syngo MR XA30

What's New

↗ **siemens-healthineers.us/mri**

SIEMENS Healthineers

Dear MAGNETOM user,

We are pleased to announce the arrival of our latest MRI scanner software, *syngo* MR XA30.

syngo MR XA30 provides comprehensive improvements to existing scanner functionalities and access to exciting new features.

MAGNETOM MRI scanners that qualify for this software update include:

- MAGNETOM Aera (1.5T)
- MAGNETOM Skyra (3T)
- MAGNETOM Prisma (3T)
- MAGNETOM Prisma^{fit} (3T)

Learn more about *syngo* MR XA30 in this informative packet and discover how it can improve your daily routine.

Enjoy reading!

Sincerely yours,

Your Siemens Healthineers MR team

Contents

1. *syngo* MR XA platform – XA30

In 2017 our new *syngo* MR XA platform was introduced. The platform includes improvements to software and hardware features as well as numerous new sequences and applications. *syngo* MR XA is the latest system software generation for our MAGNETOM scanners, enabling you to achieve clinical results faster, easier and with more comfort.

1.1. New *syngo* MR XA User Interface

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

syngo MR XA platform introduces a redesigned MR user interface (UI) running on a new hardware platform. Evolving from the successful *syngo* MR E11 software, the *syngo* MR XA user interface is a user-centric control center for patient registration, scanning, post-processing, and result distribution.

The acquisition workplace now inlcudes 24” monitors, versus the previous 18”. Central UI elements and features have been updated to make use of the extra space on the larger monitor. Planning segments (orange), queue (yellow), and scan parameters (purple) have kept their appearance but positioning on the screen was slightly changed. The new layout provides fixed positions for previously hovering UI elements, such as the physio display and the inline display (blue).

syngo MR E11

syngo MR XA30

1.2. Dual Monitor setup

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

The acquisition workplace can be implemented as a single or dual monitor concept. By default, *syngo* MR XA30 offers a single monitor (24" color LCD monitor) acquisition workplace. The dual monitor setup is optional and encompasses two 24" monitors that are operated using one keyboard and one mouse.

The dual monitor setup, with separate scanning and viewing monitors, allows the technologist to have a complete overview of the examination and results. Scanning and viewing / post-processing can be seen side by side providing the best workflow option. Constant context switches are reduced, enabling multitasking for increased quality and productivity.

The scanning side (left monitor) is primarily used for scanning and quality assurance tasks. The viewing side (right monitor) is used for viewing, additional results generation in the form of basic and advanced post processing as well as data handling (DICOM – export, import, transfer, recording to media). Several applications can be opened in parallel.

1.3. Recon&GO

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

With *syngo* MR XA platform, Recon&GO provides powerful zero-click post-processing tools. A wide range of Inline functionalities help to streamline the clinical workflow by automating post-processing steps before image viewing. Ready-to-Read results are automatically provided, even for advanced cases, helping to reduce the workload for the MR technologist.

Functionalities include:

- Inline Composing: automatic composing of multiple adjacent coronal or sagittal images of anatomical or angiographic examinations
- Inline Subtraction: Automatic subtraction of images, e.g. pre- and post-contrast enhancements
- Inline calculation of ADC and extrapolated b-values
- Inline MIP on-the-fly, e.g. MR Angiography with automatic image subtraction and MIP in three orthogonal planes and/or full Radial MIP
- Prospective motion correction (1D and 2D PACE) on-the-fly
- Automatic perfusion and diffusion maps
- Automatic on-the-fly calculation of standard deviation, for better differentiation of arterial and venous phases
- Automatic launch of post-processing applications
- Inline Display: automatically shows reconstructed images, offers immediate access to the results and opens automatically for e.g. interactive real-time scanning or Care Bolus examinations
- Inline Movie: automatically starts the cine image display

1.4. MR View&GO

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

MR View&GO is a dedicated MR viewer that covers the needs for daily routine work with respect to viewing, quality assurance, routine post-processing, filming, as well as sending and archiving results in one comprehensive workflow with consecutive steps. MR View&GO guides the user from basic viewing and quality control towards result distribution to the PACS and the DICOM nodes.

As soon as a patient has been registered, a corresponding MR View&GO automatically opens for the respective patient. Every scan that has been acquired and reconstructed automatically appears.

Tools for Dynamic Analysis are reduced to the routinely used tools: Addition, Subtraction, Division, Multiplication, Arithmetic Mean, ADC, b-Value, and Image Filter.

MR View&GO offers a dedicated TimeCurve tool (similar to the known MeanCurve tool from *syngo* MR E11 platform) which is specifically designed to focus on the scan task related needs such as test-bolus evaluation. In addition, the processing workflows (e.g. MR Basic) include the known MeanCurve tool serving basic and advanced needs for evaluation of dynamic data – e.g. the deeper evaluation of Prostate DCE series or contrast-enhanced Breast MRI. Both tools, TimeCurve and MeanCurve are part of the included standard features.

Workflow and usability improvements: MR View&GO provides 2D, 3D and 4D viewing without switching the context, provides direct access to further 3D and 4D processing tools such as range reformations or special 4D viewing options. The screen layout consists of an image area and several panels with tools. The user can configure an individual toolbox of frequently used features such as image markers, distance measurements or ROI analysis in the lower left corner. Further analysis tools can be found in “corner menus” in the edges of individual image segments. The most important dynamic analysis and basic post-processing tools are also directly available from the viewing context – no need to switch to another application.

Archiving: result / data distribution can be done as in *syngo* MR E11 from the patient browser – and directly from the MR View&GO Distribution Step.

1. Steps for dedicated tasks
2. “Send to …” buttons to load a selection into a certain step
3. Configurable tool box

1.5. Advanced image post-processing at the acquisition workplace

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Basic post-processing features included; advanced post-processing licenses available optional

On *syngo* MR XA platform it is possible to perform advanced post-processing directly at the acquisition workplace.

For advanced image processing requirements, e.g. to perform neuro perfusion and mismatch analysis, dedicated applications are optionally available. These applications cover the entire radiological spectrum from neurology (MR Neurology, Neuro3D Tractography and fMRI), to cardio-vascular evaluations (Cardiac Perfusion, Cardiac Flow, 4D Ventricular Function, Vascular Analysis), to oncology (Breast, Prostate, OncoCare, 3D Lesion Segmentation).

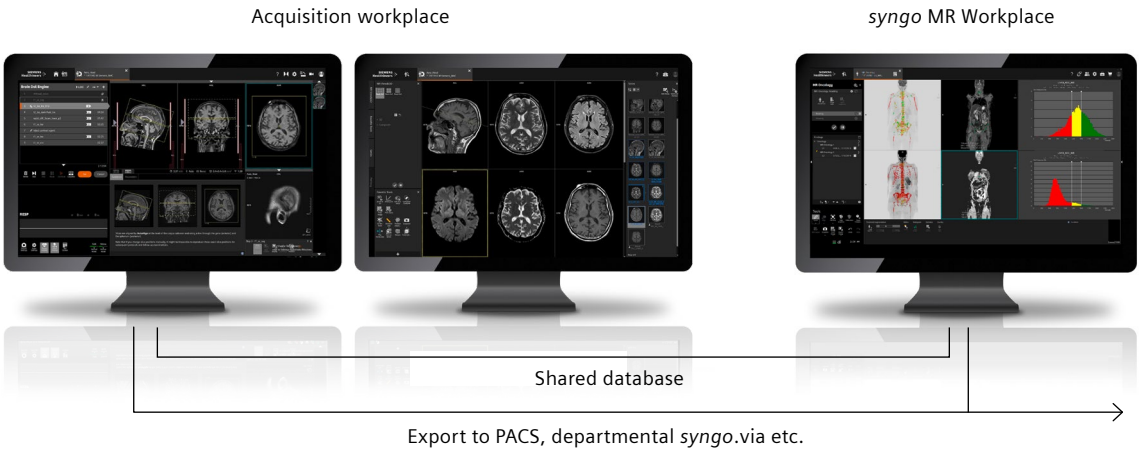
Basic post-processing functionalities are already part of the standard configuration. Included workflows are MR Composing and MR General Engine (MR Basic, MR Breast and MR Prostate workflows with MeanCurve evaluation and optimized viewing layouts).

The acquisition workplace can host one MR View&GO and up to three post-processing applications in parallel.

1.6. *syngo* MR Workplace

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature
Pre-requisite: Advanced host

Depending on the institutional setup and needs, it is also possible to operate an additional post-processing console (*syngo* MR Workplace) for basic and advanced post-processing purposes. This *syngo* MR Workplace has a shared image database with the acquisition workplace, thus images acquired at the acquisition workplace appear instantly on the *syngo* MR Workplace enabling fast image post-processing. This configuration has the additional new advantage that licenses for advanced post-processing applications are shared between MR Workplace and the acquisition console. Thus one license can be used on both Acquisition workplace and *syngo* MR Workplace. If simultaneous use on Acquisition workplace and *syngo* MR Workplace of the same post-processing application is intended, then a second license can be obtained. The *syngo* MR Workplace can host up to four post-processing applications in parallel.



1.7. New MR image data format – Enhanced MR (Multiframe Images)

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Included feature

syngo MR XA platform uses "Enhanced MR/Multiframe" data format opposed to the previously used "Single frame" format. In addition, the handling of graphics was improved. Both changes provide several advantages:

1. Reduced memory consumption and improved network transfer performance
Multiframe Images address the trend that MR studies are growing continuously in size. DICOM header data valid for the entire stack of slices (e.g. patient name, study data, etc.) is no longer replicated for every MR image but included only once into one Multiframe image. Thus memory storage can be reduced by on average 40%. In addition, the performance of data transfers in the network improves as only single objects need to be handled as opposed to handling of individual slices.

2. Improved handling of exported multidimensional datasets
Enhanced MR provides improved support of multidimensional data sets allowing easier and more robust handling after export. Correct sorting will be kept and thus viewing on PACS and workstation is improved (if Multiframe MR is supported by the receiving system).

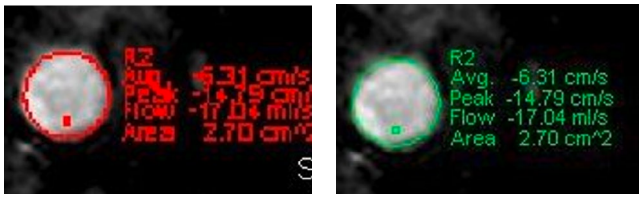
3. Easier exchange and interoperability of advanced MR applications
Enhanced MR Images store parameters of the latest MR applications in standard DICOM attributes (e.g. b-values of MR DWI, timing parameters of ASL or cardiac imaging). Previously such parameters had to be stored as workaround in private (Siemens) tags and thus were not recognized after export. Now connected systems of different vendors can make use of these parameters in their applications (e.g. in evaluations, image text).

4. Archiving DTI Tensor and Spectroscopy data
Enhanced MR provides the new possibility to export DTI Tensor and spectroscopy data directly to a PACS or post-processing station.

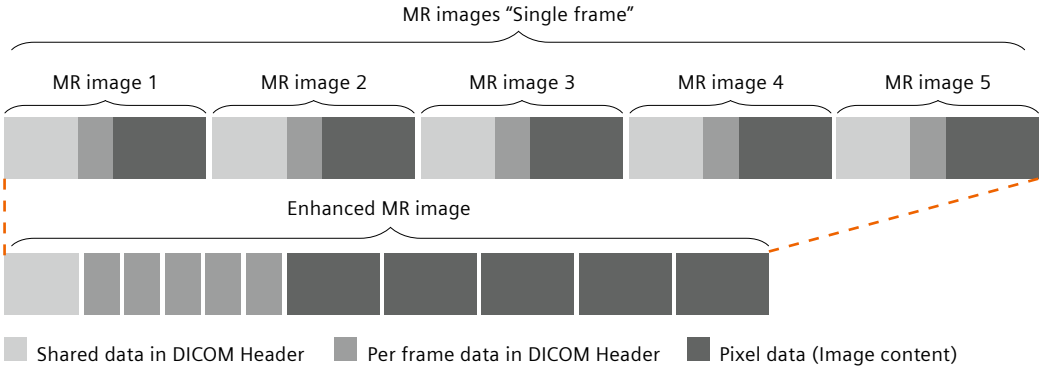
5. Exporting color maps
In Enhanced MR, color information is stored along with MR slice information enabling the correct display of color images (e.g. T1, T2 maps or DTI overlays) after export.

6. High quality graphics and Inline reports
Desired settings of image display such as windowing, rotation or zooming will be kept after export. In addition, the high quality of manually inserted graphics (drawn ROIs, text labels) as well as of Inline reports (from e.g. LiverLab or cardiac evaluations) will remain after export enabling improved readability. Previous workarounds, like archiving of snapshots of Inline reports, are no longer necessary. Pre-requisite: the receiver node supports Multiframe Image format.

Please note: If your PACS or post-processing station does not support Multiframe data then it is also possible to export images in single frame data format. This can be configured for each DICOM node individually.



Graphics and annotations can remain in high-quality and are no longer distorted after export (if receiving system supports Enhanced MR data format).



Multiframe MR data format does not replicate common DICOM header information thus allowing to reduce memory consumption and transfer times.

1.8 Security features

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Included feature

syngo MR XA30 provides security settings to protect the scanner against known security threats. It is based on a hardened Microsoft Windows 10 operating system providing enhanced security features as part of the standard configuration included in the upgrade. Features include user management, password strength definition and audit trail functionality. It supports the implementation of defined security policy and definition of different groups of users at the scanner. It includes support to achieve compliance with the HIPAA "Privacy" rule. Included features for individual configuration are:

- User management with authentication to prohibit unauthorized access
- Password strength according to configured policy
- Screensaver with password protection and adjustable idle time
- Privileges to grant rights and define functionality based on user/role/group
- Permissions to control data access
- Option to protect user pulse sequence trees against unauthorized modifications
- Whitelisting (Embedded Control) against manipulation of scanner software
- Audit trail to log system and data access by the defined users and service
- Security delivery process to frequently distribute security updates
- Support to implement security policy including compliance with HIPAA (Health Insurance and Accountability Act)

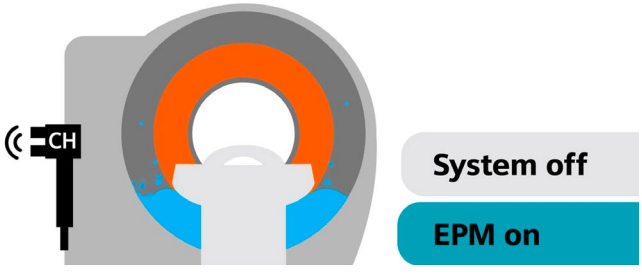
1.9. Energy saving with Eco-Power Mode

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Included feature

syngo MR XA30 includes energy saving technologies. The unique Eco-Power Mode (EPM) reduces energy consumption during system-standby and system-off modes. This means that the cold-head compressor can be automatically switched off during prolonged system idle times while maintaining zero helium boil-off.

The EPM is a standard technology which comes in addition to previous energy saving capabilities that reduce consumption by disabling the Gradient Power Amplifier during system idle times, e.g., when the table remains in the home position for a longer period of time.

If you want to benefit from EPM, a service engineer must activate it during the upgrade to *syngo* MR XA30.



2. New in standard configuration, included in the upgrade

2.1. TimCT FastView Localizer

TimCT FastView is the “one go” localizer for the whole-body or large body regions such as the whole spine or the whole abdomen. It acquires the complete extended Field of View in one volume with isotropic resolution during continuous table movement.

2.2. 2D & 3D Distortion Correction

2D and 3D distortion correction is a mechanism to compensate for distortions which result from small non-linearities of gradient fields. The correction yields images with higher fidelity in the geometric representation – especially for scans with a large field of view and off-center scans. The 2D corrections take place within image slices; the 3D correction also corrects for through-plane distortions.

Both methods have already been available in *syngo* MR E11E software. With *syngo* MR XA30 the distortion correction is activated by default in most of the sequences and cannot be turned off.

2.3. Soft Tissue Motion Correction

3D elastic motion correction, for offline 3D correction in all directions over entire 2D and 3D data sets suitable for e.g. soft tissue MR exams. Allows higher conspicuity and accuracy especially for multi-focal lesion detection. New image data is reconstructed and saved in a separate series within the patient browser. It can be combined with the original non-corrected image data.

2.4. Advanced Diffusion (RESOLVE & QuietX DWI)

Advanced Diffusion has two components: RESOLVE and QuietX DWI.

RESOLVE (Readout Segmentation Of Long Variable Echo-trains) delivers high-resolution, low-distortion diffusion-weighted imaging (DWI) for accurate depiction of lesions.

QuietX DWI
Diffusion-weighted sequence in whisper mode (very quiet imaging techniques).

2.5. 3D VRT

Post-processing: 3D-depiction of complex anatomies and anatomic relationships, for example, in angiography. In addition to color images, a threshold-based segmentation of 3D objects is possible.

2.6. Image Fusion

Post-processing: Fusion mode is a function for image fusion of multiple 2D/3D data sets with alpha blending, that is, overlay of two images and setting the opacity manually.

2.7. Recon&GO Inline Composing

Recon&GO technology encompasses a wide range of Inline functionalities to help streamline the clinical workflow by automating post-processing steps before image viewing. For example: Inline Composing enables automatic composing of multiple adjacent coronal or sagittal images for anatomical or angiographic examinations.

2.8. Post-processing composing (Offline composing)

With *syngo* MR XA30 it is again possible to perform flexible offline composing of images. For example, this may be applied when Inline Composing did not provide satisfying results, e.g. in series with images of different image types as when using the DIXON sequence.

2.9. Expert-i

Interactive real-time access to imaging data and exam information from any PC within the hospital network during the MR exam.

2.10. MR Basic Workflows

In addition to MR View&GO a range of further dedicated MR workflows (known from *syngo*.via) is provided – e.g.: MR Basic, MR Breast, MR Prostate. These MR Workflows contain dedicated layouts and tools related to the tasks at hand to view and process the related body-part specific data.

2.11. Mean Curve Evaluation

syngo MR XA30 offers dedicated TimeCurve/MeanCurve analysis tools for contrast-enhanced examinations as part of the standard configuration. Time Curve analysis is part of MR View&GO for the use case at the acquisition workplace (evaluation of test-bolus scans). For post-evaluation of dynamic series, such as DCE prostate or breast MRI, the included MeanCurve tool (e.g. in MR Basic or other advanced MR Workflows) can be used.

3. Improvements to sequences, protocols and workflows

3.1. Improved standard sequences

Within the *syngo* MR XA30 platform an extensive amount of improvements to sequences and techniques have been implemented to further optimize image quality. In the following, a collection of image quality improvements is summarized:

- DIXON: New algorithms prevent local and global swaps (also in dynamic imaging)
- Improved image quality and stability with regards to patient motion and irregular respiration for MRCP with T2 SPACE. Implementations include an improved trigger algorithm, adaptation of "Acquisition Window" and Short Cycle Mode for patients with fast breathing
- Various improvements for whole-body composing, e.g. the possibility to compose calculated b-value images and improved image normalization for more homogeneous image impression between composed stations
- Body region optimized SPAIR pulses available for improved fat suppression in Diffusion, RESOLVE, QuietDWI, TSE, SPACE, HASTE and 3DFLASH sequences (for 3T only)
- Various parallel imaging improvements for improved image quality in HASTE, VIBE, SMS EPI, MPRAGE, TSE and TSE DIXON
- New Absolute B0 Shim: The additional shimming option "Absolute" of the parameter BO Shim in the adjustments tab card allows improved fat saturation, e.g. in T-Spine Imaging
- Asymmetric saturation possible for BOLD imaging to improve scanning of patients with e.g. dental implants
- Additional external phase correction mode for Diffusion imaging to reduce artifacts in challenging body regions such as breast MRI
- Noise masking possibility for Diffusion imaging, QuietDWI and RESOLVE for improved image impression. Noise outside of the scanned object is eliminated in images and ADC maps
- For 3T systems with Tim TX TrueShape: Left/Right balancing possibility for GRE and TSE sequence to reduce B1-induced shading effect in head imaging. Image correction is based on individual acquired B1 maps and is most targeted for T1 FLASH and T2 FLAIR sequences in which the inhomogeneous signal distribution (shading effect) may occur

3.2. Coil-independent protocols and Auto Coil Select

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

The selection of coils and coil elements is an essential step during the setup of every MRI protocol. It ensures that all regions within the field of view are scanned with high signal whereas regions outside the field of view do not disturb the image, for example by infolding artifacts. With *syngo* MR XA30 we broadened the range of the Auto Coil Select (ACS) options to allow an automatic coil selection for all body regions. Additionally, with *syngo* MR XA30 protocols were implemented independent of specific coils. This provides several advantages:

1. Swapping coils for a specific protocol no longer triggers an info message which needs to be confirmed.
2. User-specific protocols which use a manual coil selection set up in the Dot Cockpit can be set up coil-independent by selecting one of the ACS modes. This makes protocol handling faster and protocols may be more easily exchanged between systems.
3. With two new ACS modes, functionality is more robust, flexible and less error prone. In general, Auto Coil Select function enables you to use the desired, plugged in coil without further efforts as it is selected automatically. The new ACS modes "ACS All but spine" and "ACS Restricted" make it possible that ACS can be used for all body regions and all coil combinations. If ACS is used, instead of a manual coil selection, the protocol will react more flexibly to variations in exams, e.g. when coils are swapped or when adapting to different patient sizes (for example different patient heights in thorax exams and thus different relative position to spine coil elements). In all Siemens Protocols one of the ACS modes are used.

On *syngo* MR XA30 the following Auto Coil Selection modes exist:

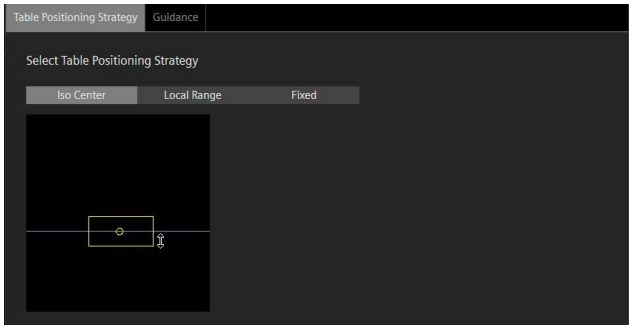
- Auto Coil Select (automatically selects the most suitable set of coil elements from any of the plugged-in coils within the field of view)
- ACS All but spine (This mode selects all coils within the FoV except the spine coil. This can be helpful if you want to examine e.g. hand/wrist, knee, shoulder, breast with dedicated coils)
- ACS Restricted (restricts the coils / coil elements that are considered by the Auto Coil Select mechanism)
- Manual (manual preselection of desired coils/coil elements can be stored in the protocol)

3.3. Changes of table modes

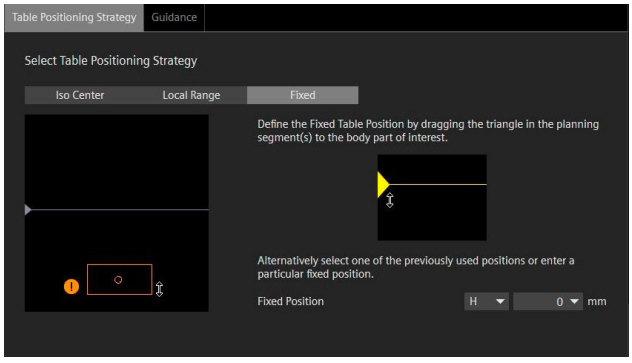
Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma; MAGNETOM Prisma^{fit}
Category: Included feature

With *syngo* MR XA30 the choice of table modes has been adapted. The following three modes are available:

Iso mode:
In Iso mode, the table moves during each examination so that the center, or region of interest, of the slice package is always at the iso center.

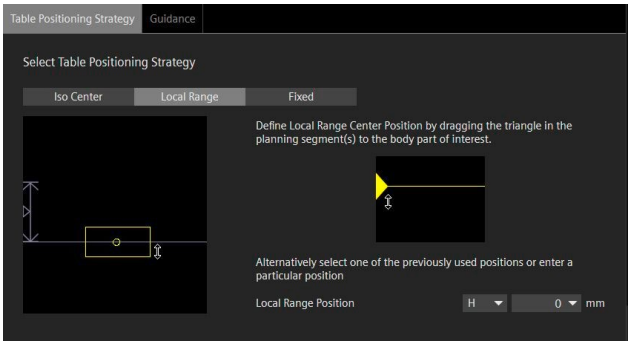


Fixed table mode:
To avoid unintentional table movement during interventions triggered by running sequences with different isocentric positions or to enable off-center scanning.



Local Range mode:
In Local Range mode, you can define one (or more) Local Range positions.

If the focus slice (region of interest) is within the tolerance range of the Local Range position, the stage is not moved for this measurement.



3.4. Unilateral hip imaging with the Large Joint Dot Engine

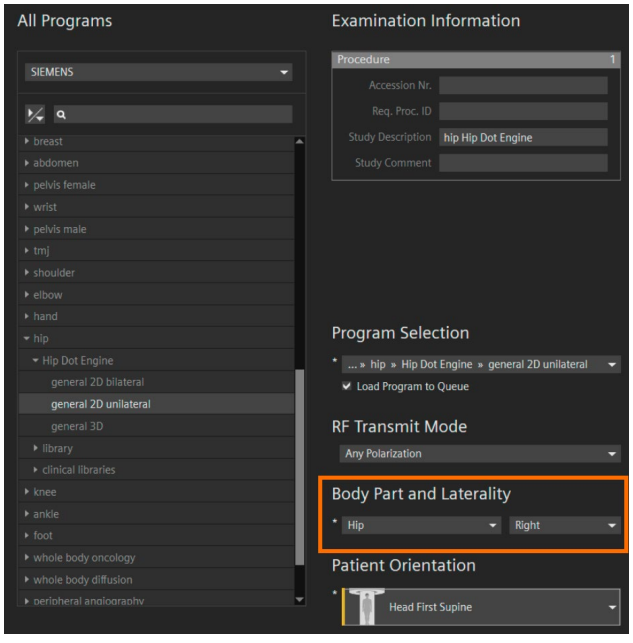
Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma; MAGNETOM Prisma^{fit}
Pre-requisites: Large Joint Dot Engine
Category: Optional feature

The Large Joint Dot Engine optimizes image quality of knee, hip and shoulder scans by proposing the most appropriate protocols according to the examination strategy chosen for the specific patient. It ensures reproducible image quality and streamlines large joint examinations.

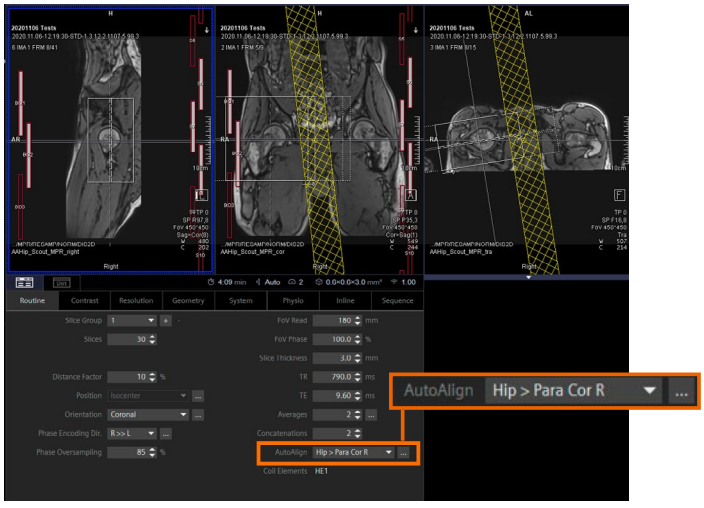
With *syngo* MR XA30, the functionality of the Large Joint Dot Engine was extended to optimize the workflow of unilateral hip imaging. In the patient registration window the laterality of the examination can be pre-selected.

Once this has been selected the system automatically performs the alignment of the slices with AutoAlign and the automatic coverage of the FOV for the respective hip side. Manual adaptions to AutoAlign are no longer necessary. In addition, the selected side will be included as image comment in the image text of the series.

Please note: this functionality needs to be activated in the configuration panel during system set up.



New possibility to specify the laterality of the examination during patient registration (marked orange)



Autoalign selection automatically updated in UI based on patient registration (marked orange)

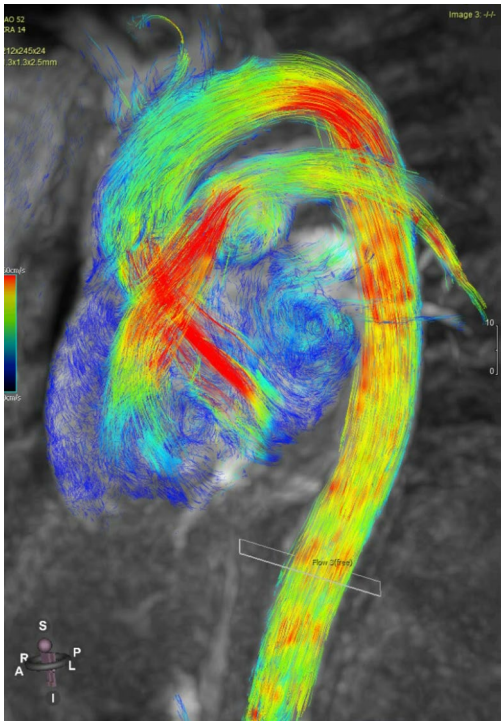
3.5. 4D Flow improvements

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma; MAGNETOM Prisma[fit]
Pre-requisite: Flow Quantification
Category: Optional feature

4D flow MRI has been broadly applied in cardiovascular disease due to its ability to image vascular systems with full volumetric coverage and provide a comprehensive non-invasive assessment of the vascular hemodynamics. With XA30, our improved 4D Flow acquisition offers full volumetric coverage. It provides orientation and enhances visualization of blood flow and velocity in cardiovascular anatomy. Hence it facilitates the analysis of useful hemodynamic parameters over entire cardiac cycle.

Benefits:

1. Sequence optimization now expands the benefits of 4D flow information from aorta to the whole heart.
2. Comprehensive 4D flow information on hemodynamics in the entire heart.



4D Flow Whole Heart: Hemodynamic information for the entire heart in a single acquisition

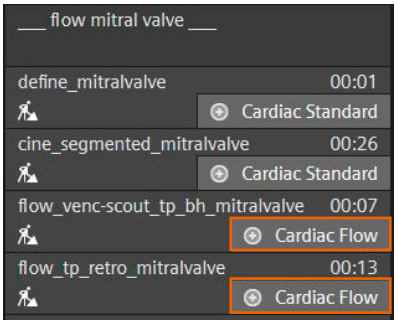
Post-proessing courtesy of Circle Cardiovascular Imaging. Siemens Healthcare is neither the provider nor reseller nor legal manufacturer of this product. Any claims made for this product are under the sole responsibility of the legal manufacturer, Circle Cardiovascular Imaging. Additionally, cmr42 4D Flow may not be commercially available in all countries. Please contact the legal manufacturer for more information.

3.6. Seamless integration of Cardiac Flow measurements in Cardiac Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Pre-requisites: Cardiac Dot Engine
Category: Optional feature

Cardiac Flow measurements require imaging in the isocenter for reliable quantification. With the new Cardiac Flow Add-in, the FOV is automatically moved to the isocenter for the respective protocols and, for subsequent scans, the table goes back to the general cardiac imaging position automatically, making new shims unnecessary. The workflow is improved and high quality is ensured. In addition, automatic positioning of the imaging plane is supported for the following views:

- Aortic Valve
- Mitral Valve



New Cardiac Flow Add-in in the protocols.

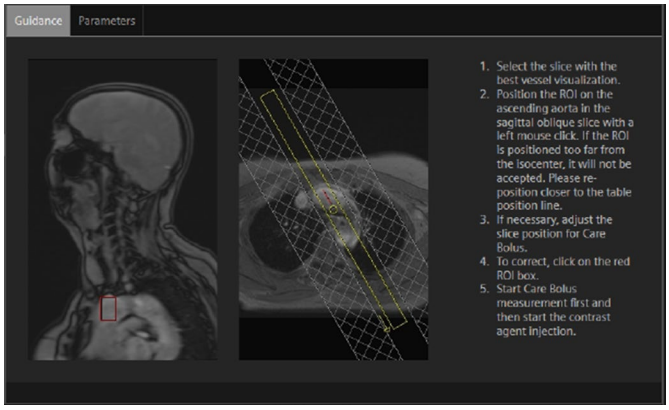
3.7. Care Bolus functionality of Angio Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Pre-requisite: Angio Dot Engine
Category: Optional feature

In addition to the existing Angio Dot Engine with Test Bolus, we now offer Angio Dot Engine with automated Care Bolus for peripheral angiographies and angiographies of the carotids. Guidance and view planning assistance are provided with dedicated instructions.

Benefits:

- Automatic bolus detection
- Fast, robust and standardized MRA examinations
- Text and image-based workflow guidance
- Various inline processing tools (e.g. subtraction, MIP generation)



Angio Dot Engine with Care Bolus: Guidance view for carotid imaging

Angio Dot Engine with Care Bolus: MIP – Subtraction image of pre- and post-contrast agent measurements

3.8. AutoAlign on valves and Flow Add-in in Cardiac Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Pre-requisite: Cardiac Dot Engine
Category: Optional feature

Cardiac examinations used to be the most complex exams in MR. Our Cardiac Dot Engine supports the user in many ways. Using anatomical landmarks, standard views of the heart, such as dedicated long-axis and short-axis views, are easily generated and can be reproduced readily using different scanning techniques. With *syngo* MR XA30, the Cardiac Dot Engine has been extended to support blood flow measurements. The paracoronal left ventricular outflow tract (LVOT) as well as the mitral valve and aortic valve (at end systole) are automatically planned.

The workflow for the valves consists of a

- cine acquisition based on a FLASH sequence to measure the valve opening
- venc scout
- flow measurement

Benefits:

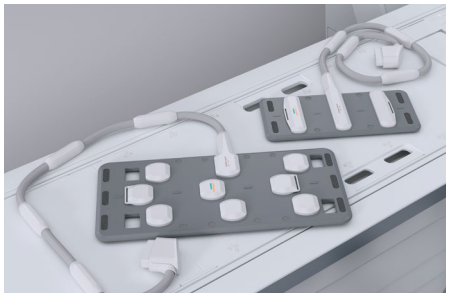
- Mitral and aortic valves and LVOT are automatically detected
- Automated flow workflow for e.g. regurgitation measurement in mitral and aortic valves

4. New coils

4.1. UltraFlex Large 18, UltraFlex Small 18

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

UltraFlex 18 Large and Small coils are very flexible multi-purpose coils that can be used for high-resolution imaging in e.g. unilateral hip, foot/ankle, hand/wrist or small FOV imaging in the body. The coils encompass an ultra-high coil element density with 18 coil elements (3 rows of 6 elements each) for up to 50% faster scans* and higher spatial resolution vs. Flex 4 coils. The UltraFlex coils are delivered with dedicated positioning aids for shoulder, knee, elbow and foot/ankle for easy and comfortable patient positioning.



UltraFlex 18 Large and Small coils

Applications:

- UltraFlex Large 18: Imaging of large regions such as medium to large shoulder, hip, knee, ankle, hand and head
- UltraFlex Small 18: Imaging of small regions such as small to medium shoulder, elbow, wrist, hand and head

* *achieved on 3T, acceleration times may vary with field strength*

4.2. Contour 24 / Contour 48 for MAGNETOM Skyra with Tim TX TrueShape

Available for: MAGNETOM Aera and MAGNETOM Skyra
Pre-requisites: Tim [204x48] configuration or higher
Category: Optional feature

On *syngo* MR E11 platform Contour 24 / Contour 48 coils have been available for MAGNETOM Aera and MAGNETOM Skyra (without Tim TX TrueShape option).

With *syngo* MR XA30 the Contour coils now become available also for MAGNETOM Skyra with pTx functionality (Tim TX TrueShape option).

Contour 24 coil

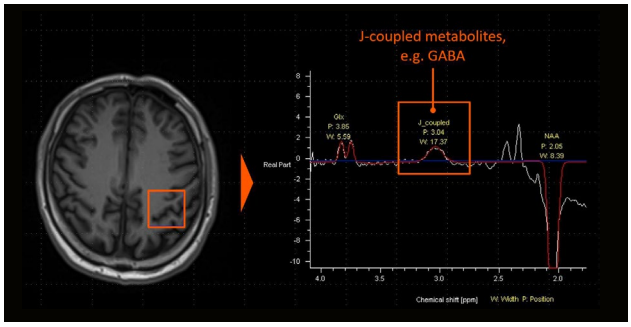
Contour 48 coil

5. New sequences, protocols and applications

5.1. Single-Voxel Spectroscopy Edit

Available for:	MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Pre-requisites:	Spectroscopy license
Category:	Included in spectroscopy
Note:	Available for 3T only

Single-voxel spectroscopy with editing pulses (SVS edit) extends the possibility of SVS to detect J-coupled metabolites such as GABA. In a normal spectrum, these signals are not easily recognizable as they are hidden below other spectral peaks. The editing pulse allows a two-step experiment: One SVS measurement with and one without the editing pulse. By subtracting the two spectra, the J-coupled metabolites can be visualized.



From a region in the brain (orange box on the left), a spectrum like the one the right can be created using SVS Edit. As can be seen, the signal from J-couple metabolites is now visible.

5.2. Multi-dynamic multi-echo (MDME) sequence for SyMRI

Available for:	MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category:	Included feature

TSE MDME is a special variant of the TSE pulse sequence, which acquires several contrasts (with different TI and TE, i.e. multiple delay, multiple echo) within a single sequence. The TSE MDME sequence is a prerequisite for generating synthetic MR images and analyzing brain myelinization with the postprocessing application offered by Synthetic MR. SyMRI Neuro can be purchased in the Siemens Open Apps store: **https://store.teamplay.siemens.com/**

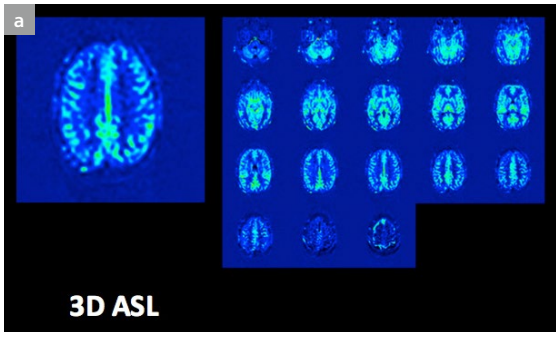
5.3. Pseudo Continuous Arterial Spin Labeling (PCASL) – 2D & 3D

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

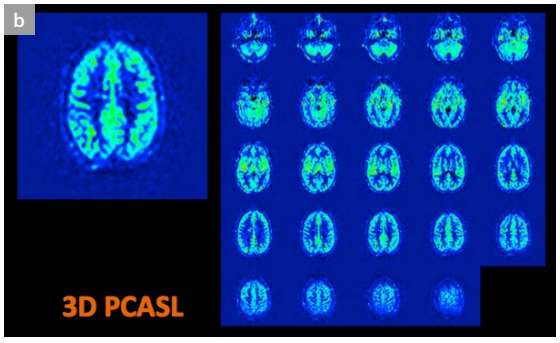
With PCASL[1] significantly higher perfusion signal/time is achieved. PCASL uses a narrow labeling plane through which flow-related adiabatic inversion of arterial spins occurs. The tagging is performed immediately proximal to the imaging volume and thus minimizes signal loss from the decay of labeled blood.

As a result, the following benefits are related:
- More slices, thinner slices in same acquisition time
- Less transit time dependency/increased perfusion homogeneity
- Improved background suppression method for 3D PCASL
- Faster 3D acquisition (with iPAT)
- Improved signal and improved image quality

PCASL is available for both 2D ASL and 3D ASL. As before, 2D ASL provides quantitative information while 3D ASL provides qualitative information only.



(a) 3D ASL 8 slices, 5.5 mm SD, coverage 99 mm, 2:50 min.



(b) 3D PCASL: 24 slices, 4.5 mm, coverage 108 mm, 2:31 min.

**Optional. 2D ASL and 3D ASL licenses remain as they are but will include respective PCASL variants.*

[1] Dai W, Garcia D, de Bazelaire C, Alsop DC. Continuous flow driven inversion for arterial spin labeling using pulsed radiofrequency and gradient fields.Magn Reson Med 2008; 60:1488-1497. (original description of PCASL)

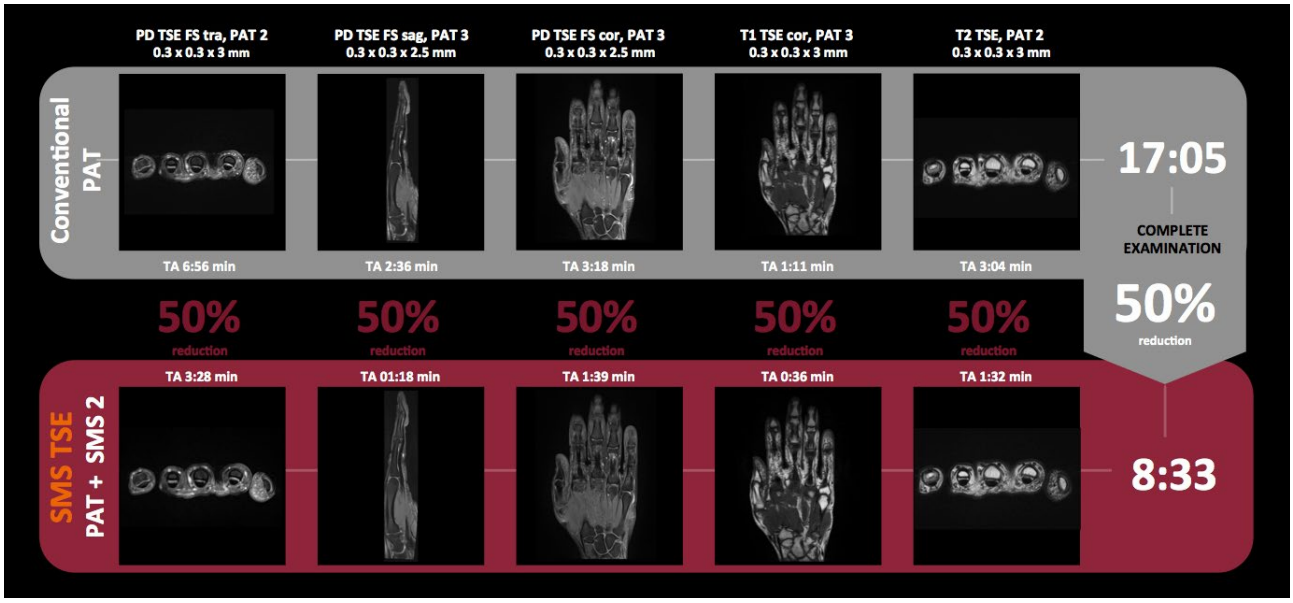
5.4. Simultaneous Multi-Slice TSE

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Optional feature, included in SMS license and Turbo Suite Excelerate package

Simultaneous Multi-Slice (SMS) concurrently excites multiple slices with a multiband pulse and then spatially encodes their signal simultaneously. While conventionally this would have led to the images from each slice overlaying on top of each other, excellent diagnostic images can be gained by separating the signals from each slice by using blipped CAIPIRINHA. By applying SMS, imaging can be accelerated by a factor equal to the number of slices that are excited simultaneously.

It is also possible to combine SMS and conventional parallel imaging.

With *syngo* MR XA30 this disruptive technique can be applied to TSE sequences with any type of contrast. Thereby, entire MSK exams can be accelerated by up to a factor of 50%[1]. Default SMS TSE protocols will be available for the following body regions: hand, hip, knee, ankle, and foot.



Significantly accelerated MSK scans with SMS TSE. Save up to 50%[1] exam time in orthopedic examinations.

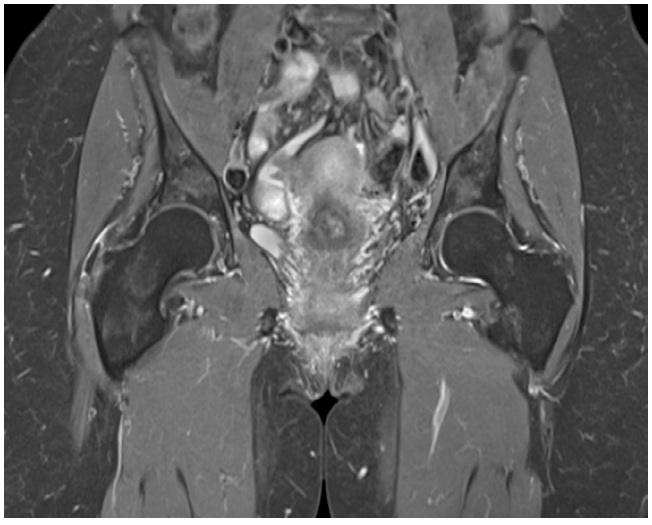
[1] *Data on file. Results may vary.*

5.5. Simultaneous Multi-Slice Dixon

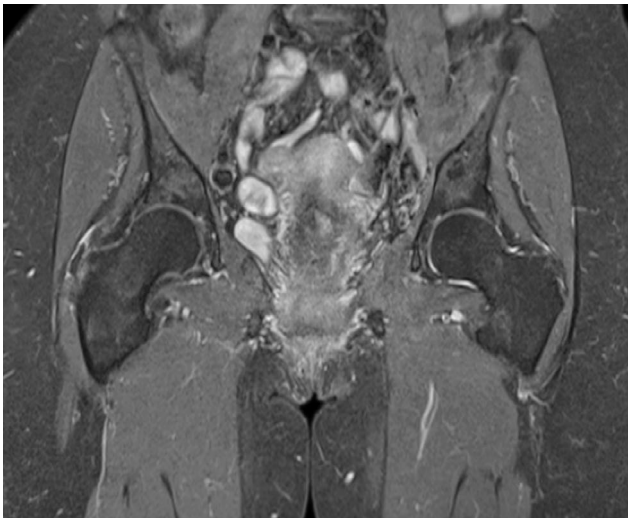
Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature, included in SMS license and Turbo Suite Excelerate package

Simultaneous Multi-Slice (SMS) concurrently excites multiple slices with a multiband pulse and then spatially encodes their signal simultaneously. While conventionally this would have led to the images from each slice being overlaid on top of each other, excellent diagnostic images can be gained by separating the signals from each slice by using blipped CAIPIRINHA. By applying SMS, imaging can be accelerated by a factor equal to the number of slices that are excited simultaneously. It is also possible to combine SMS and conventional parallel imaging.

With *syngo* MR XA30, this technique, can now also be applied to the TSE DIXON sequence. This sequence is extremely useful for MSK imaging with excellent fat suppression, i.e. for large FOVs or off-center exams (hand, elbow, wrist) or if multiple image contrasts are needed at the same time (in-phase, water, and fat).



PD TSE Dixon water, PAT 2



PD TSE Dixon water, PAT 2, SMS 2

MAGNETOM Altea (1aaaa3044)

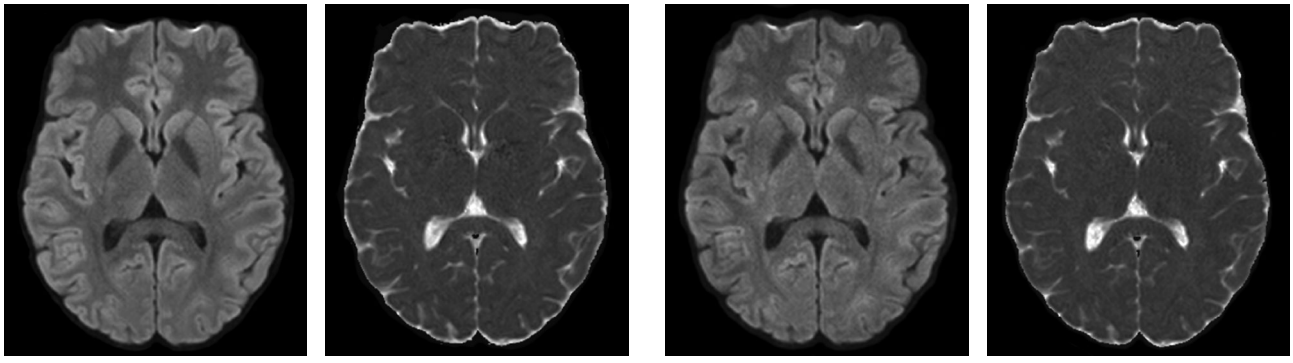
Sequence	TSE Dixon water	SMS TSE Dixon water
TR (ms)	2520	2700
TE (ms)	34	36
TA (min:sec)	**4:12**	**2:17**
Matrix	252 × 432	252 × 432
FOV (mm)	333 × 400	333 × 400
Slice thickness (mm)	3	3
Slices	36	36
iPAT factor	2	2
SMS factor		2

5.6. Simultaneous Multi-Slice RESOLVE

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature, included in SMS license and Turbo Suite Excelerate package

Simultaneous Multi-Slice (SMS) concurrently excites multiple slices with a multiband pulse and then spatially encodes their signal simultaneously. While conventionally this would have led to the images from each slice being overlaid on top of each other, excellent diagnostic images can be gained by separating the signals from each slice by using blipped CAIPIRINHA. By applying SMS, imaging can be accelerated by a factor equal to the number of slices that are excited simultaneously. It is also possible to combine SMS and conventional parallel imaging.

With *syngo* MR XA30, this technique, can now also be applied to the RESOLVE sequence. The shortening of TR, which is enabled by activating SMS, can either be used to substantially reduce acquisition times or can be used for a higher resolution scan in the same volume. Typical regions where SMS RESOLVE can be used are neuro or breast MRI exams.

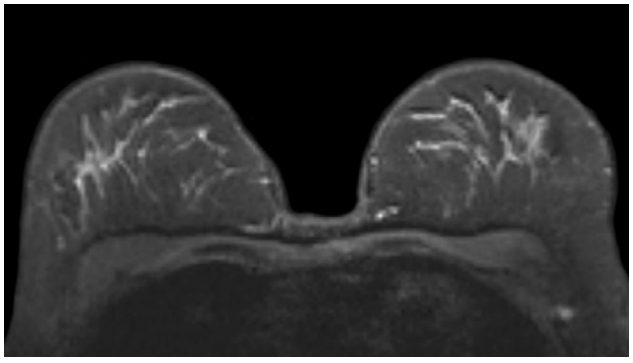


RESOLVE, b = 1000 s/mm^2 | RESOLVE, ADC map | SMS RESOLVE, b = 1000 s/mm^2 | SMS RESOLVE, ADC map

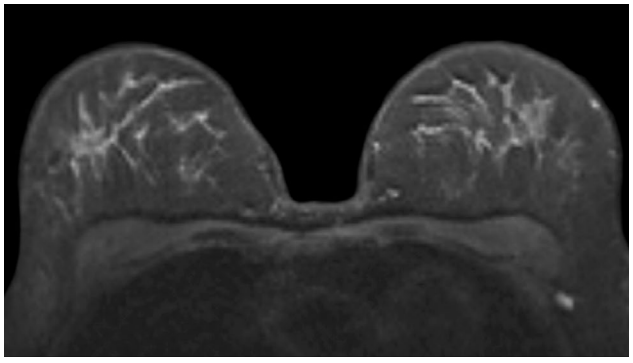
MAGNETOM Vida (3aaaa0784)

Cases acquired on 3T MAGNETOM Vida. Total examination times will vary with system field strength.

Sequence	RESOLVE, b 1000 and ADC map	SMS RESOLVE, b 1000 and ADC map
TR (ms)	6280	2970
TE (ms)	70.2	72.2
b-values (s/mm^2)	0, 1000 and ADC map	0, 1000 and ADC map
TA (min:sec)	**4:19**	**2:12**
Matrix	224 × 224	224 × 224
FOV (mm)	220 × 220	220 × 220
Slice thickness (mm)	4	4
Slices	3 × 26	3 × 26
iPAT factor	2	2
SMS factor		2



RESOLVE, b = 50 s/mm²



SMS RESOLVE, b = 50 s/mm²

MAGNETOM Vida (3aaaa0813)

Cases acquired on 3T MAGNETOM Vida. Total examination times will vary with system field strength.

Sequence	RESOLVE, b 50	SMS RESOLVE, b 50
TR (ms)	5320	3500
TE (ms)	49	51
b-values (s/mm²)	50, 800 and ADC map	50, 800 and ADC map
TA (min:sec)	**5:37**	**3:58**
Matrix	114 × 190	114 × 190
FOV (mm)	204 × 340	204 × 340
Slice thickness (mm)	5	5
Slices	34	34
iPAT factor	2	2
SMS factor		2

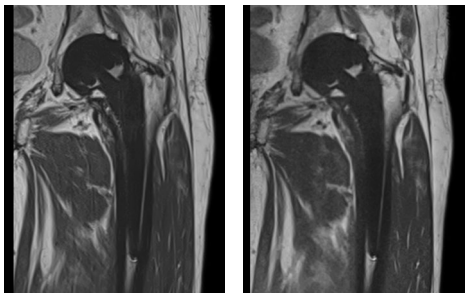
5.7. Compressed Sensing SEMAC

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature, included in Turbo Suite Excelerate package

CS SEMAC enables musculoskeletal imaging in patients with whole joint replacements[1] based on a combination of SEMAC (slice encoding for metal artifact correction) with Compressed Sensing undersampling and iterative reconstruction with reduced scan times. In SEMAC, through-plane artifacts are minimized by encoding and combining the signal from neighboring slices to compensate for signal voids. The higher the slice encoding factor, the better through-plane artifacts are compensated. However, acquisition time is also increased. Typically, applied slice encoding factors are 10–20 resulting in a substantial increase in acquisition time. At 3T, traditional acquisition times can exceed 10 minutes, depending on the chosen slice encoding factor. By applying Compressed Sensing acceleration to SEMAC, acquisition times can be substantially reduced.

- SEMAC supports Compressed Sensing acceleration with fixed acceleration in addition to conventional GRAPPA acceleration with selectable acceleration factor
- SAR optimization feature is included, which reduces the energy applied by the SEMAC pulse sequence
- Optimized protocols are offered for the knee

MAGNETOM Altea (1aaaa2955)



SEMAC CS SEMAC

Image examples acquired on 1.5T MAGNETOM Altea. Total examination times will vary with system field strength.

Sequence	SEMAC	CS SEMAC
TR (ms)	4360	4360
TE (ms)	40	40
TA (min:sec)	**6:54**	**3:03**
Matrix	320 × 320	320 × 320
FOV (mm)	280 × 280	280 × 280
Slice thickness (mm)	3	3
Slices	25	25
iPAT factor	4	
CS factor		8

[1] The MRI restrictions (if any) of the metal implant must be considered prior to the patient undergoing MRI exam. MR imaging of patients with metallic implants brings specific risks. However, certain implants are approved by the governing regulatory bodies as 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.

5.8. Compressed Sensing SPACE

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature, included in Turbo Suite Excelerate package

Compressed Sensing (CS) SPACE enables highly accelerated 3D imaging based on the SPACE pulse sequence with Compressed Sensing and iterative reconstruction:

- Spatial and/or temporal resolution can be improved, and scan time substantially reduced
- Optimized protocols are available for body imaging (triggered and breath-hold 3D MRCP), imaging of the brain and various musculoskeletal applications. Provided CS protocols are indicated and can be searched for as "_csX_" in the Siemens protocol tree, i.e. "t1_space_sag_cs7_iso"
- CS SPACE supports typical contrast such as T1, PD, T2, T2 Dark-Fluid, Double-Inversion Recovery and combination with Fat Saturation
- Best results can be achieved for contrast-rich, high-resolution applications such as T2 or T2 IR protocols

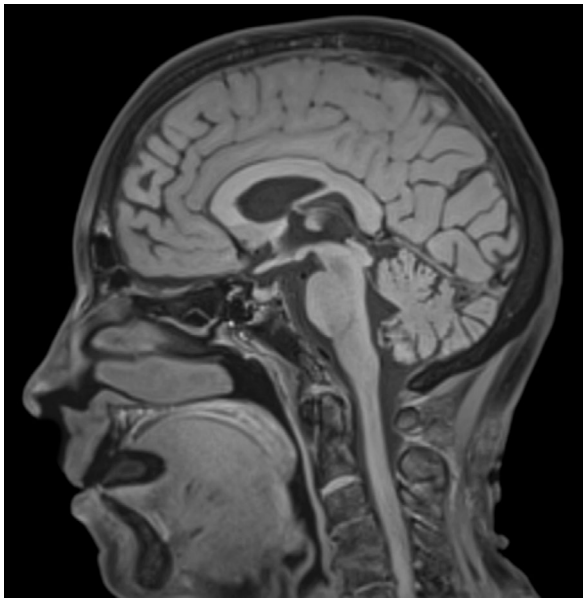
Best results can be obtained by adapting the provided Siemens CS protocols.

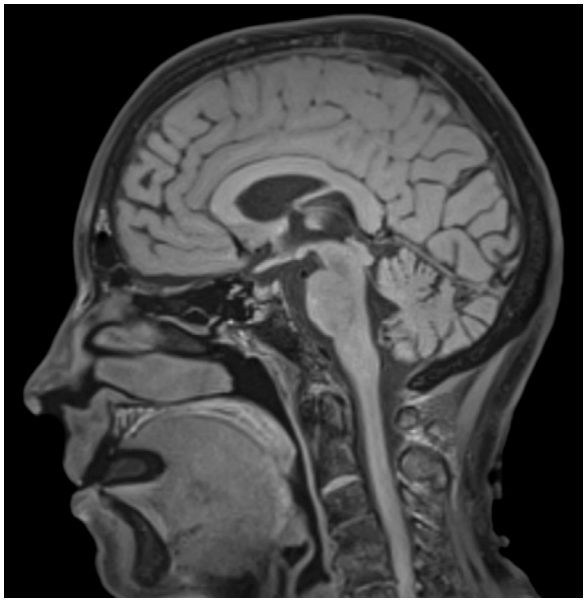
MAGNETOM Vida (3aaaa0783)

Example of CS SPACE 3D MRCP.

Image examples acquired on 3T MAGNETOM Vida. Total examination times will vary with system field strength.

Sequence	**3D SPACE, resp. trigg.**	**3D CS SPACE, resp. trigg**	**3D CS SPACE, breath-hold**
TR (ms)	4791.5	4546,3	2300
TE (ms)	703	700	701
TA (min:sec)	**7:16**	**1:26**	**0:15**
Matrix	753 × 768i	576 × 768i	560 × 704
FOV (mm)	380 × 380	285 × 380	239 × 300
Slice thickness (mm)	1	1	1.6
Slices	64	64	40
iPAT factor	3		
CS factor		20	23





MAGNETOM Vida (3aaaa0966)

Sequence	3D SPACE SPAIR	3D CS SPACE SPAIR
TR (ms)	707	707
TE (ms)	22	22
TA (min:sec)	**6:16**	**3:03**
Matrix	256 × 256	256 × 256
FOV (mm)	250 × 250	250 × 250
Slice thickness (mm)	1	1
Slices	160	160
iPAT factor	2	
CS factor		4

5.9. Compressed Sensing Time of Flight (TOF)

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature, included in Turbo Suite Excelerate package

CS TOF enables highly accelerated Time-of-Flight (TOF) MR angiography with Compressed Sensing under-sampling combined with iterative reconstruction:

- Spatial and/or temporal resolution can be improved and scan time substantially reduced
- Typical acceleration factors are between 6-10-fold acceleration, enabling 0.4-mm isotropic TOF acquisitions in 2-minute acquisition time
- Optimized protocols are offered for TOF MR angiography of the head (intracranial vasculature)

TOF Angio, TA 4:48 min

CS TOF Angio, TA 1:59 min

MAGNETOM Vida (3aaaa0784)

Sequence	TOF	CS TOF
TR (ms)	19	21
TE (ms)	3.4	3.7
TA (min:sec)	**4:28**	**1:59**
Matrix	441 × 512i	517 × 576i
FOV (mm)	181 × 200	199 × 220
Slice thickness (mm)	0.4	0.4
Slices	178	178
iPAT factor	2	
CS factor		10.3

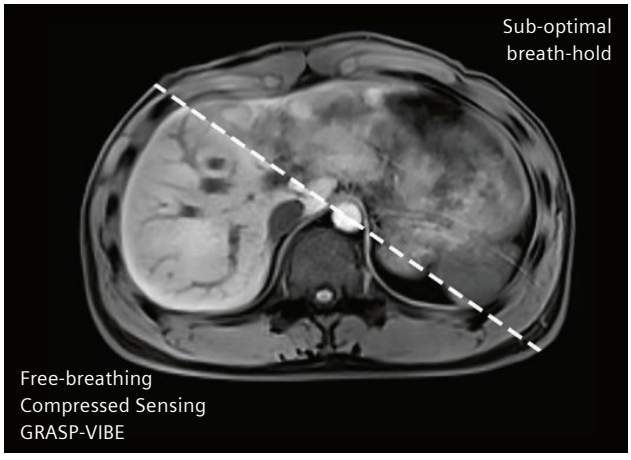
5.10. Compressed Sensing GRASP-VIBE

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Pre-requisites: High-End Computing option
Category: Optional feature, included in Turbo Suite Elite package

Compressed Sensing GRASP-VIBE (**G**olden-Angle **RA**dial **S**parse **P**arallel) makes it possible to conduct dynamic contrast-enhanced abdominal exams in free breathing. The acquisition is performed in one continuous run, using a golden-angle stack-of-stars radial scheme that reduces motion and provides the flexibility to choose the temporal resolution at reconstruction time based on the users needs. The temporal resolution may even vary over the duration of the scan. Reconstruction is performed using a Compressed Sensing accelerated iterative algorithm with per-voxel through-time regularization. The algorithm also automatically recognizes the typical phases in liver dynamics and therefore has the capability to only reconstruct a subset of clinically relevant images with respective labeling.

Additional features:

- Auto Bolus Detection at reconstruction time
- Configuration of exam phases in terms of start time relative to the auto-detected bolus arrival, duration, temporal resolution, and pre-selection for export to PACS
- Self-gating for further reduction of residual motion blur
- Includes FREEZEit+



5.11. Spin-Echo EPI – (SE EPI MRE) for MR Elastography

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

The new SE-EPI pulse sequence offers the acquisition of multiple slices in a single, short breath-hold, and provides improved robustness in patients with iron overload.

Spin-Echo EPI for MR Elastography (SE EPI MRE)

Spin-Echo EPI MRE is an alternative to a GRE-type sequence for MRE. It combines a SE sequence with a fast Echo-planar imaging (EPI) readout. Advantages of the SE EPI based approach are a higher robustness in patients with iron overload and a higher signal-to-noise ratio of the wave images compared with GRE-based MRE.

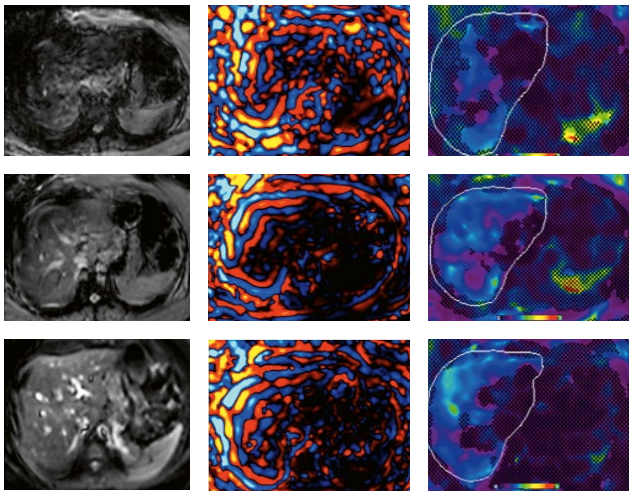


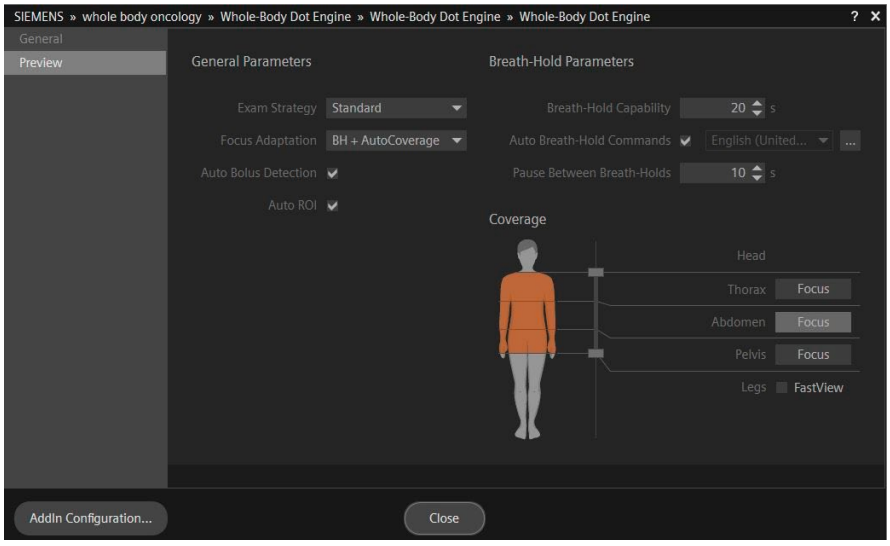
Figure reprinted with friendly permission from Felker ER, et al. Liver MR Elastography at 3 T: Agreement Across Pulse Sequences and Effect of Liver R2 on Image Quality. AJR 2018; 211(3):588-594.*

5.12. Whole-Body Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

The Whole-Body Dot Engine allows easy, seamless planning of multi-parametric, multi-station exams with automated recognition of individual anatomy. The Whole-Body Dot Engine also provides consistent settings for spatial resolution, image contrast, and breath-hold capacity.

- Landmark-based automatic segmentation of the anatomical regions based on FastView scan
- AutoCoverage: scan range across the chest, abdomen and pelvis can be easily defined with a coverage slider
- Automatic overlap of stations
- Additional stations for head and leg coverage can be added using the coverage slider
- Core Protocol with WB T2 HASTE, WB T1 VIBE, WB DWI, and whole-spine exam
- Protocol can be extended with dedicated scans of the focus regions Chest, Abdomen, Pelvis with dynamic exams of the respective regions
- AutoBolus detection for focus region Abdomen (liver)
- Supports 2D and 3D acquisitions in axial and coronal orientation
- Option to repeat stations flexibly (results are integrated accordingly during composing)



5.13. Fat Fraction % Maps

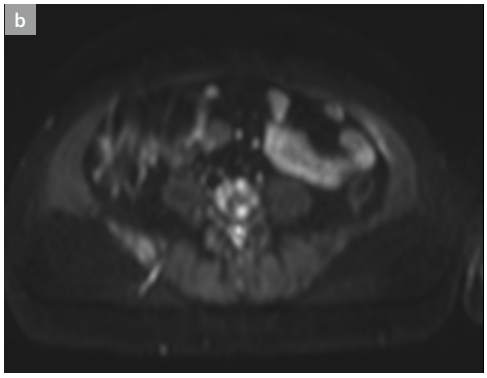
Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

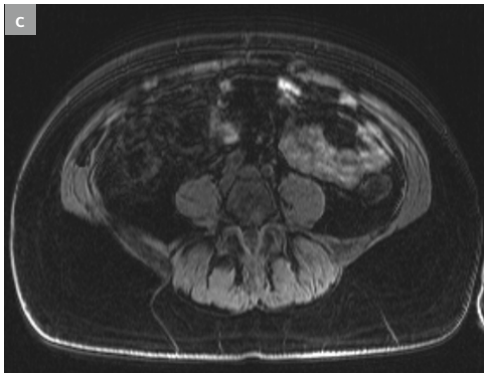
Inline calculation of Fat Fraction % Maps is based on a 2-point T1 VIBE Dixon technique (2pt FF % Maps) and composing of respective multi-station exams.

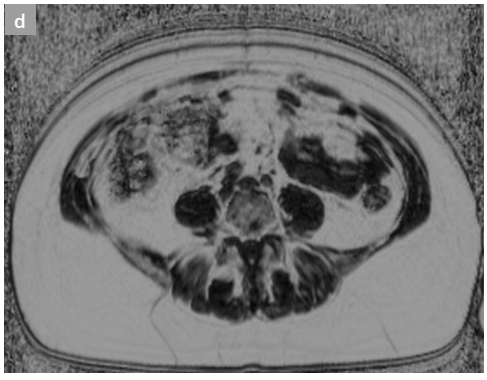
In patients with metastatic bone disease, lesions found in DWI (a, b) shall be confirmed in other contrasts, e.g., to exclude T2 shine through effects.

T1-weighted images may show subtle hyperintensity but the contrast between lesions and background is typically not strong.

For this purpose 2pt FF % Maps have the advantage of a much stronger lesion to background contrast, since normal red bone marrow is rich of fat (bright) while metastases contain no fat and are dark in fat-fraction maps.







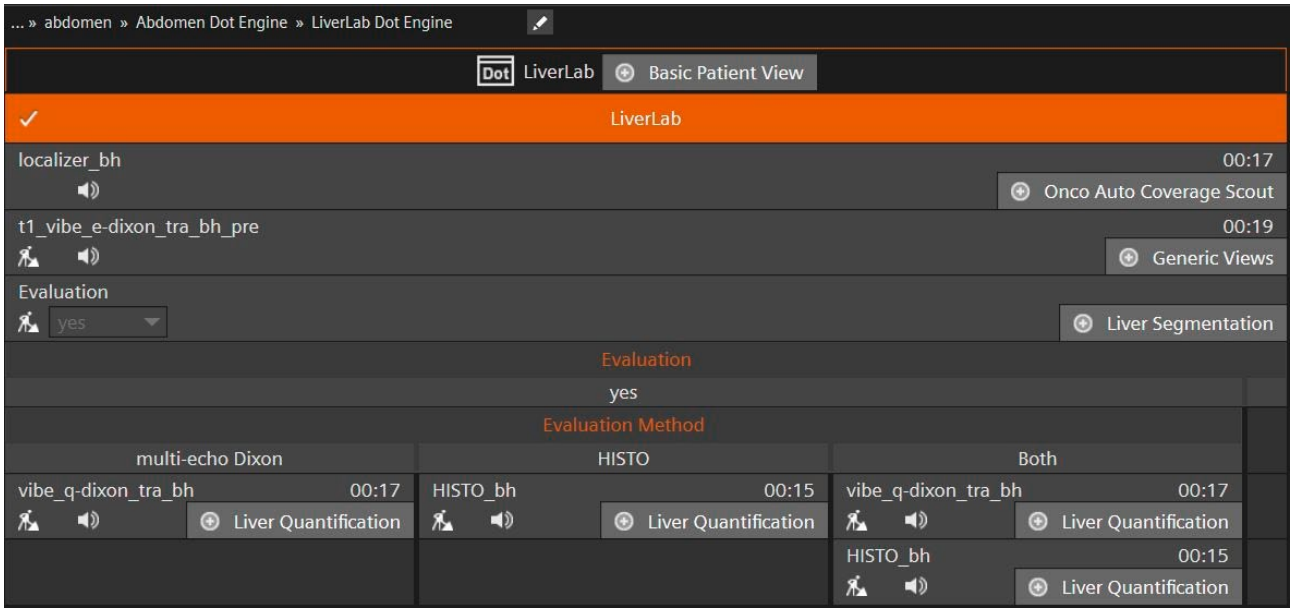
5.14. LiverLab Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

Evaluating the iron and fat content of the liver is an important step in monitoring early stages of disorders like nonalcoholic fatty liver disease (NAFLD), which are on the rise due to changing nutritional habits. LiverLab non-invasively provides information on liver fat content and iron overload.

Benefit

The package allows for detection of liver deposition disease (fat, iron, combined) with guided workflow steps and fully automated post-processing. Results are intuitively displayed in a color bar and maps (fat fraction/ R2*) indicating fat/iron overload. Liver Lab provides quantitative assessment of fat concen-tration and qualitative assessment of iron overload.

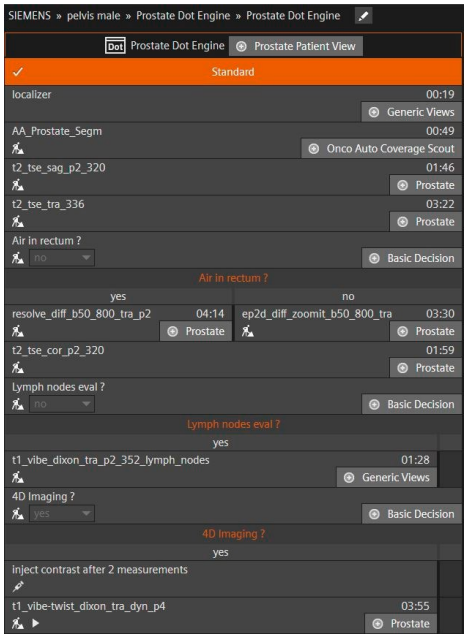


LiverLab Dot Engine strategies in our Dot Cockpit user interface.

5.15. Prostate Dot Engine

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma; MAGNETOM Prisma[fit]
Category: Optional feature

The Prostate Dot Engine is designed for fast, reproducible and standardized prostate MR examinations. Supports multi-parametric, multi-plane MR imaging according to the latest PI-RADS v2.1 recommendations. The operator is guided through one comprehensive workflow with decision points to adapt the strategy to individual patient conditions, while artificial intelligence provides support for planning and performing the procedure steps.



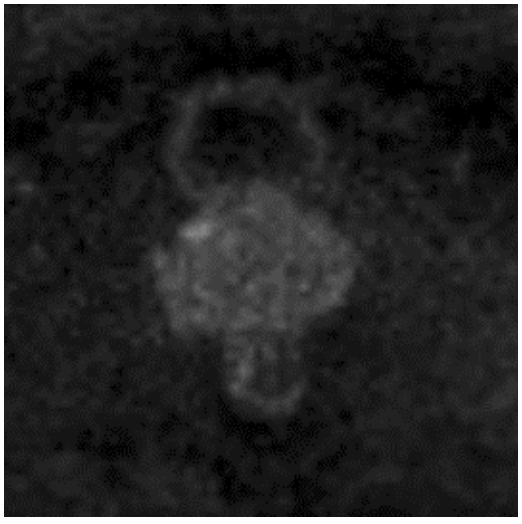
5.16. ZOOMit[PRO]

Available for: MAGNETOM Aera, MAGNETOM Skyra (not available for systems with Tim TX TrueShape)
Category: Optional feature

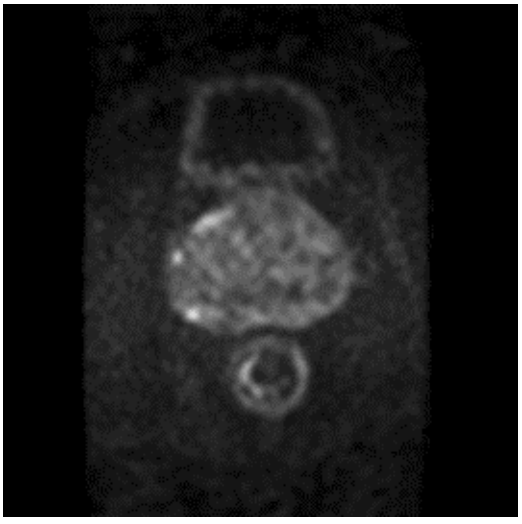
Diffusion-weighted imaging (DWI) is a decisive tool in body oncology for detection and characterization of disease. Artifacts caused by susceptibility effects are an issue but can be addressed with shorter echo times and echo spacing. One way to reduce the echo spacing is reduced FOV imaging with dedicated excitation pulses. Introducing a new sequence scheme for excitation and readout, reduced FOV imaging with DWI is enabled at both 1.5T and 3T.

Benefit

ZOOMit[PRO] allows for high-resolution and fast selective volume-of-interest diffusion-weighted imaging, e.g., of the prostate, the pancreas, the kidneys, the breast or the brain. With zoomed EPI, there is substantially less image blur and respiratory motion artifact and significantly higher diagnostic confidence. With the optimized pulse sequence scheme the acquisition technique is more robust in the presence of off-resonance effects, i.e. metal implants.



Conventional DWI



ZOOMit[PRO]

Images courtesy of Shanghai 6th People Hospital, Shanghai, P.R. China

MAGNETOM Skyra (WIP, VE11) – (2aaaa1515)

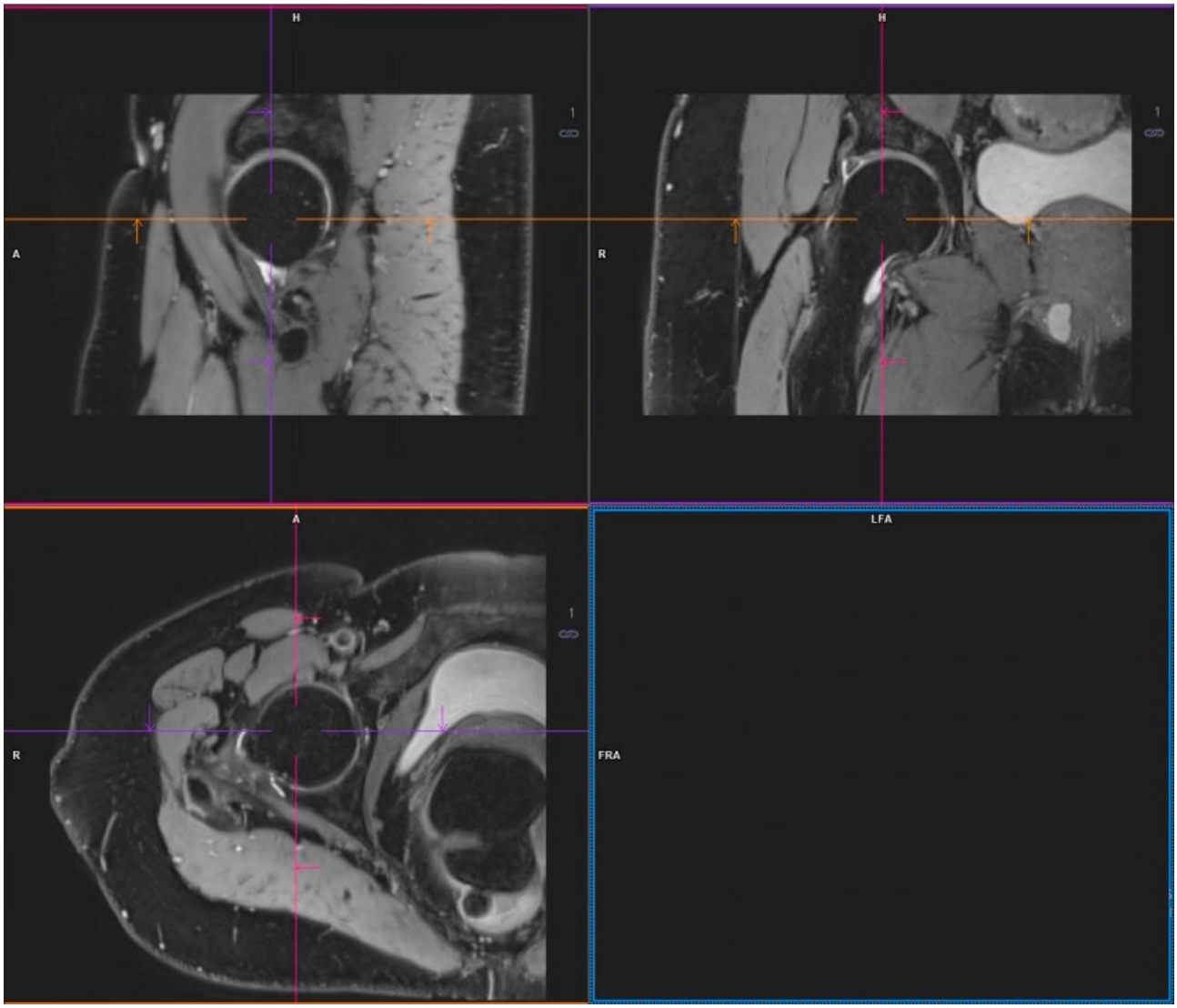
Sequence	Conventional DWI, b 1500	ZOOMit[PRO], DWI, b 1500
TR (ms)	4600	4600
TE (ms)	79	76
b-values (s/mm²)	50, 1000, 1500 and ADC map	50, 1000, 1500 and ADC map
TA (min:sec)	3:23	3:29
Matrix	132 × 178	56 × 100
FOV (mm)	**282 × 380**	**106 × 190**
Slice thickness (mm)	3	3
Slices	4 × 20	4 × 20
iPAT factor	2	

5.17. CAIPIRINHA SPACE

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Included feature

CAIPIRINHA (Controlled Aliasing in Parallel Imaging Results in Higher Acceleration) is an imaging acceleration technique which distributes the acquired k-space data more heterogeneously and therefore improves the SNR by up to 18%[1]. The higher SNR can be translated into higher imaging speed. CAIPIRINHA is standard and now also available for the SPACE sequence.

On the *syngo* MR XA platform, default protocols with T2 fatsat and PD weighting are provided for hand/wrist, unilateral hip, knee and foot/ankle exams. In the knee, for example, high-resolution scans with isotropic 0.5 mm resolution can be acquired in 4:41 min, which is a 50% reduction of the acquisition time compared to conventional PAT 2.



Isotropic, submillimeter 3D MSK examinations with CAIPIRINHA SPACE in 5 minutes acquisition time.

[1] *Breuer FA et al., Magn Reson Med 2006; 55 (3): 549-56.*

5.18. GOKnee3D

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Pre-requisites: Large Joint Dot Engine
Category: GOKnee3D is included in optional Large Joint Dot Engine

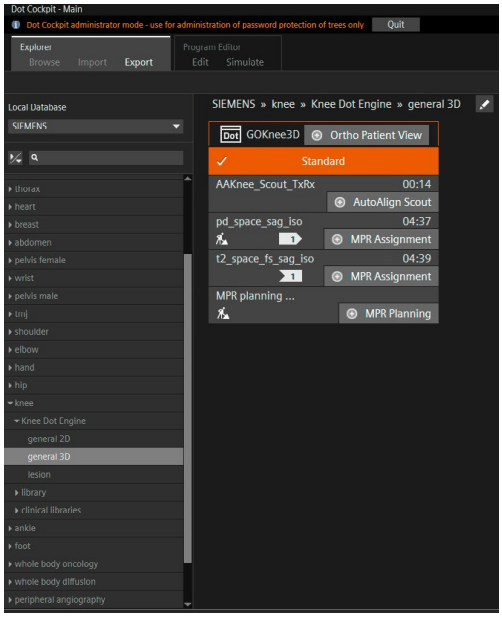
Conventional clinical imaging of the knee is typically performed with 2D TSE pulse sequences with high in-plane resolution (0.5 mm) but low through-plane resolution (2–4 mm) and with a slice gap. With 2D scans, multi-planar reformats are not possible, and the need to acquire each orientation separately can lead to longer exam times of approximately 20 minutes.

GOKnee3D is a push-button, clinically validated, high-resolution 3D isotropic exam of the knee which takes only 10 minutes.[2] GOKnee3D exam consists of AutoAlign localizer in the knee, PD weighted contrast and T2-weighted contrast with fat suppression.

Push-button functionality is enabled by AutoAlign Knee[3] providing high consistency in imaging. The 3D protocols are enabled by SPACE sequence with CAIPIRINHA acceleration. As the images are high-resolution 3D iso tropic, they can be reformatted in any plane.

On *syngo* MR XA30 the GOKnee3D protocol becomes available also for MAGNETOM Prisma and MAGNETOM Prisma[fit]. Prerequisite is the optional Large Joint Dot Engine. Once the Dot engine is available the protocol is available on the system directly – no need to download the protocol separately. To achieve the mentioned exam times a dedicated Tx/Rx Knee coil is required.

Acquired at 3 Tesla with Tx/Rx Knee 15. Total exam time will vary with system field strength with up to 11 minutes at 1.5 Tesla.



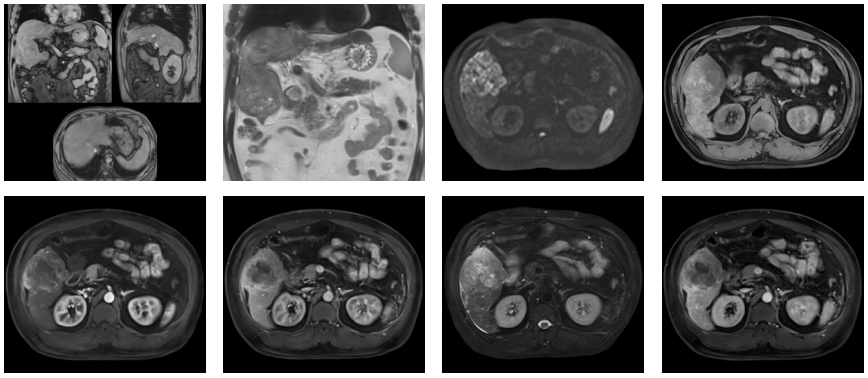
GOKnee3D protocol becomes available with Large Joint Dot engine

[1] *Fritz J et al. Three-dimensional CAIPIRINHA SPACE TSE for 5-minute high-resolution MRI of the knee. Invest Radiol 2016; 51(10): 666-676.*
[2] *Thawait GK. High resolution istropic 3D CAIPIRINHA SPACE MRI of the musculoskeletal system. MAGNETOM Flash 2016, 66: 30-38.*
[3] *Del Grande F & Fritz J. Fully-Automated 10-min 3D TSE MRI of Knee. 2017; Manuscript submitted for publication.*

5.19. GOLiver

Available for: MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Pre-requisites: Abdomen Dot Engine
Category: Protocols for 3T can be downloaded from MAGNETOM World website

GOLiver is a fast and semi-automated MRI workflow for abdominal MR exams in approximately 12 minutes of total examination time. The set of protocols including T2, DWI, T1 in/opp, and dynamic T1 protocols have been clinically validated and compared with an extensive abdominal MR exam in a number of clinical conditions, e.g., HCC, fatty liver disease, hemangioma, liver metastases and others by Changhai University, Shanghai. Due to the AutoAlign and AutoCoverage functionality of the Abdomen Dot Engine, the user is assisted throughout the exam, facilitating minimal user interaction, high reproducibility and standardization, and short exam times.



MAGNETOM Skyra (VD13, WIP)

Images courtesy of Changhai Hospital, Second Military Medical University, Shanghai, P.R. China

Sequence	T1 FLASH Localizer	T2 HASTE
TR (ms)	7.8	900
TE (ms)	3.7	97
TA (min:sec)	0:17	0:18
Matrix	179 × 256	240 × 256
FOV (mm)	430 × 430	425 × 340
Slice thickness (mm)	7	6
Slices	12	20
iPAT factor	2	3

Sequence	3D VIBE FatSat (3 phases)	T2 TSE SPAIR BLADE
TR (ms)	3.7	4574.2
TE (ms)	1.3	79
TA (min:sec)	3 × 0:12	3:19
Matrix	195 × 320	320 × 320
FOV (mm)	325 × 400	390 × 390
Slice thickness (mm)	3.2	6
Slices	3 × 64	33
iPAT factor	3	2

Sequence	Diffusion, b-value 1000	3D VIBE Dixon water (4 contrasts)
TR (ms)	3200	4.0
TE (ms)	62	1.3
TA (min:sec)	1:14	0:13
Matrix	128 × 128	195 × 320
FOV (mm)	390 × 390	325 × 400
Slice thickness (mm)	6	3.2
Slices	31	4 × 64
iPAT factor	2	CAIPIRINHA 3

Download Protocols

Download GOLiver protocols (.exar1 file) at
siemens.com/magnetom-world
> Clinical Corner > Protocols > Body & Pelvis

5.20. High Bandwidth Inversion Recovery

Available for: MAGNETOM Aera
Category: Optional feature
Note: Available for 1.5T scanners only

MRI is the gold standard modality when it comes to gaining information on myocardial tissue characterization.

High Bandwidth Inversion Recovery uses wideband techniques to reduce susceptibility artifacts, and therefore, extends the benefits of tissue characterization to these patients, enabling them to receive diagnostically robust imaging to visualize myocardial injury using tissue characterization.

This technique has been evaluated under clinical conditions and has shown robustness.

Benefits:

1. Extends benefits of cardiac inversion recovery imaging to patients prone to susceptibility artifacts.
2. Myocardial tissue characterization based on inversion recovery imaging.

5.21. PSIR HeartFreeze

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

Description:

PSIR HeartFreeze with motion compensation algorithms enables high-resolution PSIR imaging in free-breathing. This means you can extend the benefits of cardiac MRI viability assessment to even more patients, even to those with arrhythmias and those who cannot hold their breath.

Benefits:

- Acquire high-resolution PSIR imaging in free-breathing
- Extend the benefits of cardiac MRI to even more patients, even those with arrhythmias and those who cannot hold their breath
- Increase efficiency with shorter scan times

Customer experience with PSIR HeartFreeze

For Dr. João Cavalcante PSIR HeartFreeze was a game-changer. In his practice he was able to scan more vulnerable patients and at the same time increase his efficiency.

"Since we started using the PSIR HeartFreeze inline motion compensation application, we have been able to increase the number of CMR scanning slots from seven to nine per day. PSIR HeartFreeze helps us get high-quality diagnostic CMR images, even in the most challenging and vulnerable group of patients, reducing the overall scan time."[1]

João L. Cavalcante, MD
Minneapolis Heart Institute, USA

[1] *The statements by Siemens' 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 is from a person, who or whose institution is engaged in a collaboration with Siemens.*

5.22. Compressed Sensing Cardiac CINE Segmented

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Pre-requisite: High-End Computing Option
Category: Optional feature, included in Turbo Suite Elite package

In addition to Compressed Sensing Cardiac CINE real-time, the new application Compressed Sensing Cardiac CINE Segmented is a prospective or retrospective acquisition alternative for cooperative patients who can hold their breath with no significant arrhythmias.

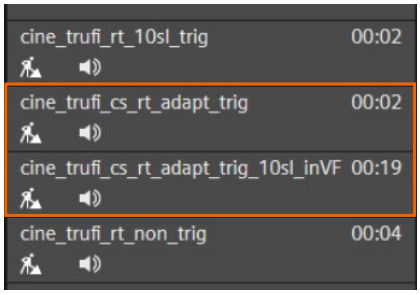
Benefits:

1. High acceleration factor
2. Faster imaging without loss of diagnostic detail
3. Ideal for imaging valves

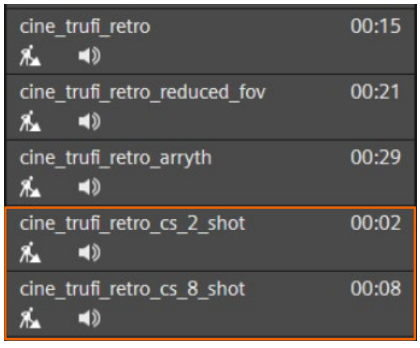
	Prospective triggering	Prospective triggering across > heart cycle	Adaptive triggering	Retrogating	Retrogating with arrhythmia detection
CS Realtime	Non-compliant patient, can't hold breath and/or is arrhythmic	Simultaneous visualization of heart contraction, breathing movement or for patients e.g. with strong arrhythmia to watch several heart beats. Not suitable for funtional evaluation.	Comnpliant patient without strong arrhythmia. Ideal solution for post-processing		
NEW!! CS Segmented (2 shot)	Comparable spatial and temporal resolution to the standard segmented protocol. For patients with arrhythmia.			Rhythmic patients, acquisition of full cardiac cycle.	Slightly arrhythmic patients, pro-longed acquisi-tions time
NEW!! CS Segmented (8 shot)				Rhythmic, compliant patient for highly increased temporal and spatial resolution.	

CS Protocols – Trufi

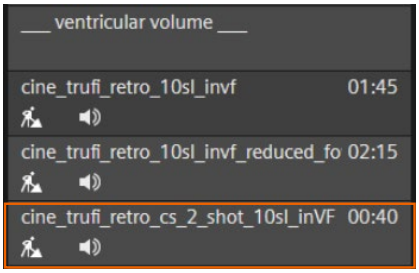
Realtime



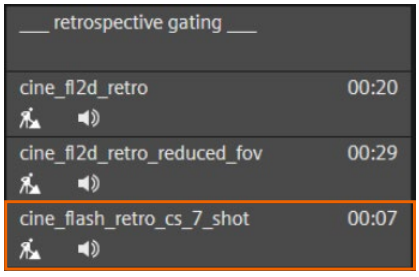
Retrogating



Retrogating



CS Protocols – Flash

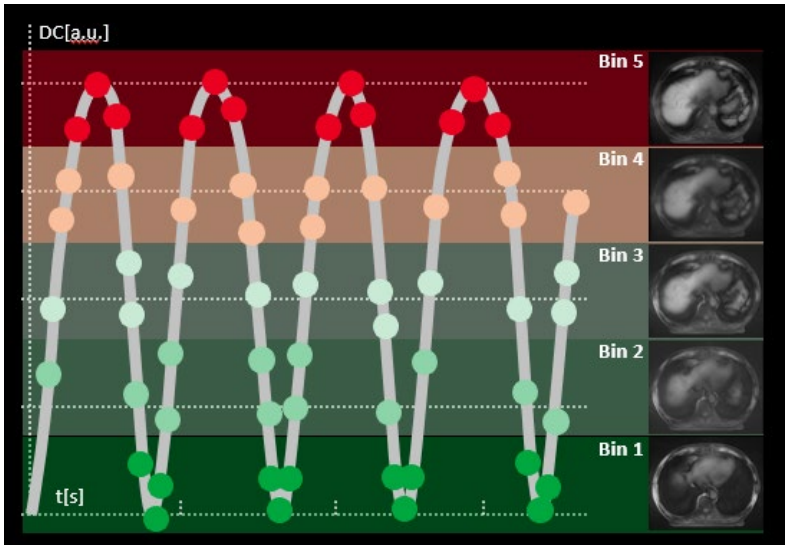


5.23. RT Respiratory Self-Gating

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

4D MRI – RT Respiratory Self-Gating is an MRI technique for capturing organ motion in the abdomen and thorax with excellent soft tissue contrast and automatic respiratory phase sorting during the entire acquisition time, all without the need for external respiratory devices or surrogates.

- 4D MRI is a free-breathing, non-contrast, 3D radial acquisition technique
- Images are automatically binned, or sorted, into separate discrete phases that correspond to a patient's distinct respiratory motion
- Allows for precise target delineation in the abdomen and thorax at each phase of the respiratory cycle
- Supports MR-based radiotherapy planning of moving targets in the thorax and abdomen without the need for external respiratory devices or surrogates



Filtered RT respiratory self-gating signal over time.

5.24. MR-Injector Coupling

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma^{fit}
Category: Optional feature

Contrast-enhanced MR imaging procedures, such as MR angiography (MRA) or dynamic contrast-enhanced (DCE) imaging in oncology, require precise timing of contrast injection and MR data acquisition to hit the first pass of contrast agent in the body region or tissue of interest.

Bayer Healthcare and Siemens Healthineers have jointly developed a hardware and software interface (ISI – Injector Scanner Interface)[1] enabling active coupling between the injector and the MR scanner.

It establishes a direct and constant data stream between the MR scanner and the injector control system, allowing a technologist at the MR operator console to release injections remotely. Combined with intuitive guidance provided by the Angio Dot Engine or the Abdomen Dot Engine, this provides a self-contained, intuitive workflow for high-quality and consistent contrast-enhanced procedures.

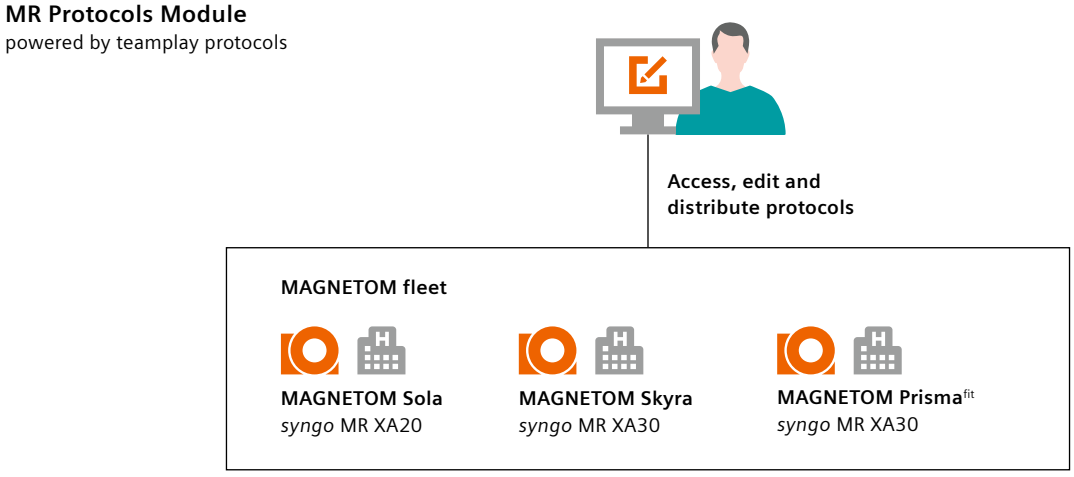
[1] *The information shown herein refers to products of 3rd party manufacturer's and thus are in their regulatory responsibility. Please contact the 3rd party manufacturer for further information.*

5.25. MR protocols module

Valid for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Optional feature

With the MR protocols module, we are introducing a new generation of MR protocol management in teamplay protocols. With this solution, the technologist or chief radiologist is now able to manage scan protocols from one central location. It is now possible to edit and distribute scan protocols across scanner types and configurations without interrupting scanner operation. Changes are distributed across the scanner fleet with one click.

Furthermore, the feature supports the setup of consistent examination protocols to maintain a common protocol structure across an enterprise fleet of scanners for different clinical demands. This ensures highest imaging standards for all patients.



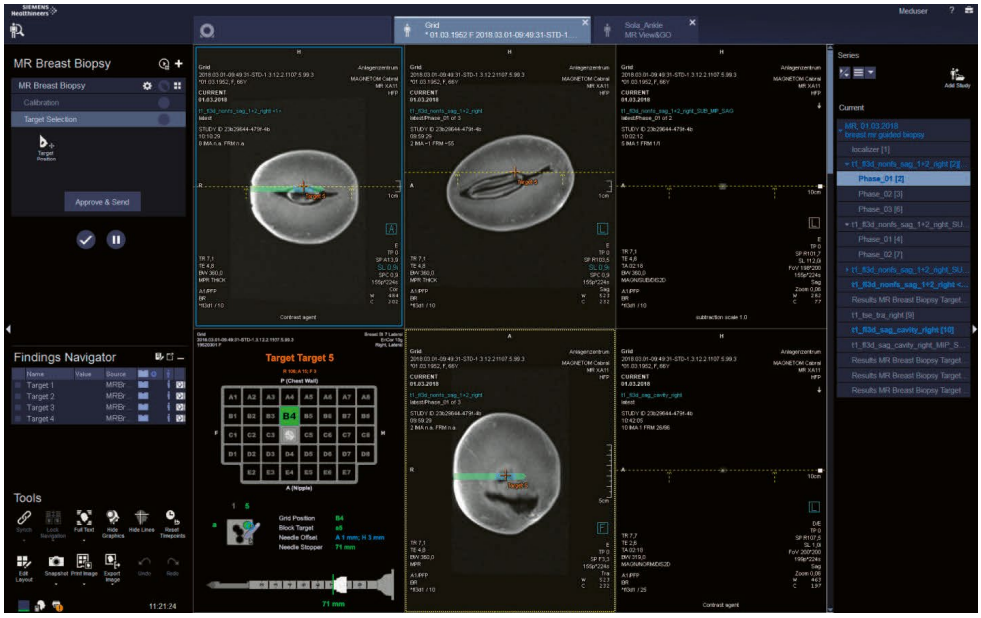
With MR protocols module, you can manage your scan protocols from one central location.

5.26. Breast biopsy software

Available for: MAGNETOM Aera, MAGNETOM Skyra, MAGNETOM Prisma and MAGNETOM Prisma[fit]
Category: Optional feature

The newly developed and designed Breast Biopsy software guides breast interventions such as vacuum-assisted biopsy and wire localization for streamlined interventions and high accuracy.

- Guidance for intervention planning and execution for both grid method and post/pillar method
- Automatic extraction of coordinates for the selected target and calculation of required point of entry, angulation (for post/pillar method) and penetration depth
- Projection of needle path on the planning images for control
- Support of coil-specific guidance with graphical instructions on both the console and the Select&GO display at the scanner
- Support of following MR breast coils: Breast BI 7, 2-/4-/8-Channel Sentinelle Breast Coil, 2-/10-/16-Channel Sentinelle Breast Coil



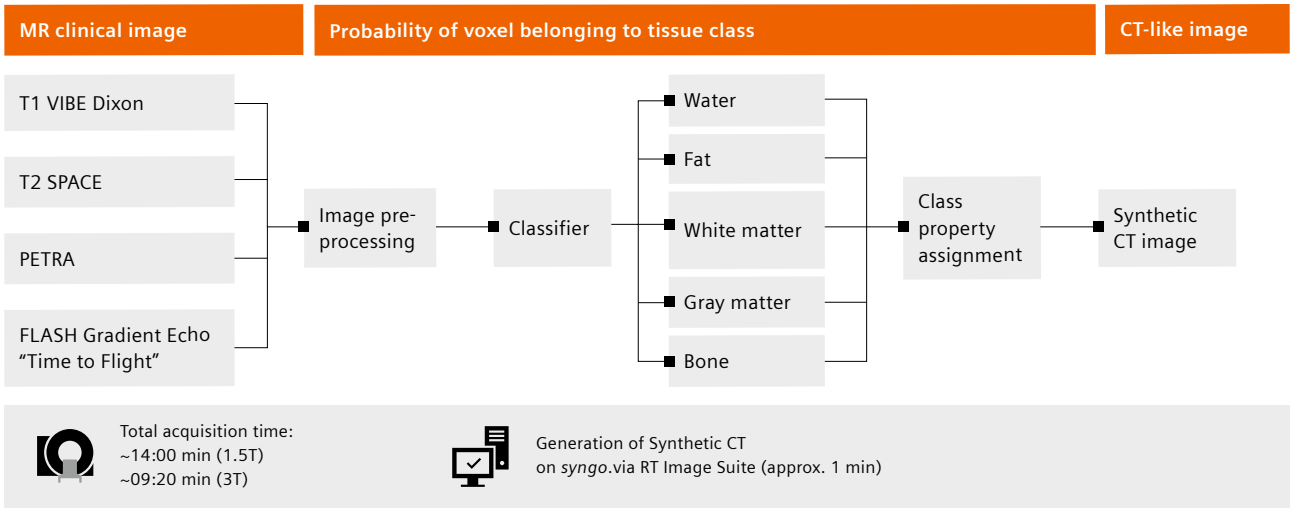
Breast biopsy software.

5.29. Synthetic CT images in RT Dot Engine

Available for: MAGNETOM Aera and MAGNETOM Skyra (not available for MAGNETOM Skyra with Tim [204x24] configuration)
Pre-requisites: FREEZEit and High-End Computing Option
Category: Optional feature
Note: Synthetic CT is a separate *syngo*.via RT Image Suite license

The RT Dot Engine includes optimized protocols and sequences for radiotherapy planning. With *syngo* MR XA30, the RT Dot Engine now covers brain, head & neck, and pelvis. The RT Dot Engine for brain and pelvis includes scan protocols for generating Synthetic CT images. The synthetic CT images can be generated on the right monitor on a separate workstation with the corresponding license.

Synthetic CT[1] generation for the brain



*Source: "Assessing the Domestic Accuracy of Magnetic Resonance-Generated Synthetic CT Images for Focal Brain VMAT Radiation Therapy" Paradis et al, International Journal of Radiation Oncology * biology * physics, Vol. 93, No. 5, p. 1154e1161, 2015;*

Visualization of the Synthetic CT algorithm for the brain from image acquisition to Synthetic CT image generation

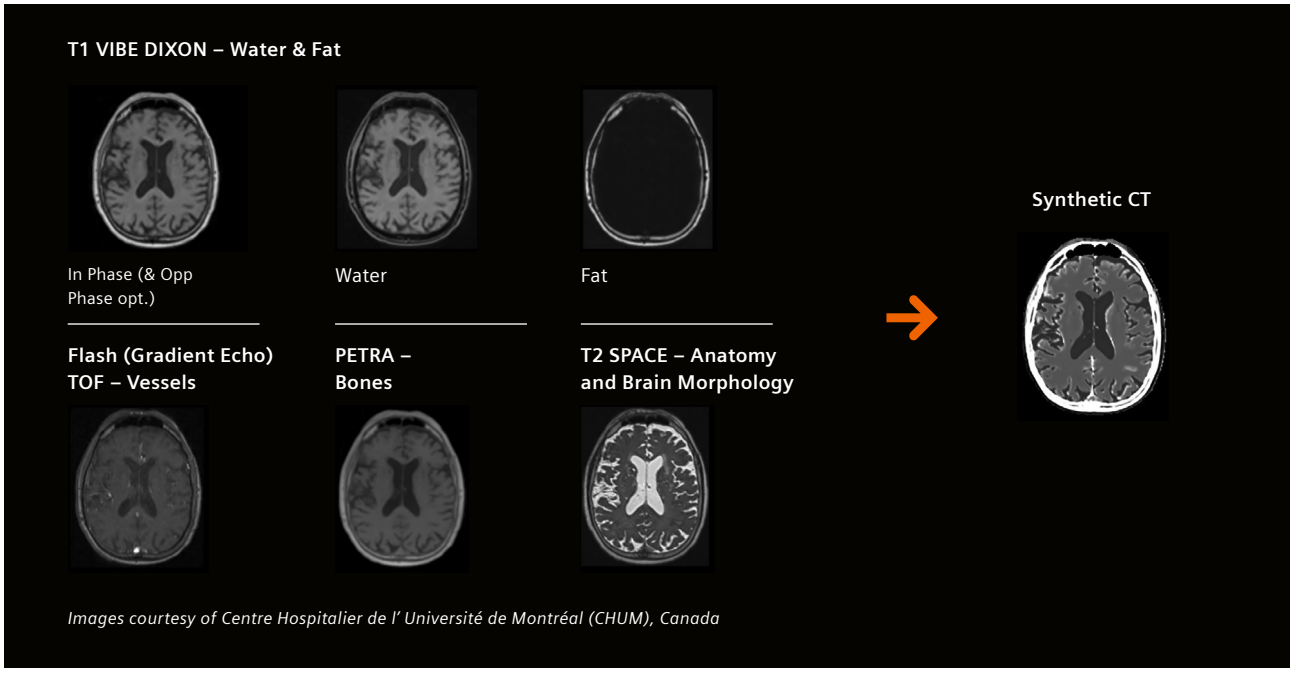


Image examples of MR sequences required to generate the Synthetic CT image for the brain arrange courtesy of Centre hospitalier de l'Université de Montréal – CHUM Montreal, Canada

[1] *The data acquisition protocols for Synthetic CT are available on VA11A software with MAGNETOM RT Pro edition for MAGNETOM Vida and MAGNETOM Sola.*

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