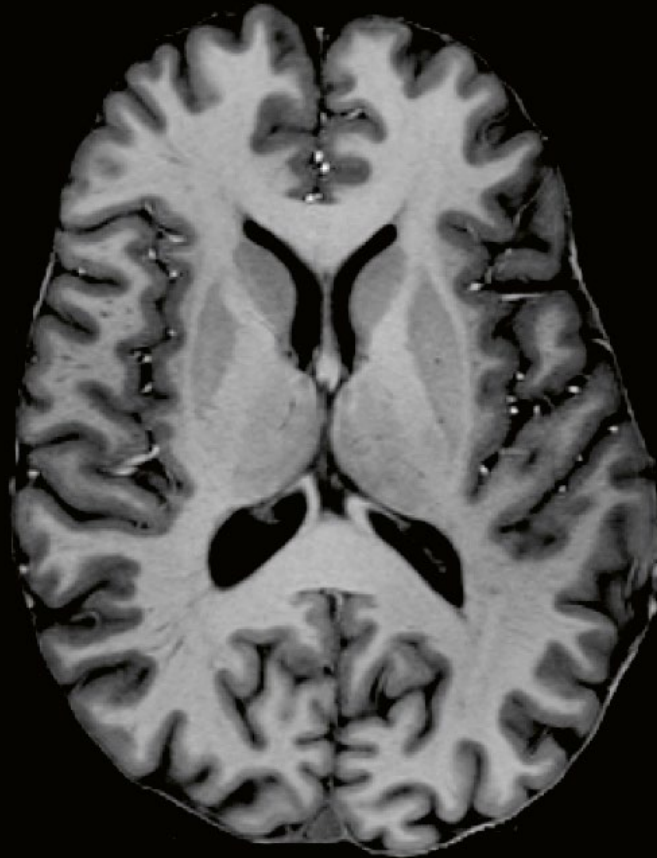


7 Tesla T2 TSE, 0.2 x 0.5 x 3 mm³, TA 3:09 min

Diffuse axonal injury

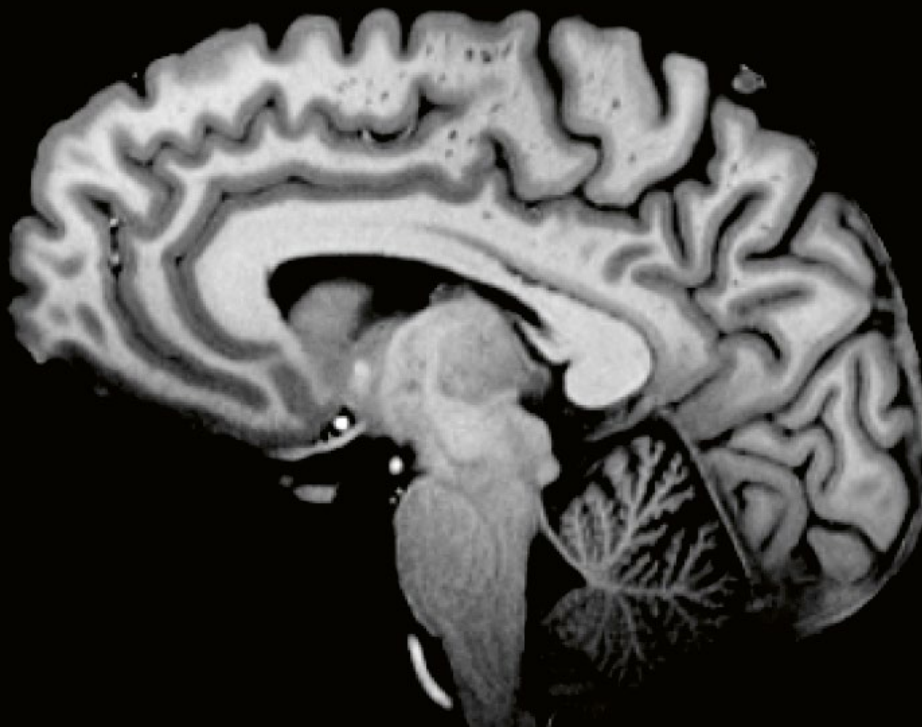
The higher sensitivity at 7T reveals hemosiderin from traumatic brain injury in PD images.

Clinical Mode – Healthy volunteer



Clear identification of anatomical structures with increased tissue contrast and high resolution at 7T.

0.6 x 0.6 x 0.6 mm³, 13:45 min



Clinical Mode – Stroke

Time of Flight (ToF) with 400 micron isotropic resolution reveals smallest vessels in the brain. The higher the signal and the longer the T1 at 7T are, the higher the quality of the Maximum Intensity Projection (MIP) gets.

Coronal



Sagittal



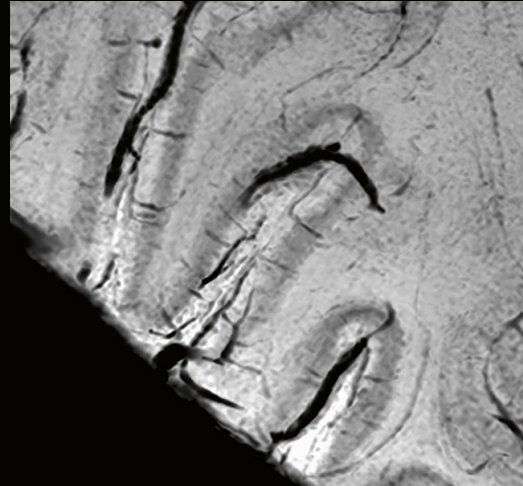
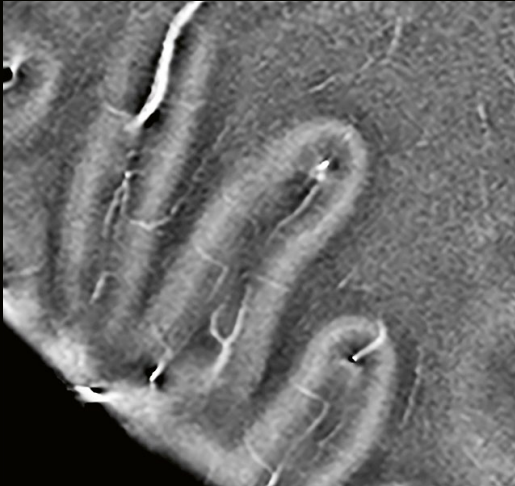
Axial

Visualize smallest vessels with 0.4 mm isotropic resolution.
0.4 x 0.4 x 0.4 mm³, 8:09 min

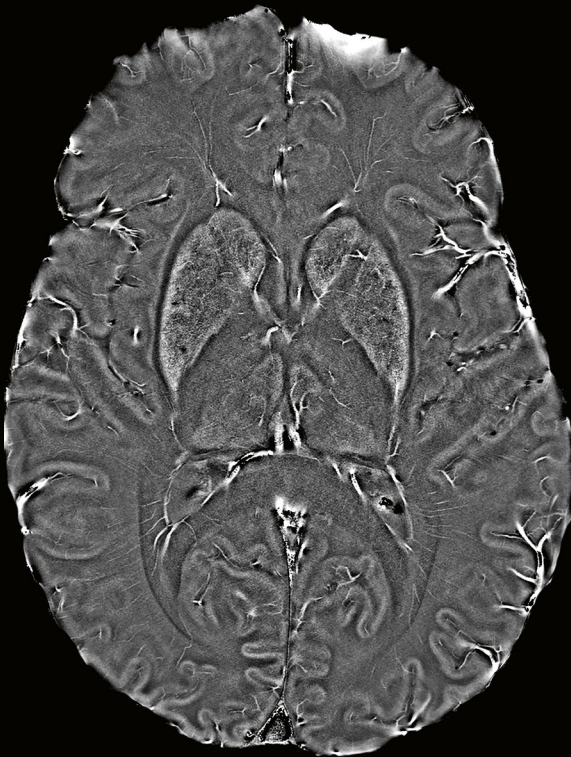


Clinical Mode – Healthy volunteer

Ultra-fine 0.2 mm anatomical resolution can be achieved at 7T with susceptibility weighted imaging (SWI). Enlarged section: At this resolution, previously unseen structures, such as cortical veins, can be visualized.



The basal ganglia Caudate, Putamen and Globus Pallidus can be differentiated.



SWI 0.2 x 0.2 x 1 mm³, 10:59 min

Clinical Mode – Enchondroma

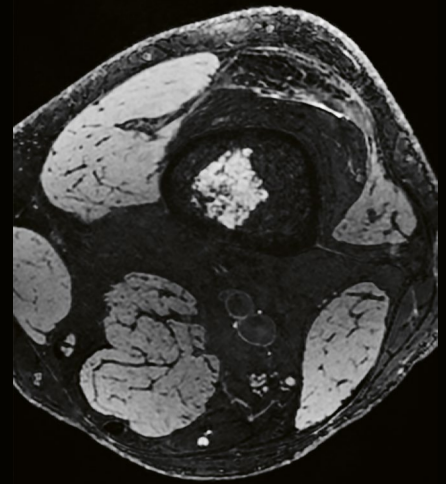
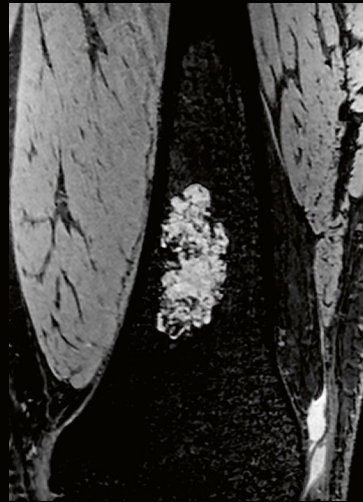
Fine structure visible in the lesion with different contrasts.



PD TSE FS 0.2 x 0.2 x 2.5 mm³, 3:15 min



T2 TSE 0.3 x 0.3 x 2 mm³, 3:24 min



3D DESS 0.5 x 0.5 x 0.5 mm³, 3:43 min

Clinical Mode – Healthy volunteer

Clear delimitation of anatomical structures, such as ligaments, vessels or cartilage.

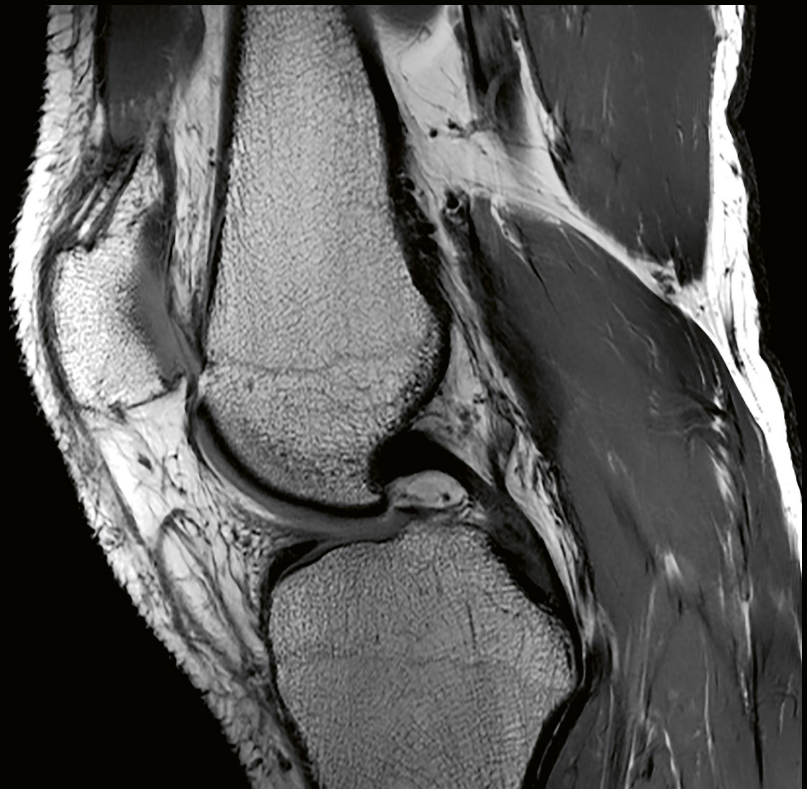
T1 SE

0.2 x 0.2 x 2.5 mm³,
4:05 min

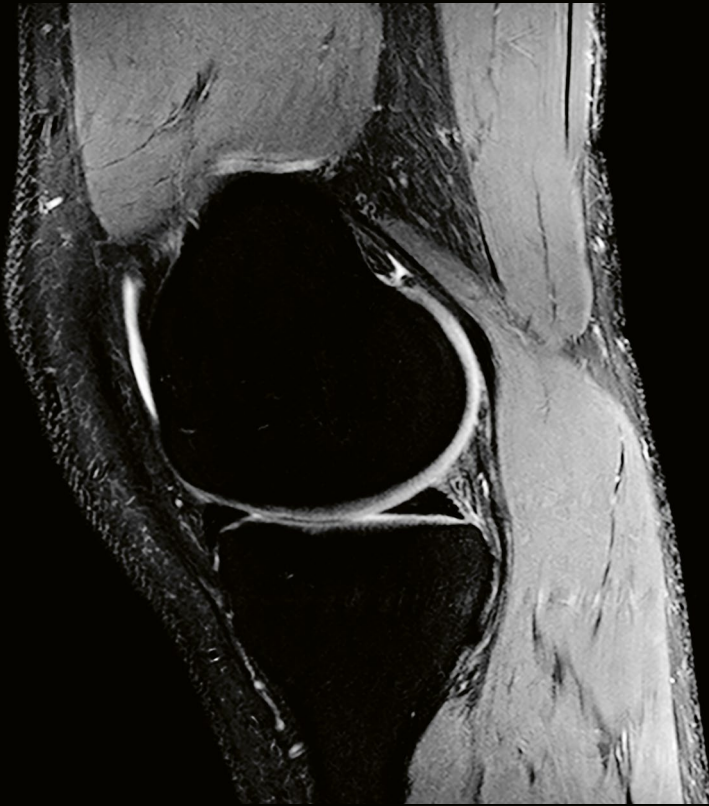


T1 qSE

0.3 x 0.3 x 2.5 mm³,
7:21 min



Clinical Mode – Healthy volunteer



PD qTSE FS
0.2 x 0.2 x 2.5 mm³,
3:15 min

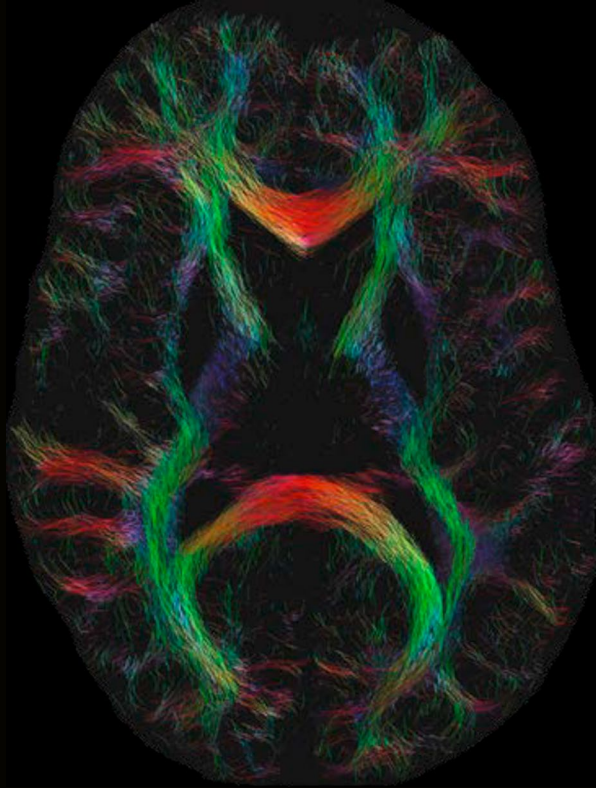


T1 FL3D WE
0.5 x 0.5 x 0.5 mm³,
4:35 min

Clinical Mode – Healthy volunteer

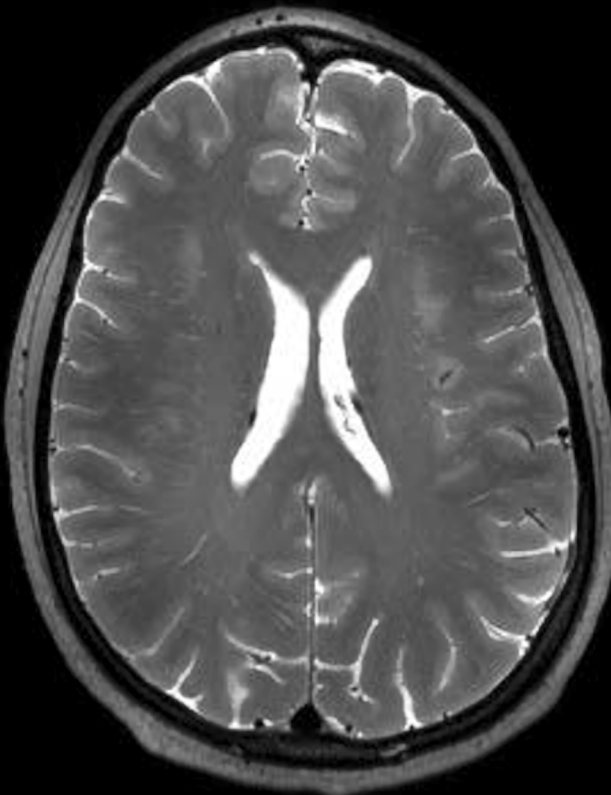
High resolution fiber tracking
with SMS RESOLVE at 7T
and *syngo.via* Frontier¹⁶

1.4 mm isotropic, 29:22 min

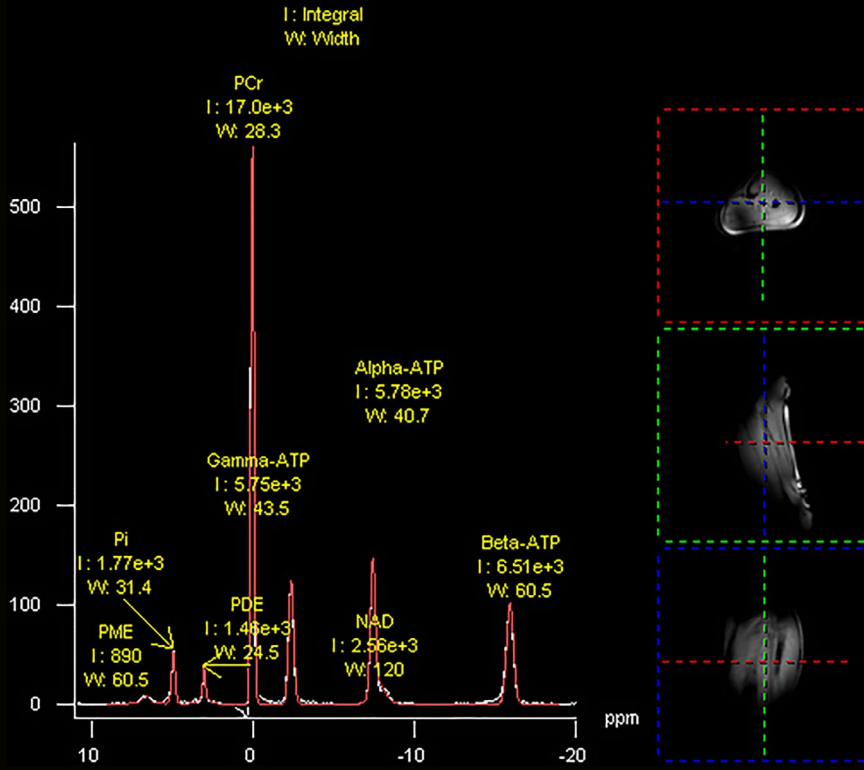


CAIPIRINHA acceleration for
the SPACE pulse sequence at 7T,
acceleration: 3x2

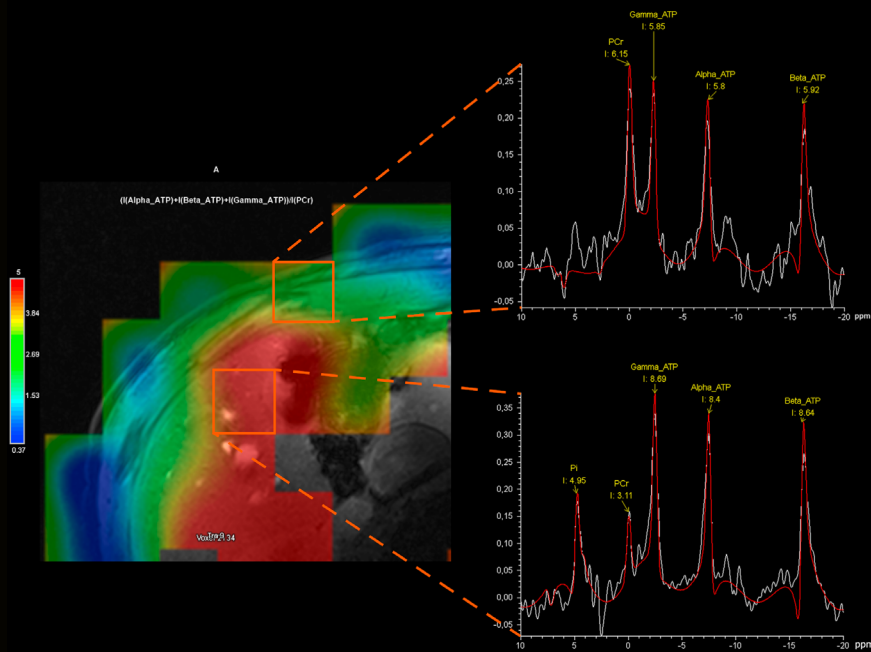
0.7 mm isotropic, 6:52 min



Clinical Mode – Healthy volunteer



³¹P FID of the human calf with NOE enhancement
Non selective 1:42 min

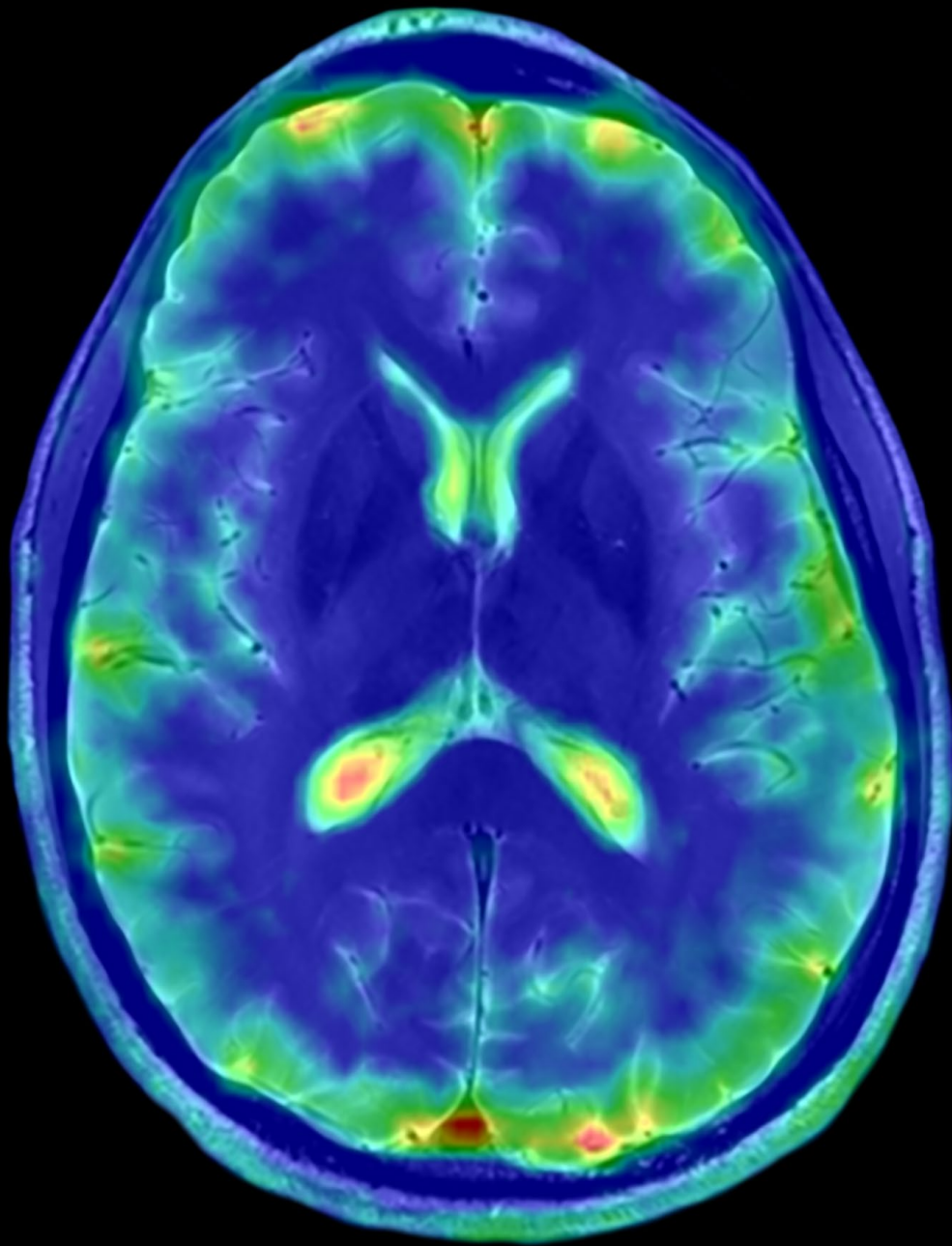


³¹P CSI of the human liver
15 ml voxel volume, 4:42 min

Clinical Mode – Healthy volunteer

Additional metabolic
information with ^{23}Na UTE,
fused with T2 TSE

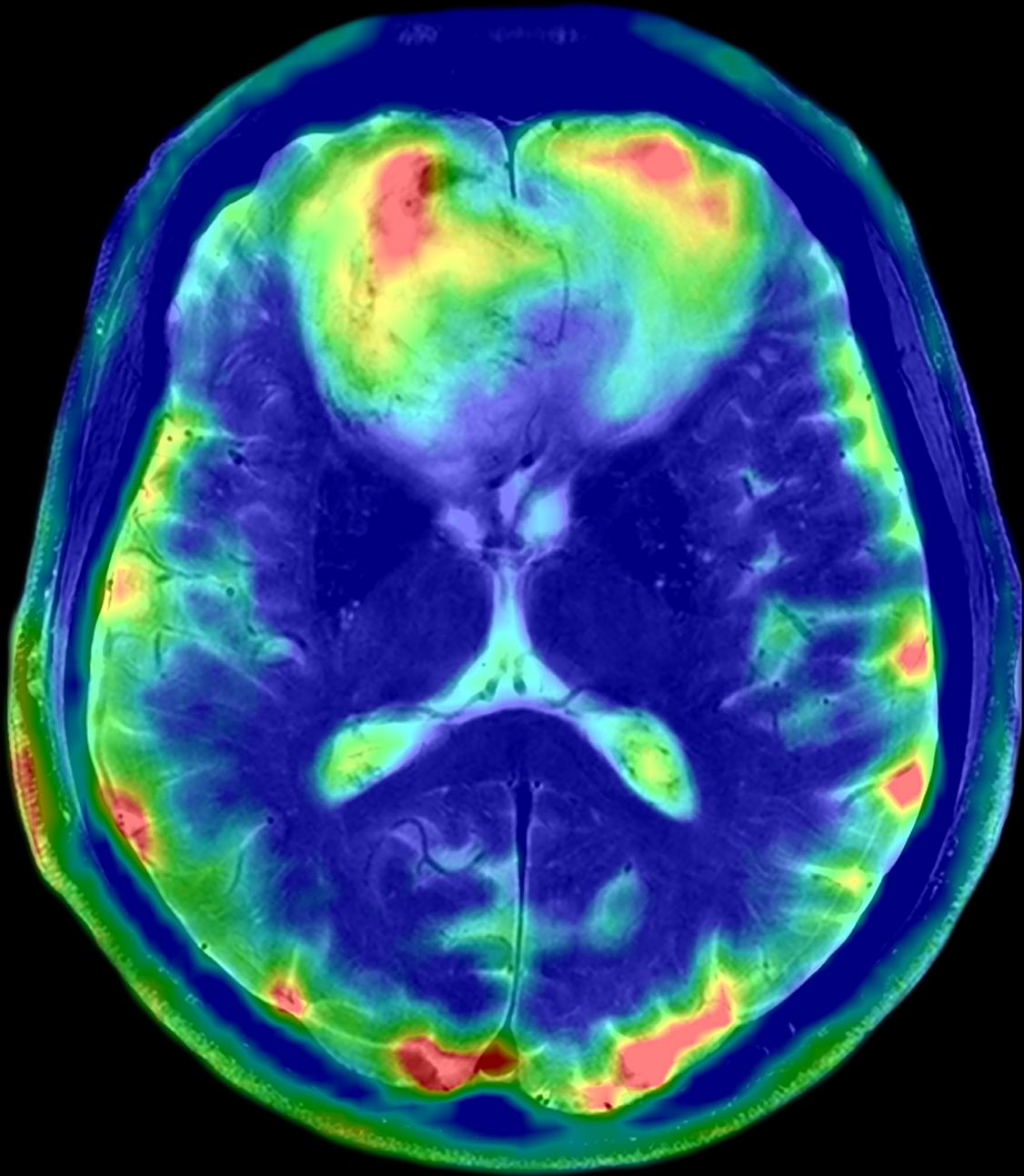
3 mm isotropic, 7:38 min



Clinical Mode – Tumor

Additional metabolic
information with ^{23}Na UTE,
fused with T2 TSE

3 mm isotropic, 7:38 min





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Healthineers

MAGNETOM Terra
A Tim System

Change the game in UHF business

Medical research funding has stagnated in the last decade. Ensuring your high-end MRI endeavors have the right business impact is crucial in today's competitive environment. MAGNETOM Terra is the result of over 25 years of Siemens Healthineers UHF innovations, culminating in the design of a brand-new, volume-produced 7T magnet. The magnet is 50% lighter than previous generations and supports easier integration into clinical environments. MAGNETOM Terra can help you become more competitive, while making a tangible difference to clinical care, research – and your business.

“When you talk to other people in the field, it is clear that Siemens Healthineers has by far the greatest expertise in ultra-high-field imaging.”¹³

Professor Rainer Goebel
University of Maastricht & scannexus,
Maastricht, The Netherlands

Change the game in UHF business with Siemens Healthineers' 50% lighter 7T magnet⁵

Innovative magnet technology

Siemens Healthineers' 7T magnet is a milestone in MR magnet technology. Its unique design and thermally balanced materials minimize physical interactions between core components. The result is 50% lighter than previous generations, with a higher structural stability and a greater fundamental stress capacity. In addition, excellent homogeneity makes for enhanced image quality.

Easy clinical integration

Thanks to the lighter magnet, the scanner can be shipped cold via airfreight. What's more, you benefit from up to 50% faster installation time and ramp-up. Zero Helium boil-off⁶ translates into lower lifecycle costs and an improved eco-footprint. All this has the potential to enhance performance, lower resource consumption, improve sustainability, and reduce operating costs.

Increased competitiveness

MAGNETOM Terra⁸ can help you broaden research funding opportunities, making your institution stand out as a leader in life sciences. By being at the cutting edge of clinical care and research, you have the opportunity to increase competitiveness for grants, benefit from reduced complexity in clinical trials, and open up potential for clinical imaging reimbursements.

Forward-looking technology

An investment in MAGNETOM Terra is an investment in the future. Siemens Healthineers is committed to serving the ultra-high-field community – today and tomorrow – with a host of outstanding innovations. From development and production, to service – all of MAGNETOM Terra's key components are delivered from a single reliable partner you can trust, for maximum peace of mind.

*"We are extremely proud at Siemens Magnet Technology to have developed the 7T magnet at the heart of the MAGNETOM Terra. Once again our expert design and process teams have demonstrated how their innovative thinking has led to a product that has pushed forward the boundaries of magnet technology. It is wonderful to see how seamlessly the manufacture of this flagship product has already been integrated into our award winning facility."*¹³

Ralph Seidler
Managing Director,
Siemens Magnet Technology

- **1980**
The world's first superconducting whole-body MRI
- **1989**
The world's first 1.5T active-shielded magnet
- **1994**
The world's first open MRI magnet
- **1997**
The world's first 3T active-shielded magnet
- **2003**
The world's first Zero Helium boil-off magnet
(*MAGNETOM Avanto*)
- **2004**
The world's first open-bore (70cm) 1.5T magnet
(*MAGNETOM Espree*)
- **2008**
The world's first open-bore (70cm) 3T magnet
(*MAGNETOM Verio*)
- **2010**
The world's first PET-compatible magnet
(*Biograph mMR*)

- Best Factory Awards for Siemens Magnet Technology, Oxford
(*Process and Design*)
(*MAGNETOM Espree*)
- **2012**
Best Factory Awards for Siemens Magnet Technology, Oxford
(*Best Engineering Plant, Supply Chain Award & Innovation Award*)
- **2015**
The world's first cold-shipped 7T magnet, 50% lighter
(*MAGNETOM Terra*)
(*BEST Factory Award overall winner*)
- **2017**
First cold air shipped 7T magnet

Proven innovations in the development and production of magnet technology

Award-winning development and production

Siemens Magnet Technology in Oxford, UK, has received seven Best Factory Awards and seven Queen's Awards for Enterprise in multiple categories, including for processes and design. The facility deploys leading-edge supply chain management methods, and prides itself on reliable, robust production and the highest standards of quality.



April 2015 – Installation of Siemens Healthineers' first 7T magnet

During the 30 years that we have been producing 1.5T and 3T magnets, we have gained extensive engineering skills and well-founded process expertise. This knowledge and experience has led to the development and production of our own 7T magnet.





Unlock research beyond clinical limits

When it comes to research, the freedom to push the boundaries is imperative for gaining a competitive edge. For neuroscience and clinical research applications, MAGNETOM Terra delivers ultra-high SNR and up to 16-channel pTX² for imaging challenging body regions. In addition, it has up to 64 receive channels³ for higher acceleration factors⁴ and 80/200 gradients for maximum flexibility, as well as a broadband RFPA for the multinuclear option. Moreover, this powerful, reliable scanner supports basic research by helping you develop groundbreaking technologies, set new trends and translate your outcomes into clinical routine.

“The increased spatial resolution offered by 7T MRI enables us to study fine-grained activation patterns within cortical areas and investigate detailed functional topography of the cerebral cortex in individual human subjects. This will provide us with a deeper understanding of the human brain and its connectomics in healthy and diseased populations.”¹³

Professor Kamil Ugurbil

Director of the Center for Magnetic Resonance Research (CMRR),
Minneapolis, Minnesota, USA

Unlock research beyond clinical limits with 16-channel parallel transmit²

Enhanced images with pTX²

Image quality and speed are key, but inhomogeneities may present challenges, for example, in body MRI. MAGNETOM Terra's pTX technology with up to 16 channels helps you overcome these issues and generate images of excellent quality. This particularly promising technology has the potential to support your own hardware developments.

More power for your research

MAGNETOM Terra offers a host of cutting-edge research functionalities, providing access to works in progress packages² and powerful hardware configurations. 80/200 gradients and up to 64 receive channels deliver enhanced capabilities for your studies. What's more, the scanner gives you the freedom to explore and develop new clinical applications only possible at ultra-high-field strengths.

Ultra-high resolution spectroscopy²

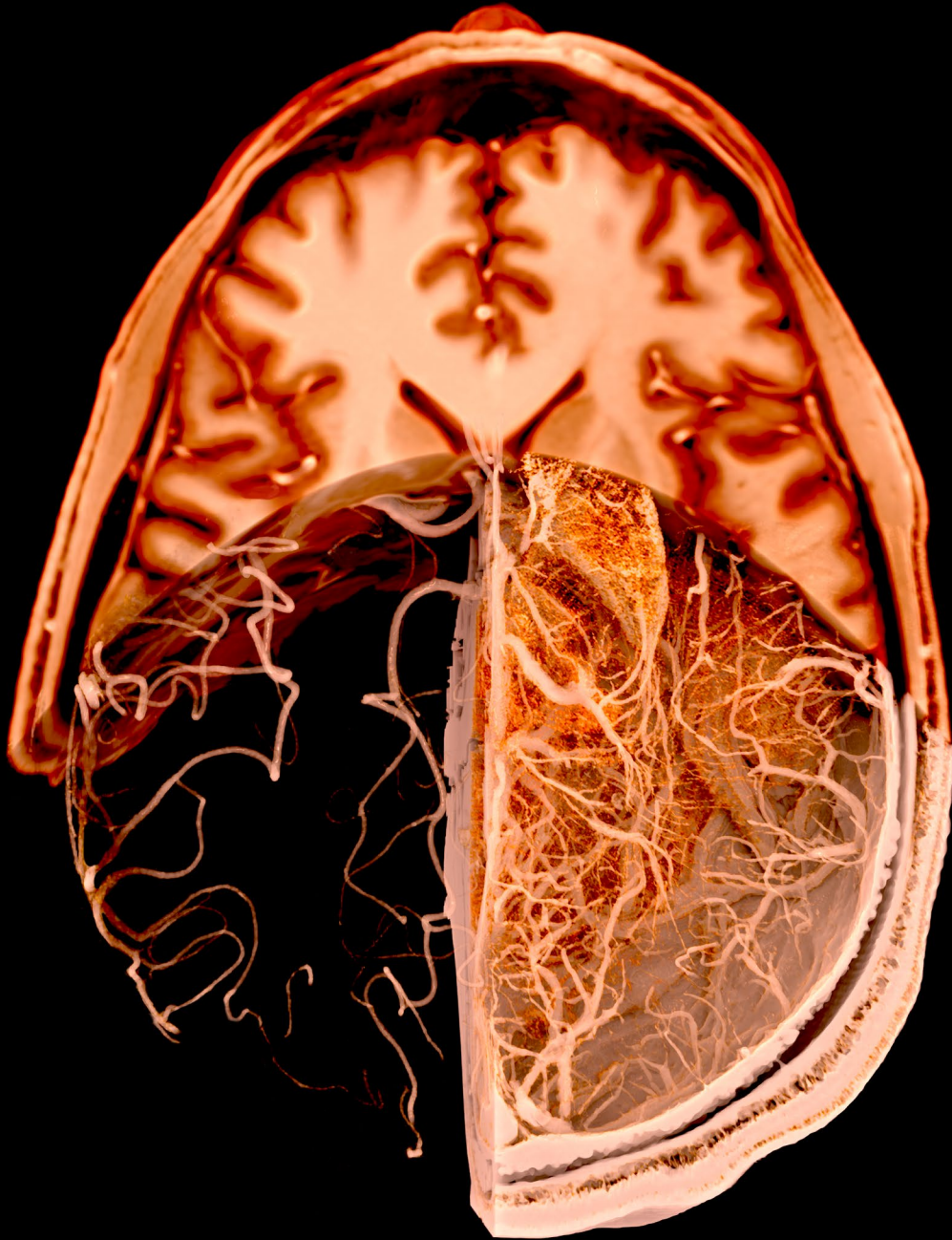
Proton magnetic resonance spectroscopy at 7T not only delivers metabolic information, but also gives accurate anatomical insight. Ultra-high 0.14 cm³ resolution⁸ has the potential to reveal valuable new diagnostic information for clinical applications – including patients with tumors, epilepsy, multiple sclerosis or other neurodegenerative diseases.

Open platform architecture²

MAGNETOM Terra provides a flexible, fertile ground for your own UHF hardware and software developments. For example, Siemens Healthineers collaboration partners benefit from technical support and direct access to the sequence, the Image Calculation Environment (ICE), and imaging protocols.

Discover a world beyond anatomy

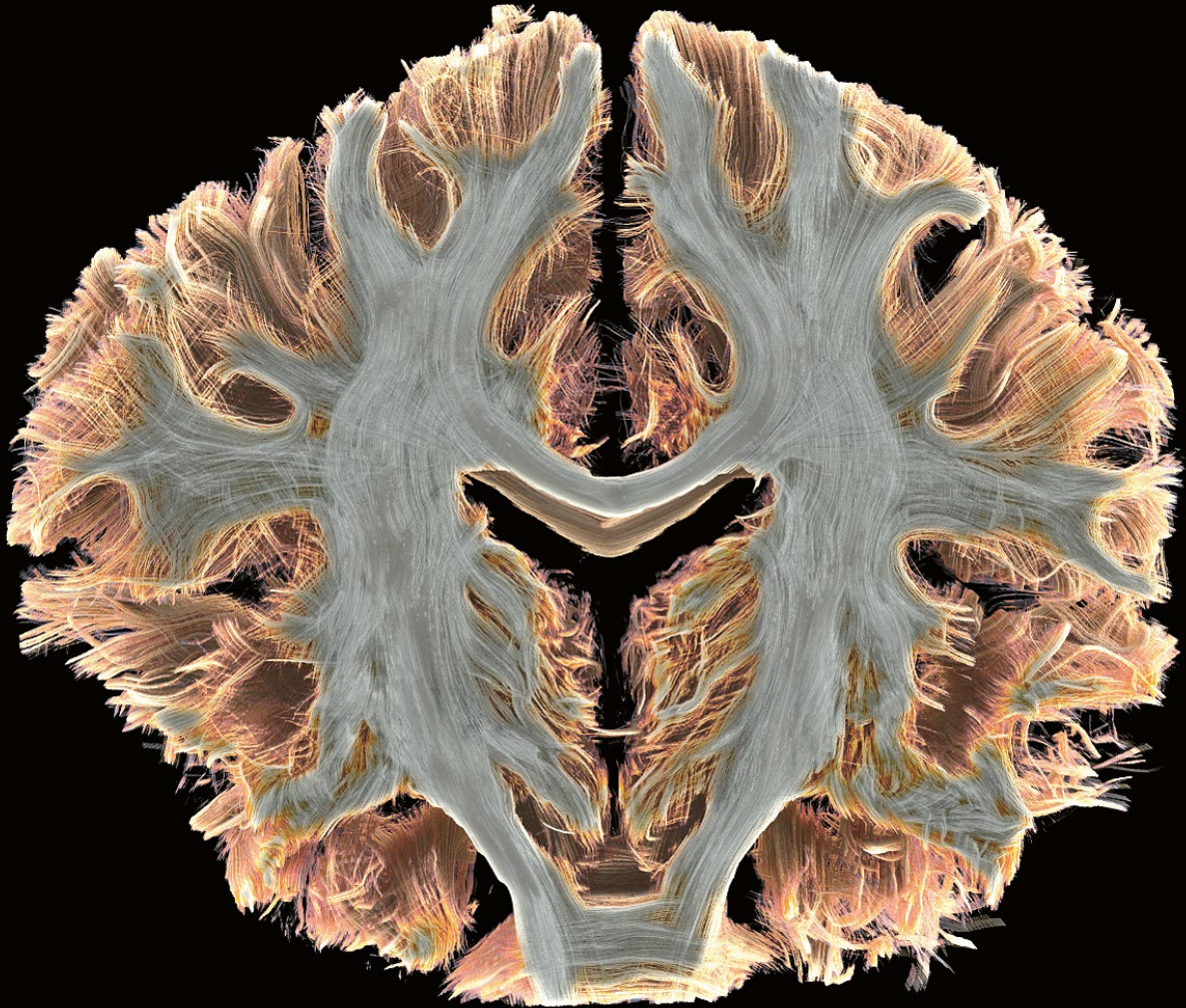
The broadband RFPA enables the acquisition of spectra and images with up to 10 nuclei². While ²³Na and ³⁵Cl imaging can give insights to salt balance, ³¹P spectroscopy can shed a light on energy metabolism¹⁰. Use this additional layer of information to dive into a world of metabolic imaging with MAGNETOM Terra.





Transparent fibers

Tracks calculated with spherical deconvolution based on diffusion-weighted EPI acquisitions with 1 mm isotropic resolution covering the whole brain. The high SNR provided by 7T allows resolving crossing fibers in many brain sub-regions.



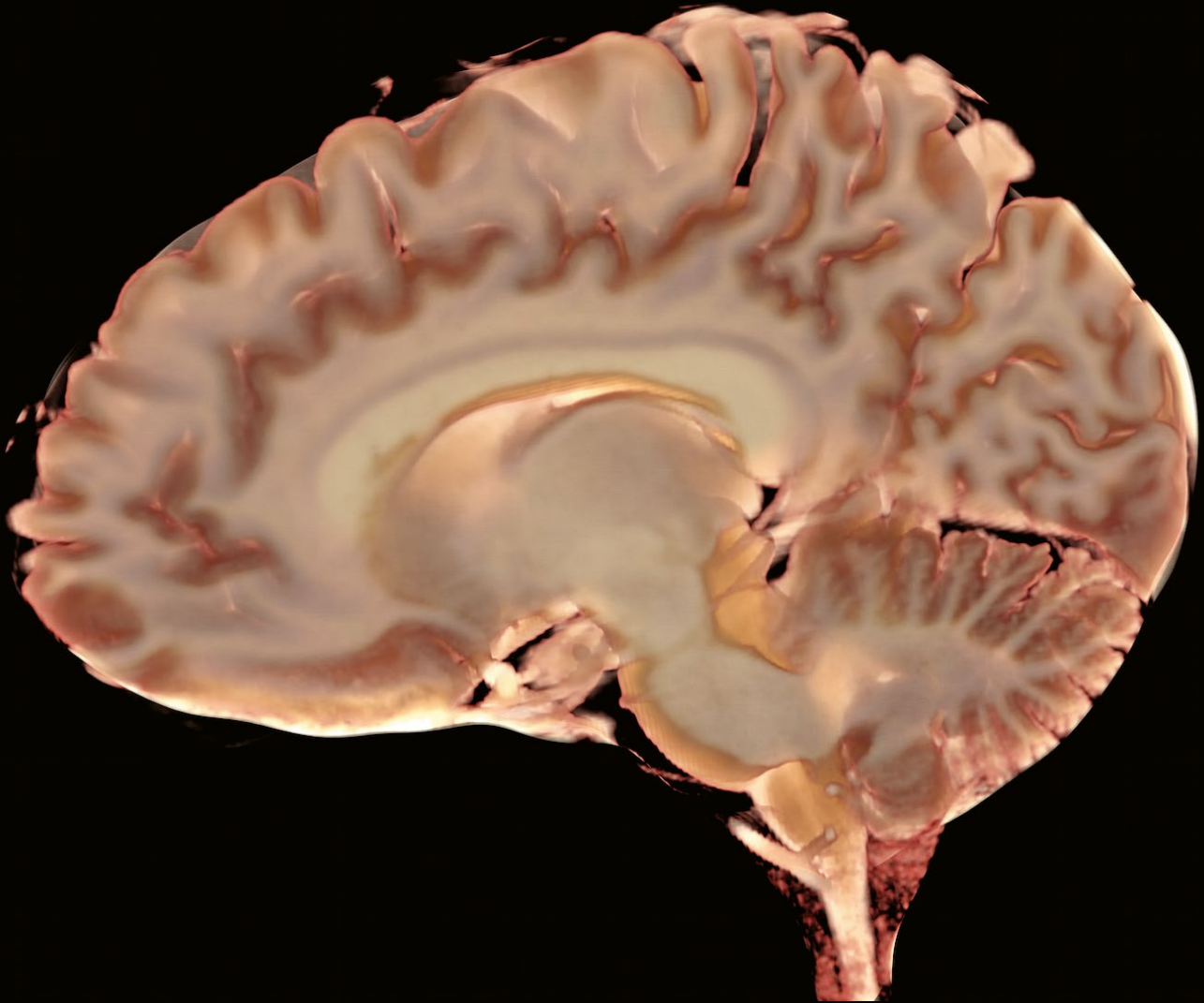
In-vivo histology

syngo.via Frontier¹⁶, the research extension of *syngo.via*, helps bridge the gap in post-processing translational research. Cinematic rendered images based on MR data sets may be used for patient counseling, surgery planning, or teaching purposes.¹⁷



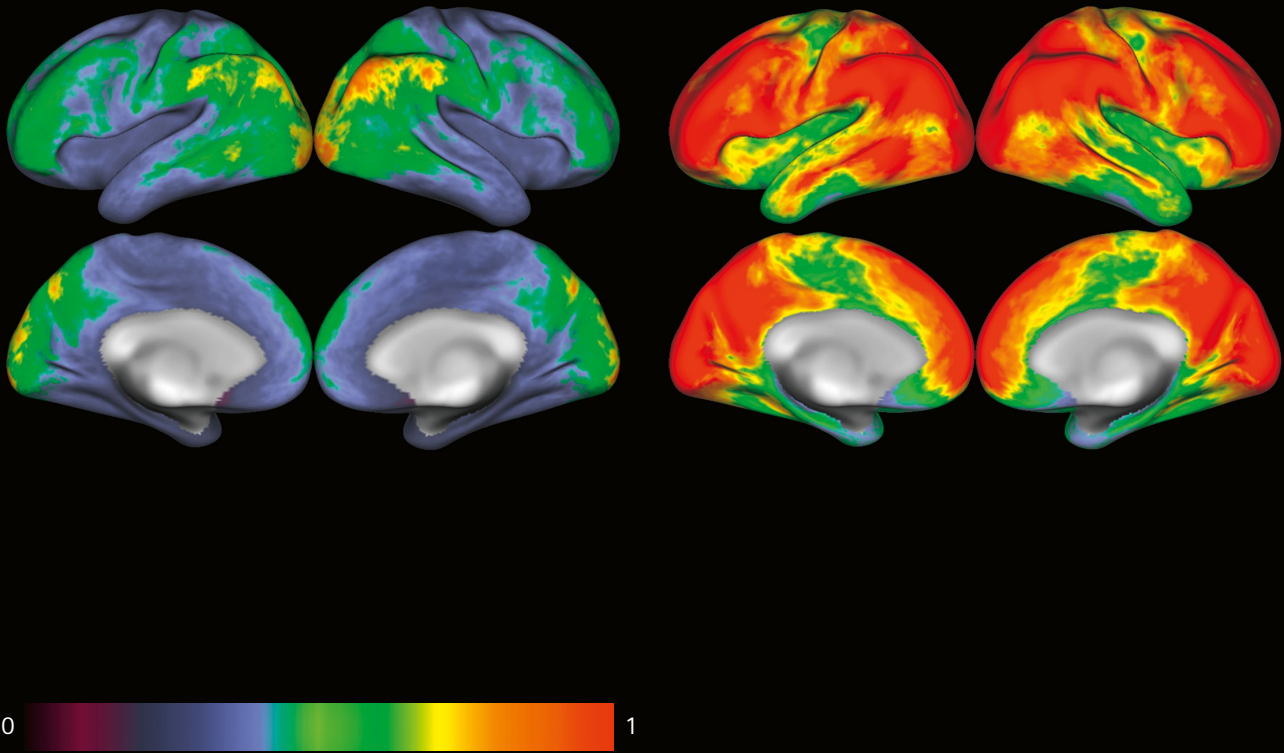
Transparent fibers

Tracks calculated with spherical deconvolution based on diffusion-weighted EPI acquisitions with 1 mm isotropic resolution covering the whole brain. The high SNR provided by 7T allows resolving crossing fibers in many brain sub-regions.



In-vivo histology

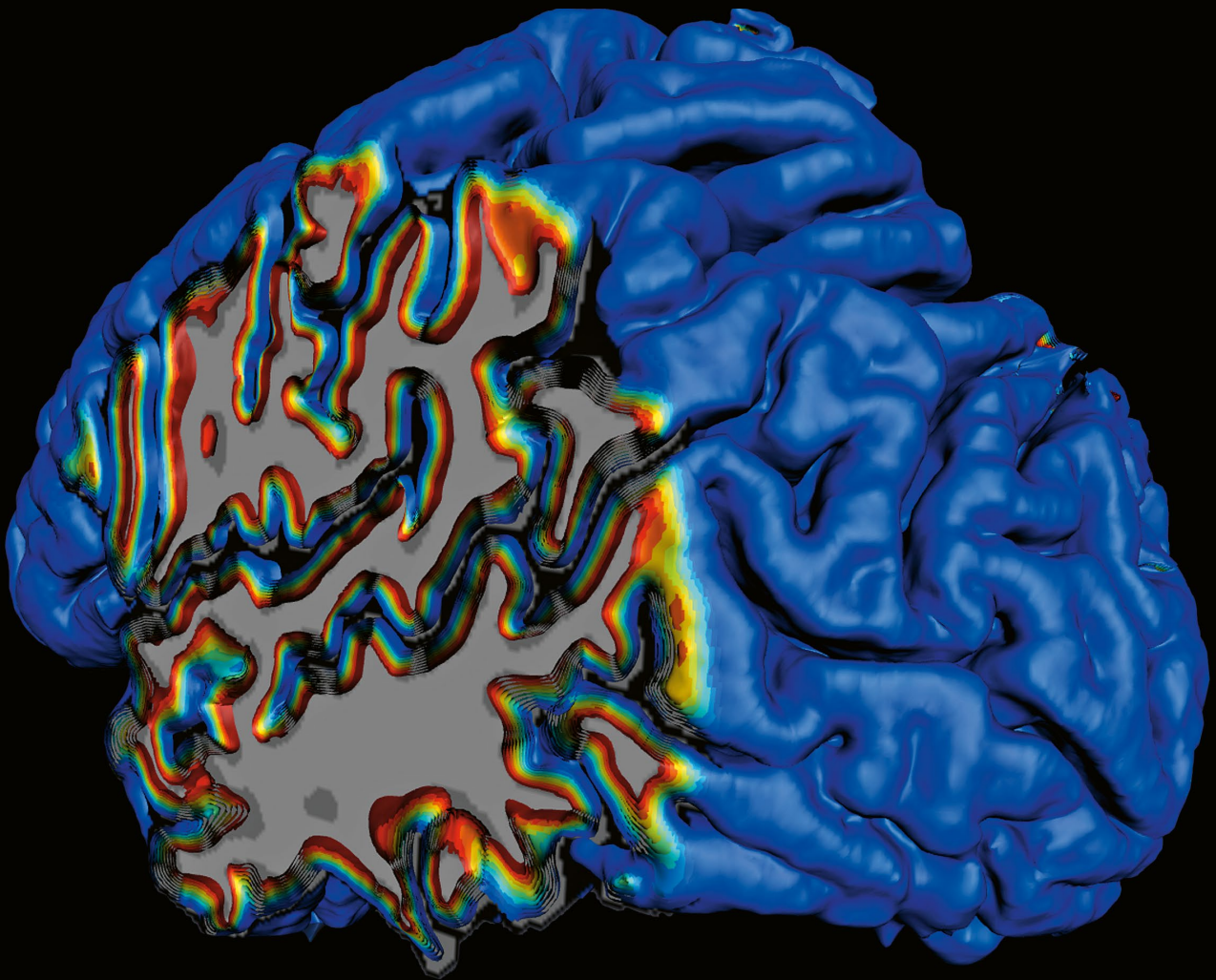
syngo.via Frontier¹⁶, the research extension of *syngo.via*, helps bridge the gap in post-processing translational research. Cinematic rendered images based on MR data sets may be used for patient counseling, surgery planning, or teaching purposes.¹⁷



Functional MRI

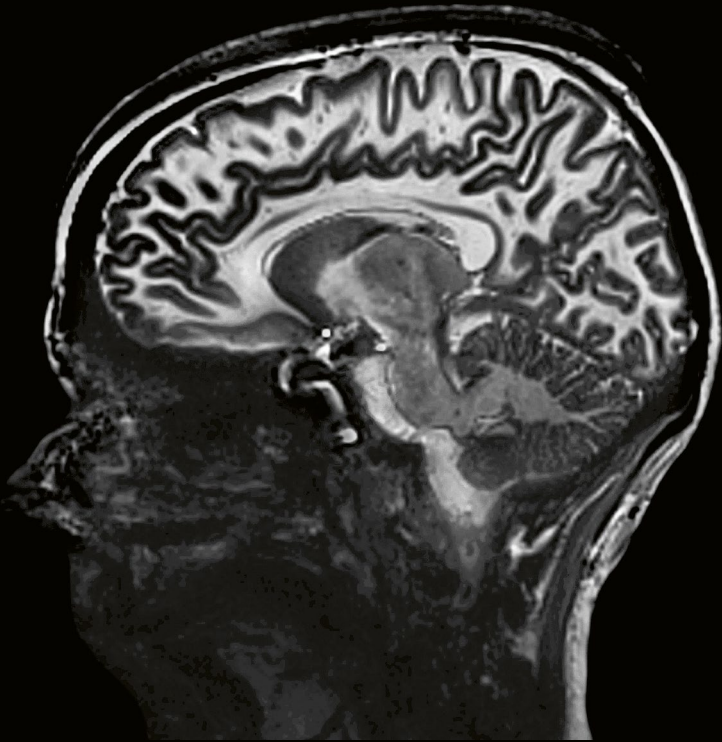
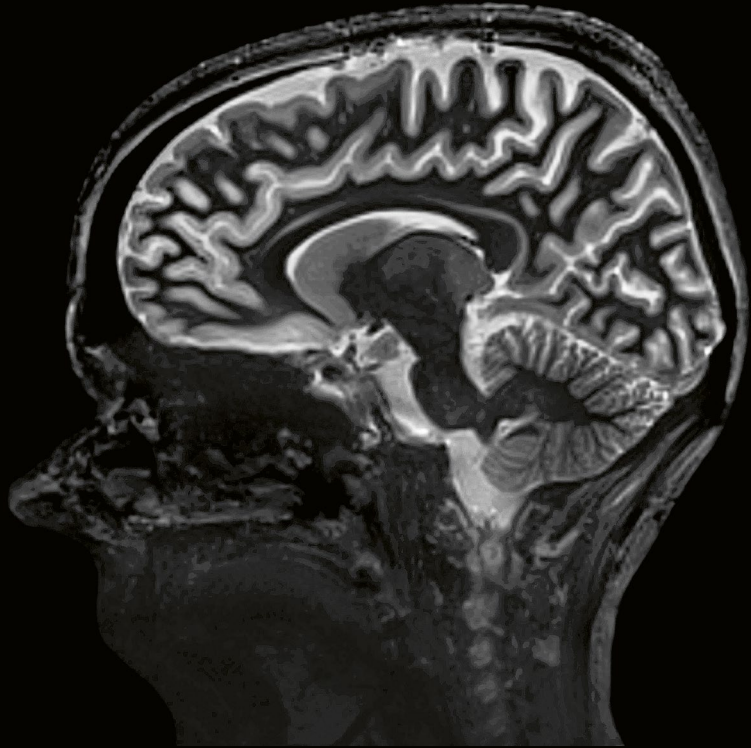
Contrast-to-noise ratio maps in resting state fMRI.

*Consortium The Human Connectome Project.
CMRR, Minnesota, USA
Washington University St.Louis, USA
Oxford University, UK*



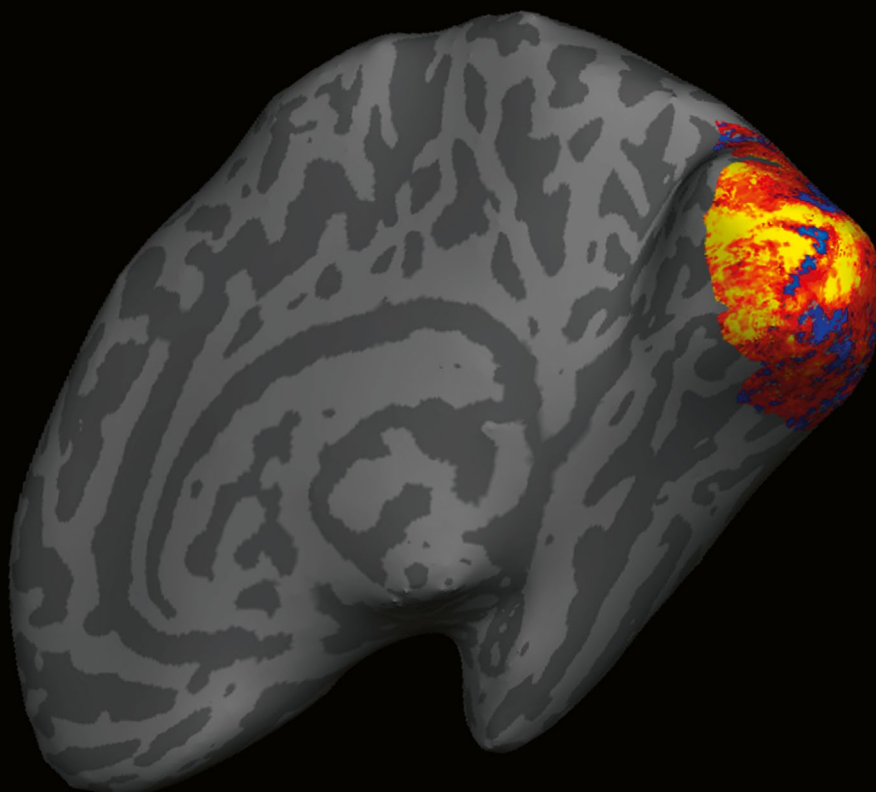
Depiction of cortical layers

Post-processed high-resolution anatomical MR data reveals reconstructed surfaces at different cortical depth levels. The inner red surface runs along the white/gray matter boundary. The outer blue surface runs along the outer (pial) boundary of the cortex.



Tissue segmentation

Delineation of subcortical nuclei in the thalamus and brainstem at 1 mm isotropic resolution. White matter nulled MPRAGE (top TA 8:52 min) and gray matter nulled MPRAGE (bottom TA 10:38 min).

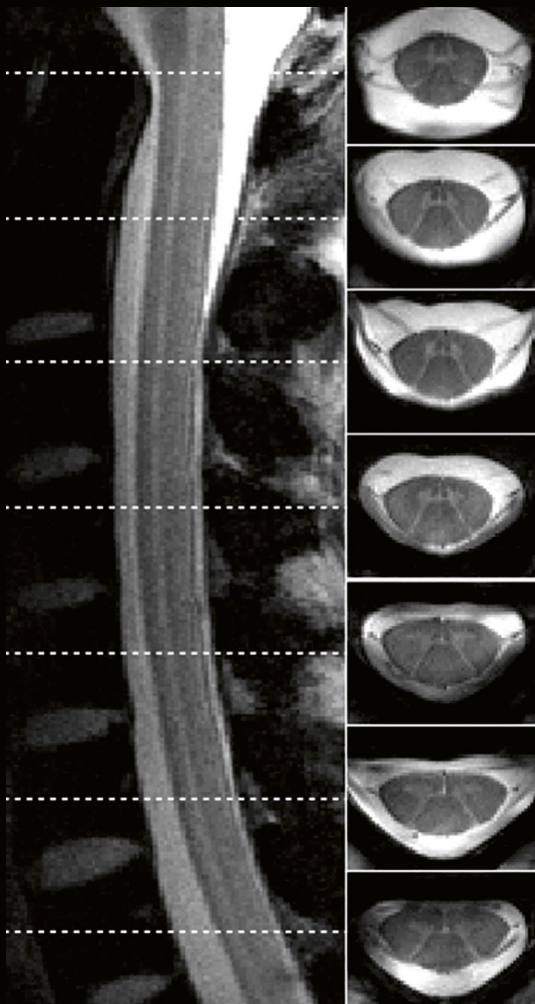


High-resolution fMRI

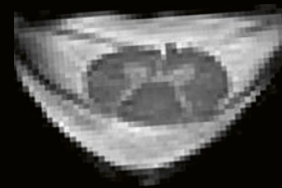
Cortical-layer-specific activation with fMRI at 1 mm isotropic resolution, inflated view. The fMRI visual stimulus was designed to activate a pattern in the shape of the number “7” using the known retinotopic mapping in the human visual cortex.

“Siemens Healthineers provides the best possible open hardware and software environment to explore these new transmit and receive concepts, all of which have proved essential to allow ultra-high fields to fulfill their potential for the benefit of human health.”¹³

Professor Lawrence L. Wald, Director
MGH NMR Core at Martinos Center, Department of Radiology,
Boston, Massachusetts, USA



3 Tesla
0.5 mm in-plane



7 Tesla
0.5 mm in-plane

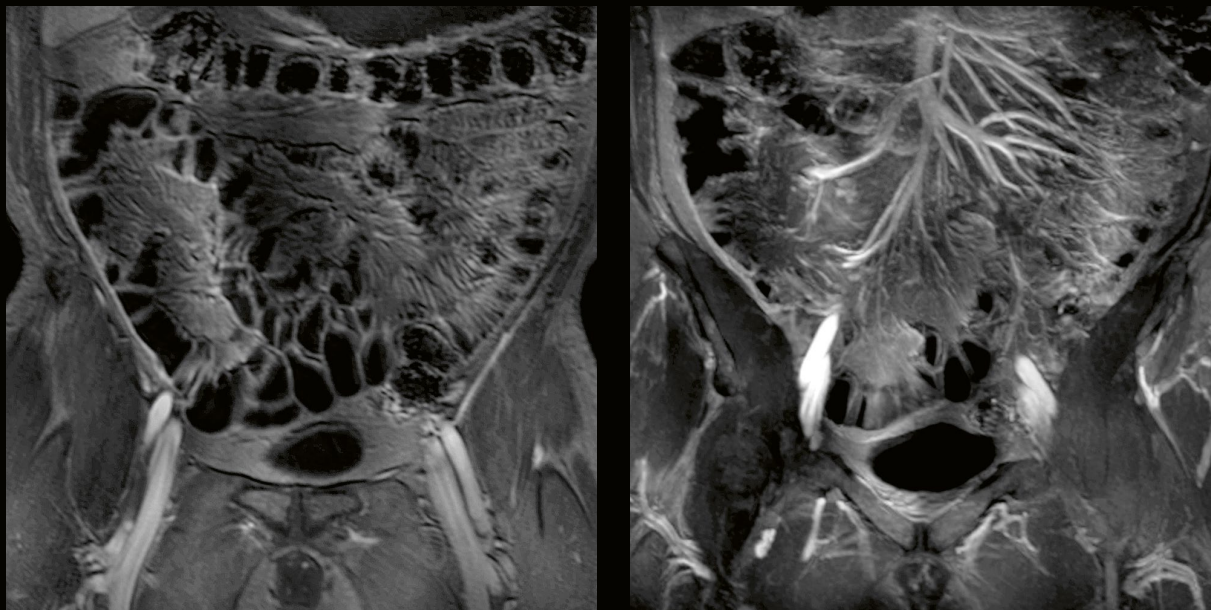


7 Tesla
0.3 mm in-plane

Spine imaging

Ultra-high resolution of the cervical spine using a custom-built spine coil.

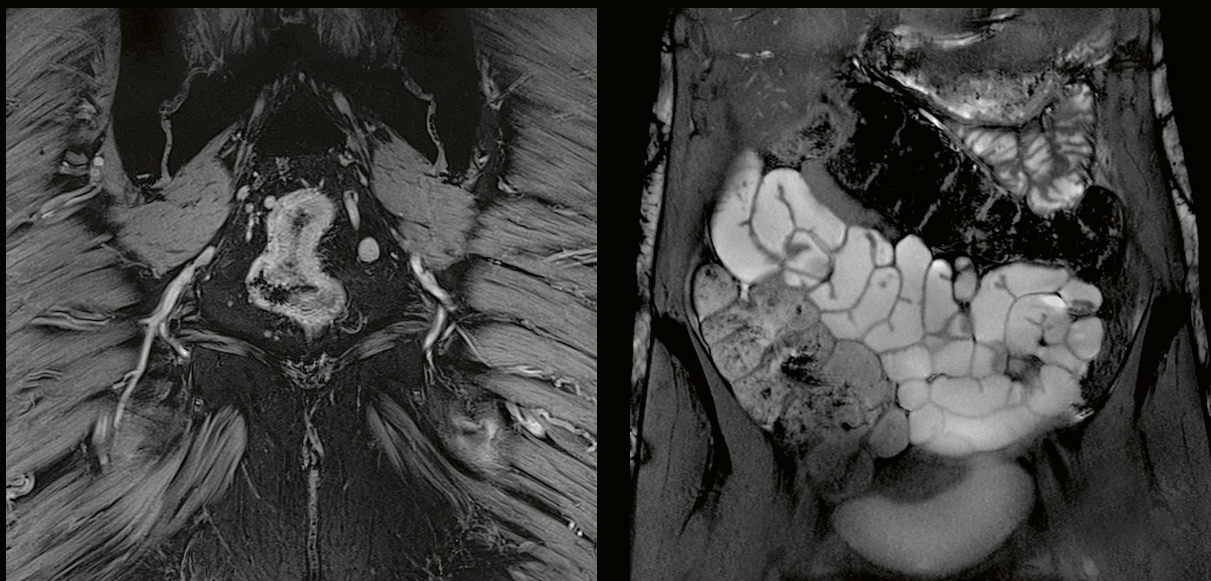
MGH, Boston, USA



Body imaging

Left image, 3D VIBE FatSat, right image, thin MIP from the 3D VIBE FatSat. Images acquired using pTX and custom-built coils.

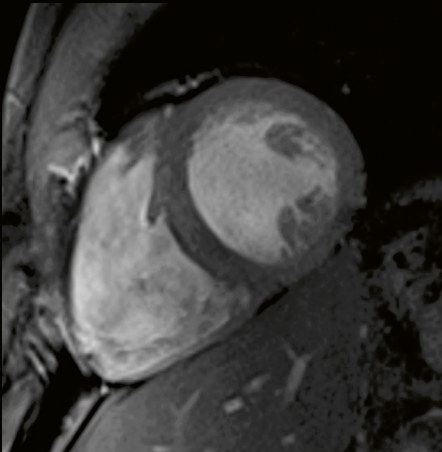
Erwin L. Hahn Institute for MRI, Essen, Germany



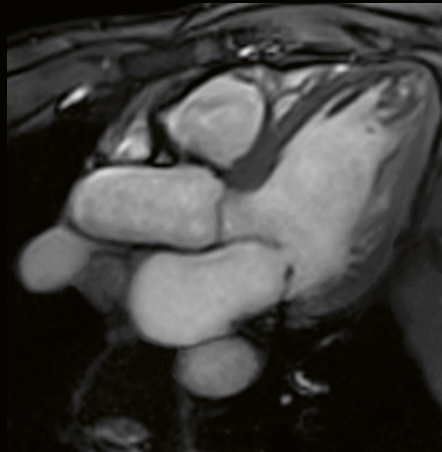
Body imaging

Image left, rectum carcinoma imaged with a ce-FLASH ($0.3 \times 0.6 \times 2 \text{ mm}^3$, TA 2:14 min). Images acquired using pTX and custom-built coils. Image right, abdominal small bowel imaging with TrueFISP ($0.4 \times 0.8 \times 2 \text{ mm}^3$, TA 26 s).

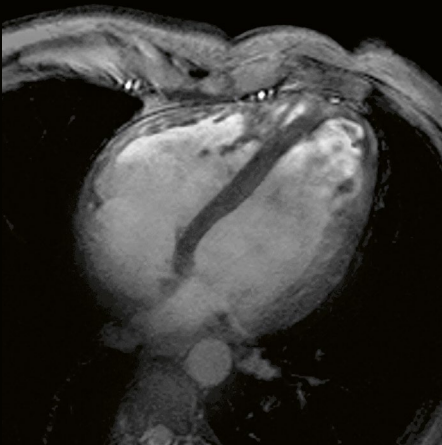
Erwin L. Hahn Institute for MRI, Essen, Germany



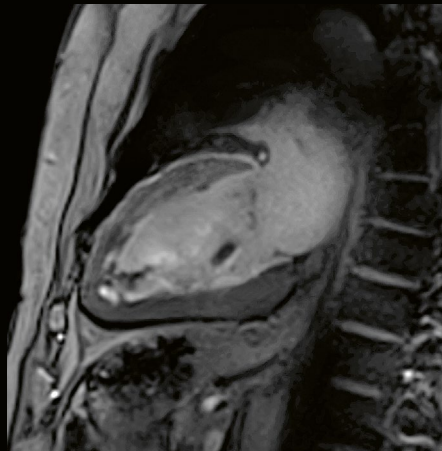
Short axis view
FLASH cine retro
(1 x 1 x 4 mm³, GRAPPA 2, TA 18 s).



Right ventricular output tract
FLASH cine retro
(1.3 x 1 x 4 mm³, SENSE 2, TA 13 s).



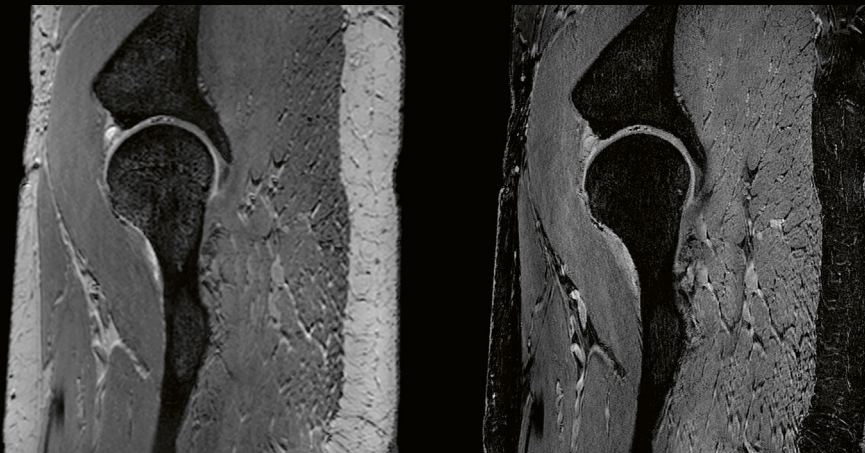
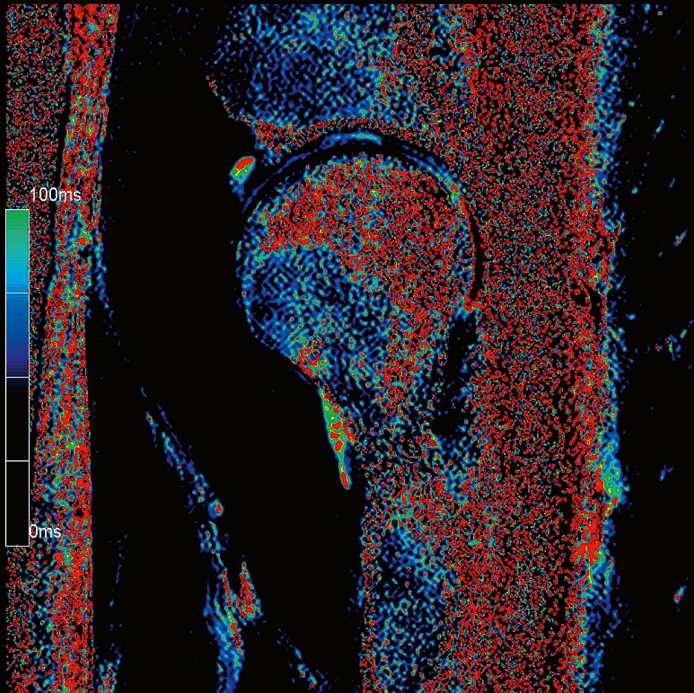
Four chamber view
FLASH cine retro
(1 x 1 x 4 mm³, GRAPPA 2, TA 16 s).



Two chamber view
FLASH cine retro
(1.2 x 1 x 4 mm³, SENSE 2, TA 13 s).

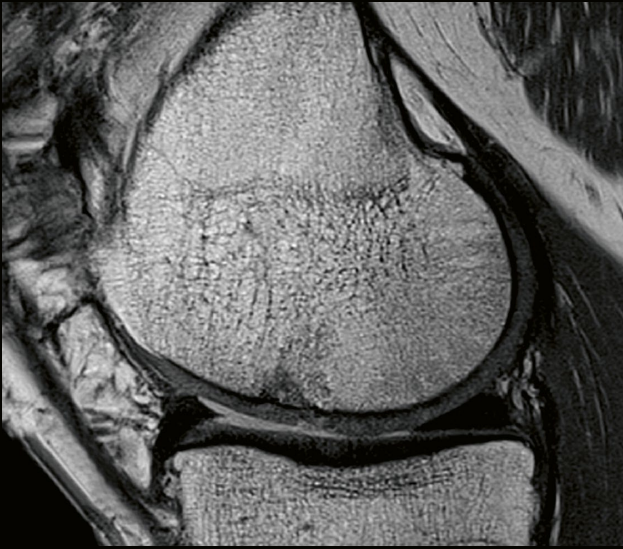
Cardiac imaging

Accelerated T1-weighted FLASH acquisitions using a customer-built coil.

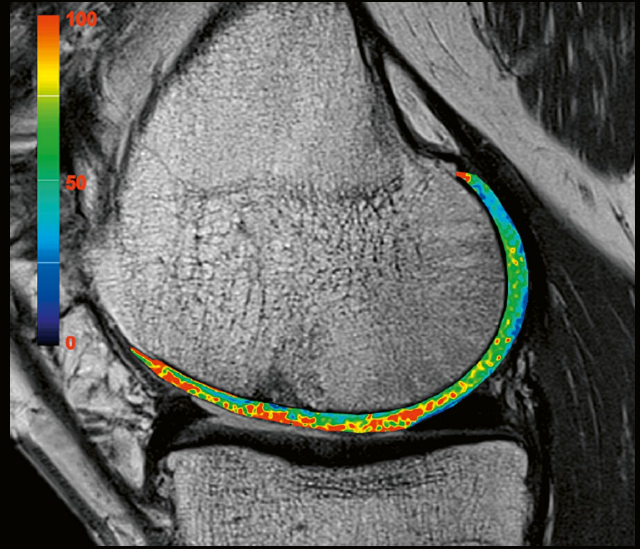


Hip cartilage transplant

Cartilage transplant visible in 3D DESS ($0.37 \times 0.74 \times 0.74 \text{ mm}^3$, TA 5:11), 3D VIBE SPAIR ($0.19 \times 0.39 \times 0.8 \text{ mm}^3$, TA 5:58) and T2 MapIt ($0.25 \times 0.5 \times 2.5 \text{ mm}^3$, TA 4:47) 14 months after Autologous Chondrocyte Transplantation (ACT) using a customer-built coil.



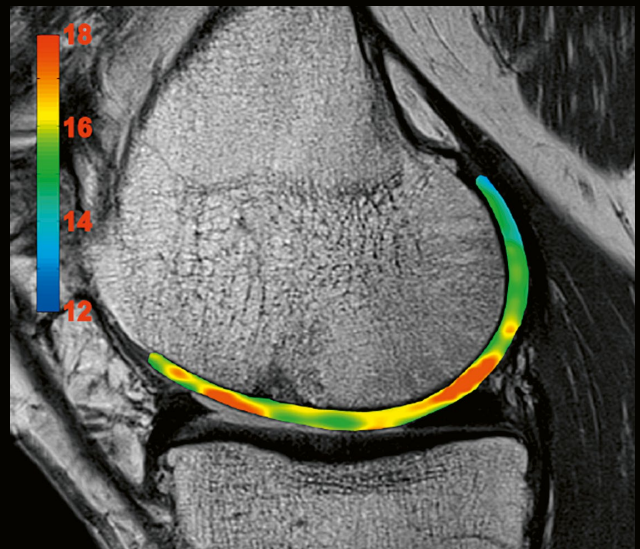
Morphologic PD TSE F(0.4 x 0.4 x 2 mm³)



T2 map (0.6 x 0.6 x 1 mm³), T2 in ms
More water, disturbed collagen architecture visible



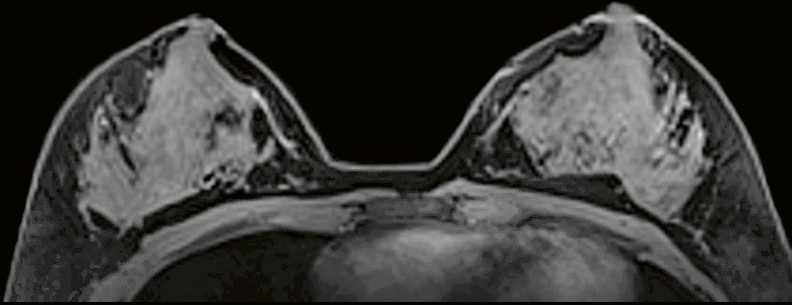
gagCEST image (0.7 x 0.7 x 3 mm³)
gagCEST asymmetries in [%] lower values, less PG content



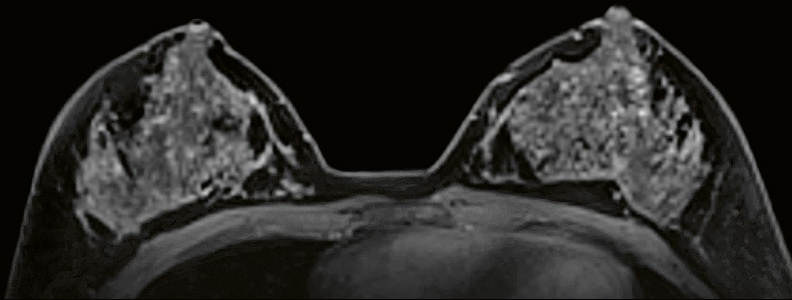
Sodium image
Sodium SNR lower values, less PG content

Biochemical imaging using CEST

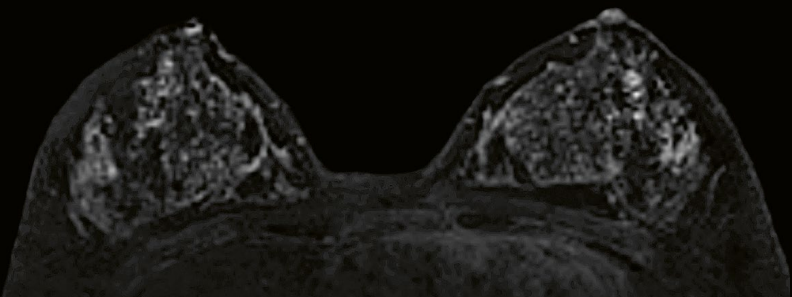
Male patient nine years after Autologous Osteochondral Transplantation.



Pre-contrast



Post-contrast



Subtraction

Breast imaging

High-resolution bilateral breast imaging in short acquisition time. Pre- and post-contrast 3D FLASH SPAIR, 1.4 mm isotropic resolution, TA 1:48 min/series using a customer-built coil.



Join the Largest research community

Your reputation plays a pivotal role in your institution's success. MAGNETOM Terra has the power to let you go deeper than ever before, making your research and patient outcomes stand out from the rest. What's more, this leading-edge technology can help you attract the brightest minds to your facility, further enhancing your capabilities. MAGNETOM Terra has the potential to put your organization firmly on the map, offering access to an exclusive network of expertise and broad scope for collaboration and exchange.

"When we were in a position to order a 7T system, Siemens Healthineers was the logical choice."¹³

Professor Kamil Ugurbil

Director of the Center for Magnetic Resonance Research (CMRR),
Minneapolis, Minnesota, USA

Join the largest research community with over 75% of all UHF users

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MAGNETOM Terra helps you achieve your research goals, giving you the opportunity to publish first and become a true opinion leader. This advanced technology has the potential to strengthen your position by attracting the brightest brains to your facility. The scanner lets you deliver previously unseen insights that could improve patient outcomes and further enhance your reputation.

Expand your network

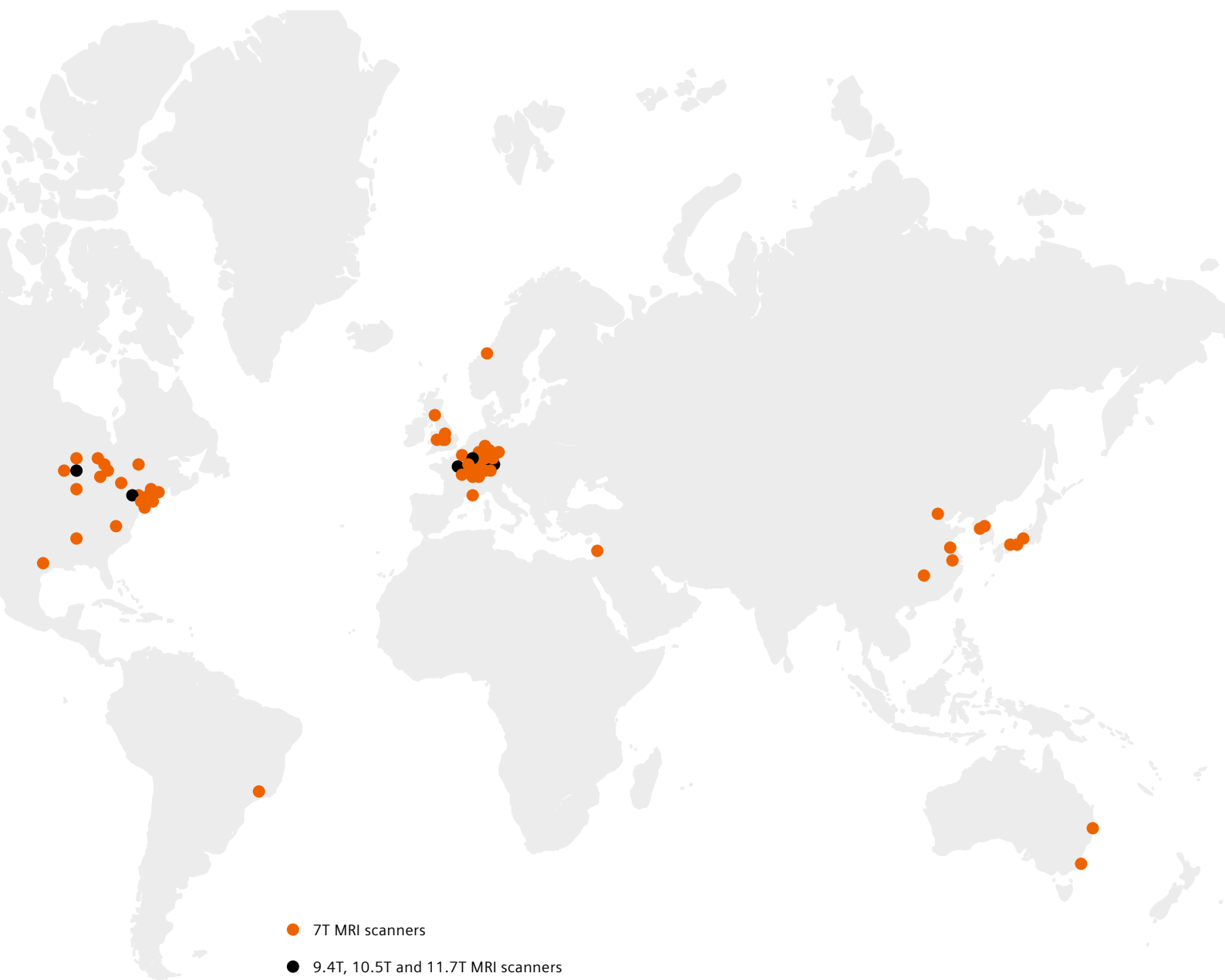
Even if you are taking your first steps in ultra-high-field imaging, you will never be alone. Siemens Healthineers has proven expertise in UHF MRI and cultivates links with an extensive network of users. As a result, you benefit from the experience of others and can share your own ideas. Siemens Healthineers is the global leader in 7T – with a market share of over 75% and more than 25 years of experience in this field.

Exchange your ideas with peers

When you become part of the Siemens Healthineers UHF community, you join an exclusive group of outstanding MRI experts. Through collaboration and exchange with other leaders in your field, you can extend your own knowledge and gain deeper insights. Siemens Healthineers' regular user meetings and an online discussion board are the ideal platforms to interact with your peers.

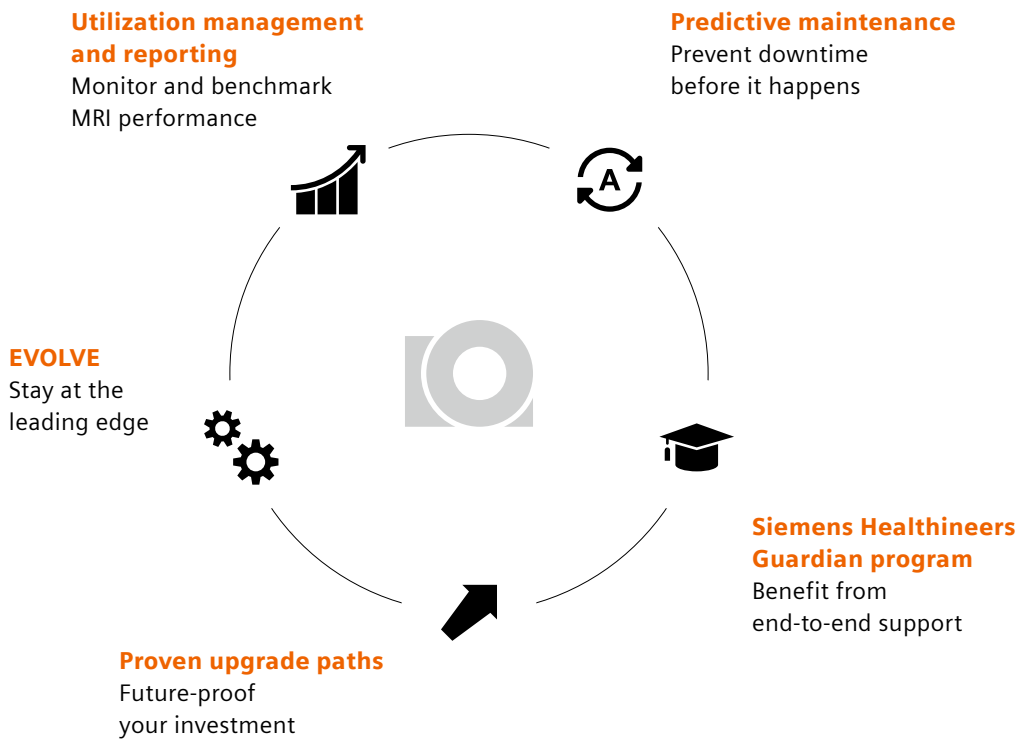


73% of ISMRM UHF abstracts in 2018 were based on data from Siemens Healthineers UHF systems.¹³



- 7T MRI scanners
- 9.4T, 10.5T and 11.7T MRI scanners

Service and exchange – Comprehensive services



Siemens Healthineers' end-to-end services ensure you stay at the leading edge of MRI technology throughout the entire system lifecycle – from installation, to operation, to upgrades, to ongoing support. Moreover, our diverse communication platforms and communities keep you up to speed on the world of MRI and enable you to share your ideas and experiences with your peers.

Utilization management and reporting

This powerful solution gives you more from your MRI scanner. It allows you to monitor KPIs and benchmark your system against other Siemens Healthineers MRI machines at any facility or organization. So you can keep track of your MRI performance, and reap the maximum reward from your scanner.

Predictive maintenance

When systems go down, it impacts both your ability to care for your patients and your bottom line. We provide a predictive maintenance service to help you minimize lost time. It informs you when a part of your MRI system is likely to fail, enabling you to plan repairs and prevent downtime before it happens.

EVOLVE

Keep your hardware and software up to date at all times – a key factor in enhancing performance and diagnostic quality. You receive all applicable upgrades for software and the *syngo* OS, plus at least one workstation hardware upgrade within the first six years.

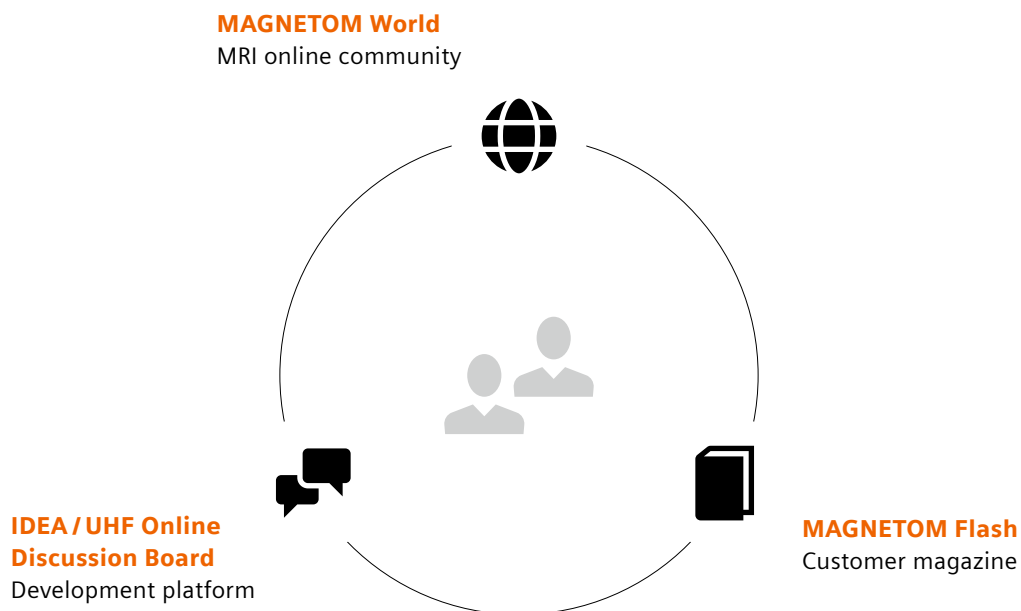
Siemens Healthineers Guardian program

This program provides the latest service technology so you can better manage your MRI system. It combines many features in a single package – offering real-time system monitoring, expert advice to improve workflow efficiency, proactive maintenance, and support. Moreover, it guarantees defined repair times, giving you complete peace of mind.

Proven upgrade paths

With MAGNETOM scanners, taking your MRI system to the next level is simplicity itself, thanks to clearly defined upgrade paths. In fact, we have built an entire organization (CDV) to help customers truly maximize their system life – and increase their return on investment.

Service and exchange – Peer-to-peer information



On *MAGNETOM Flash*:

“An excellent and useful combination of technological and clinical articles that both keep one up to date with advances in MRI and provide practical assistance for day-to-day practice – good and interesting learning material.”¹³

Mark Lourensz

St Vincent’s Hospital, Fitzroy, Victoria, Australia

MAGNETOM World

Siemens Healthineers' global MRI community offers peer-to-peer support and information. Radiologists, cardiologists, technologists, and physicists have all contributed with publications, presentations, training documents, case studies, and more – all freely available to you via this unique network. Plus, the bi-annual MAGNETOM World Summit is the ideal opportunity to share and exchange ideas.

MAGNETOM Flash

Published quarterly, the MR customer magazine features up-to-date clinical case studies, application tips and 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.

IDEA / UHF Online Discussion Board

IDEA⁸ is an open development platform for the largest and most active 3T and UHF research communities in the world. It unites users from across the globe and fosters innovation in the field of MRI. Members collaborate online at www.mr-idea.com and at an annual meeting. IDEA includes an exclusive area, the UHF Online Discussion Board, to help users focus on topics of interest, as well as find and communicate with the right peers.



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Technical specifications

Field strength	7 Tesla
Bore size	60 cm
Magnet length	270 cm
System length	297 cm
System weight (in operation)	< 25 tons
Minimum room size¹²	65 m ² / (w/o pTX2 and 3rd order shim option)
Dual Mode functionality²	Clinical Mode, Research Mode ²
RF transmit	TimTx-1, TimTx-8, TimTx-16 (in research mode) ²
Maximum number of channels³	32, 64
Number of independent receiver channels that can be used simultaneously in one single scan and with one single FOV, each generating an independent partial image	32, 64
Gradient strength	XR gradients (80 mT/m @ 200 T/m/s)
Helium consumption	Zero Helium boil-off technology
Quiet Suite/DotGO	Available in research mode ²
Local coils in clinical mode	1TX/32RX head coil, 1TX/28RX knee coil, 23Na 1Tx/32Rx head coil, 31P/1H TxRx flex loop coil

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For accessories, please visit: [siemens-healthineers.com/medical-accessories](https://www.siemens-healthineers.com/medical-accessories)

¹ Compared to 3T systems.

² Research mode as part of dual mode is available as an option and not intended for clinical use. Research operation may require observation of national regulations.

³ Channels (coil elements) that can be connected simultaneously.

⁴ Compared to standard 3T systems.

⁵ Keil et al., *Magn Reson Med* 70:248–258 (2013); Wiesinger et al., *Magn Res Med* 52:953–964 (2004); Pruessmann et al., *Magn Reson Med* 42:952–962 (1999); Griswold et al., *Magn Reson Med* 47:1202–1210 (2002)

⁶ Compared to previous 7T generation.

⁷ Under normal operating conditions with standard Siemens Healthineers sequences/protocols.

⁸ Example images available in this Brochure: Page 22 ; SWI

⁹ Scheenen et al., *Magn Reson Mater Phy* 21:95–101 (2008)

¹⁰ Heidemann et al., *Magn Reson Med* 68:1506-1516 (2012); Yacoub et al., *PNAS* 105:10607-10612 (2008)

¹¹ Madelin et al., *J Magn Reson Imaging* 38:511-529 (2013); Valkovic et al., *Analytical Biochemistry* 529:193-215 (2017)

¹² <https://health.usnews.com/best-hospitals>

¹³ <https://www.ismrm.org/18m>

¹⁴ 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.

¹⁵ Trattig, et al., *NMR Biomed.* 9:1316-1334 (2015)

¹⁶ Cinematic VRT is recommended for communication, education, and publication purposes and not intended for diagnostic reading.

¹⁷ Rendered with a Siemens Healthineers internal cinematic rendering prototype.

¹⁸ Minimum total space requirement for magnet, electronics, and console room.

¹⁹ Siemens AG, "Sustainable healthcare strategy – Indicators in fiscal 2014", pages 3–4.

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