

An aerial photograph of a snowy mountain slope. Several skiers are visible, leaving behind a series of parallel, wavy tracks that ripple across the white snow. The skiers are wearing various colored gear: green, blue, red, and black. The perspective is from above, looking down at the skiers as they descend the slope.

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siemens.com/TrueShape

TimTX TrueShape

The parallel transmit architecture of the future.

The product/feature (mentioned herein) is not commercially available.
Due to regulatory reasons its future availability cannot be guaranteed.



TimTX TrueShape – Shape your pulse

TimTX TrueShape is Siemens' architecture for parallel transmit (pTx) technology. Based on an intelligent interaction of multiple, independent transmit channels, TimTX TrueShape breaks ground for a broad range of outstanding new magnetic resonance imaging (MRI) applications. Starting with *syngo* ZOOMit, a zoom function for MRI, TimTX TrueShape is the key to exciting future applications. Bringing TX array imaging into the clinical world with the first TrueShape application for clinical use, TimTX TrueShape also bears much potential for your research.



A whole new degree of freedom

The parallel transmit architecture of the future

TimTX TrueShape provides multi-channel TX array imaging, excelling in higher image quality and shorter scan times. Shape the RF pulse according to your application and experience a whole new degree of freedom. The results are higher image quality and faster scan times. With two transmit channels fully integrated into the system architecture of the 3 Tesla scanner MAGNETOM Skyra, you are ready for the future.



The sky is the limit

Designed for groundbreaking MRI applications

The intelligent interaction of independent transmit channels in TimTX TrueShape, enables the selective excitation of a specific body area. That's the key to a broad range of outstanding new MRI applications like zooming with *syngo ZOOMit*. Only the sky is the limit.

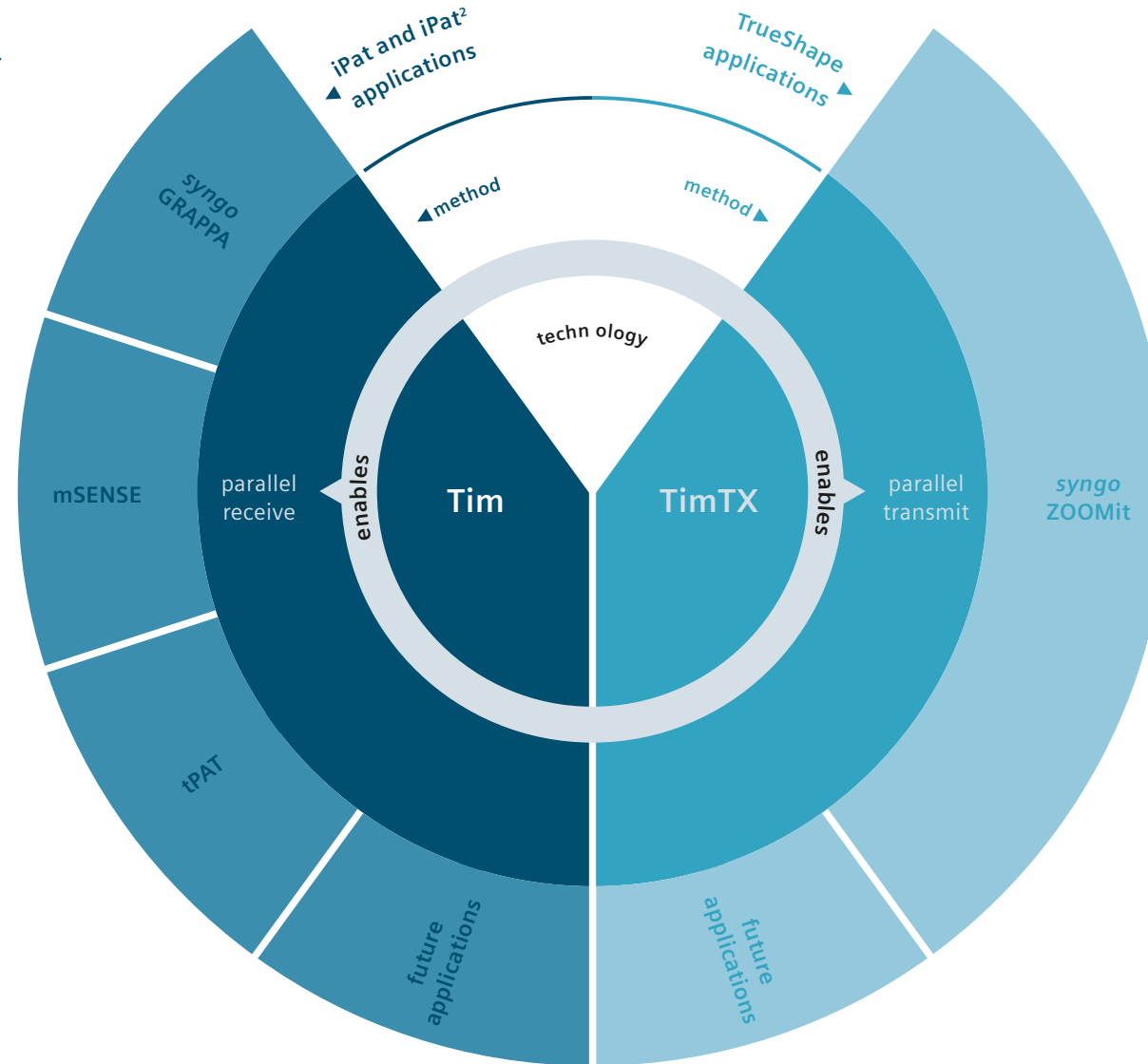


Open up new horizons

Parallel transmit for research and clinical use

TimTX TrueShape transfers parallel transmit technology from research into the clinical world with *syngo ZOOMit*, the first TrueShape application for clinical use. Allow this powerful technology to boost your research activities and open up new horizons.

TimTX complements Tim



As innovation leader in MRI, Siemens has set the trend in RF and coil technology. Around the world, Tim (Total imaging matrix) has changed the way of MR scanning. Our parallel receive technology is now in its 4th generation. Offering the highest channel configurations with up to 128 receive channels. With Tim accuracy, flexibility, and speed are the rule.

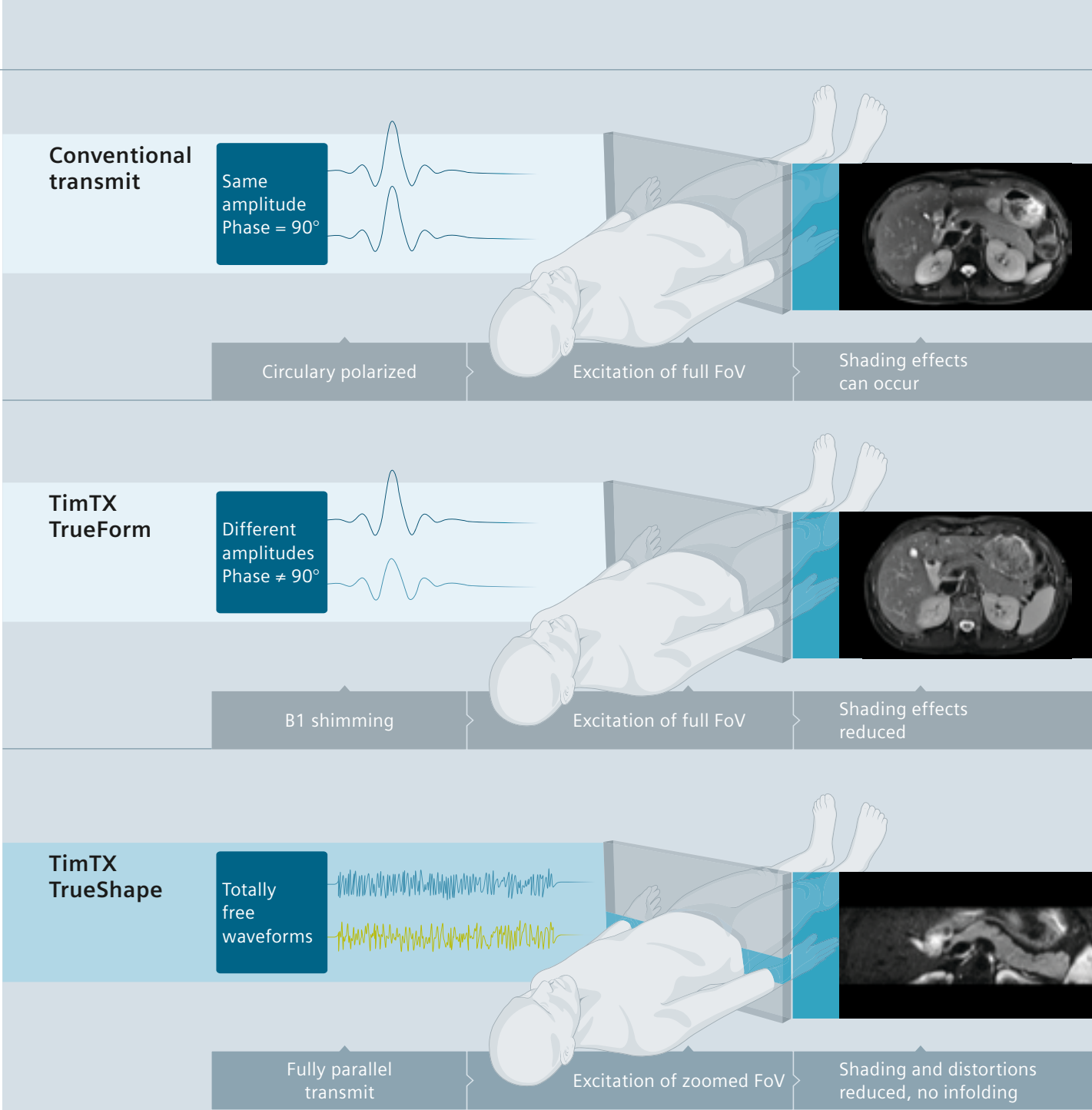
- Now, TimTX is completing Tim by adding transmit power to the parallel imaging intelligence of Tim.
- Tim and TimTX enable a broad range of existing standard and new MRI applications.
- Tim and TimTX – cover the full spectrum of MR imaging.

The way to outstanding new MRI applications

Conventional MR imaging uses RF pulses at a single amplitude and phase. At higher field strengths (3T) this may lead to shading artifacts, so called B1 inhomogeneities.

In 2007 Siemens was the first vendor to introduce TimTX TrueForm as standard B1 shimming solution for better image quality. TimTX TrueForm uses different RF pulse amplitudes and phases to reduce shading artifacts and increase image quality.

Now, Siemens again sets the trend in parallel transmit MRI. With TimTX TrueShape you will be able to shape your RF pulse freely to achieve a new degree of freedom in MR imaging. This is opening up the way to outstanding new MRI applications. Starting with syngo ZOOMit, the first zoom function in MRI. This unique parallel transmit application allows zooming in MRI for better diagnostic confidence. In addition, it provides beneficial clinical features like focussed B1 Shimming, B1 Mitigation in “zoom” direction, B₀ Compensation, and transmit SENSE. All paying into increased image quality and imaging speed.



Parallel transmit glossary

B1 inhomogeneities	If B1 is inhomogeneous, different locations in the image will have different signal and contrast. The image contrast cannot be made homogeneous by postprocessing. The problem needs to be addressed at its roots, e.g. by B1 Shimming and B1 Mitigation. B1 inhomogeneity can arise at higher field strength (3T and above).
B1 Shimming	In conventional imaging, the ports of the RF body coil are fed with identical amplitudes and a fixed phase shift of 90°. B1 Shimming means that the ports of the RF body coil can be fed with different amplitudes and a phase shift different from 90°. It can be used to achieve a higher B1 homogeneity. There are two approaches to B1 Shimming, anatomy specific and patient-specific. Both are two different means of B1 Shimming to achieve the same goal, higher B1 homogeneity (see below).
Anatomy-specific B1 Shimming	With anatomy-specific B1 Shimming, the different (amplitude/phase) settings for the ports of the RF body coil are taken from a look-up table consisting of anatomy specific pre-fixed values. TimTX TrueForm uses anatomy-specific B1 shimming. It achieves excellent B1 homogeneity without additional scan time or changing the workflow.
Patient-specific B1 Shimming	With patient-specific B1 Shimming, a B1 map needs to be measured. This changes the standard workflow and takes time. Based on the measured B1 map, the settings of the RF body coil are calculated. With TimTX TrueShape, you can also perform patient-specific B1 Shimming. But the benefit lies elsewhere: It enables fully parallel transmit applications like syngo ZOOMit.
B1 Mitigation	B1 Mitigation is a unique dynamic application to improve flip angle homogeneity beyond what can be achieved with B1 Shimming alone. This is achieved with sophisticated excitation pulses, typically multiple excitation "spokes" in the so-called excitation k-space. TimTX TrueShape and syngo ZOOMit features B1 Mitigation in the zoom direction, additionally to localized B1 Shimming of the excited FoV.
B ₀ Compensation	B ₀ is the main magnetic field. Conventionally, B ₀ homogeneity can be improved with B ₀ Shimming. Siemens unique B ₀ Compensation with dynamic parallel transmit pulses is an additional means to compensate for remnant B ₀ inhomogeneities. With sophisticated excitation pulses, the phase of the spins can locally be altered to counteract and compensate the phase shift due to B ₀ inhomogeneities. This will mitigate susceptibility artifacts and improve fat saturation.
Transmit SENSE	The principle of Transmit SENSE is the same as Parallel Imaging (mSENSE or GRAPPA) on the receive side. Parallel imaging results in fewer phase-encoding steps for the same spatial resolution and, consequently, shorter scan times. Siemens unique Transmit SENSE results in a reduction of the length of the excitation pulse to achieve the same excitation quality, e.g. the steepness of the excitation profile, in less time.

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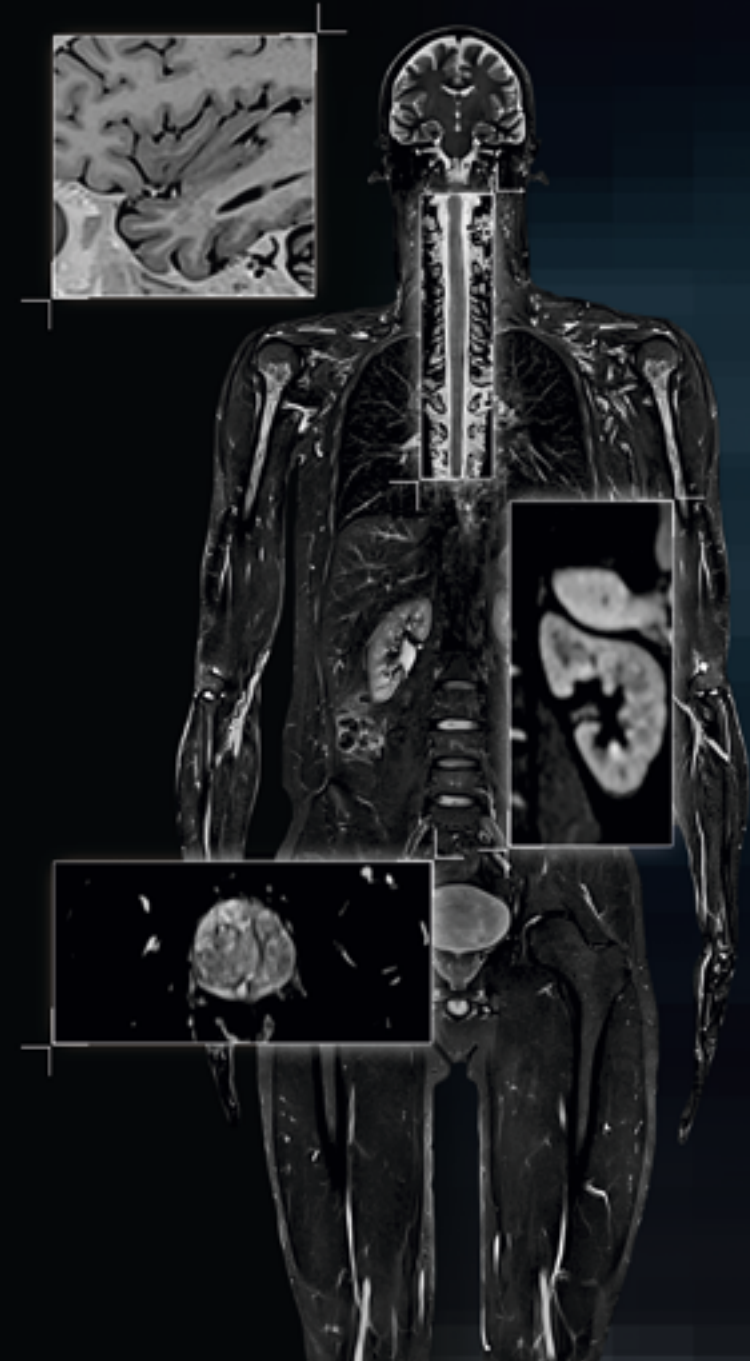
syngo ZOOMit

The first TimTX TrueShape application for clinical use.

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syngo ZOOMit – Shape your image

syngo ZOOMit is the first zoom function for MR imaging ever. Based on TimTX TrueShape, Siemens' parallel transmit technology, *syngo* ZOOMit creates a zoom effect during MR imaging. This unique application uses selective excitation to allow you to shape your image. Use *syngo* ZOOMit to highlight regions, organs, or even features of an organ. This speeds up the scan and improves the image quality in the selected zoom area. As innovation leader in MRI, Siemens introduced *syngo* ZOOMit as successful start of a broad range of TrueShape applications that will change the game in MRI.



Create a MRI zoom through selective excitation

Based on TimTX TrueShape, *syngo* ZOOMit creates a zoom effect during MR imaging. Thanks to multi-channel transmit technology with its fully flexible wave forms, you can select a small stripe instead of a large excitation plane. This will allow you to perform a targeted excitation. Data volume is reduced from the very start, as well as time effort for phase-encoding steps. The scan will be faster and image quality in the selected zoom area is considerably improved.

The first TrueShape application for clinical use

With *syngo* ZOOMit, Siemens is the first company to provide a zoom function for MR imaging. Enabled by Siemens' parallel transmit (pTx) technology TimTX TrueShape, it is the first of a broad range of TrueShape applications for clinical use. As innovation leader, Siemens creates the future of MRI – impressively demonstrating how to get the most out of a promising technology like pTx.

Be part of the future with TimTX TrueShape

Collaboration is the key for innovative MRI technologies and applications. Based on Siemens' large network of innovation partnerships, *syngo* ZOOMit is the result of fruitful collaboration backed by the pTx architecture TimTX TrueShape. And this is only the beginning of the capabilities of parallel transmit technology. Together, let's explore the limits.

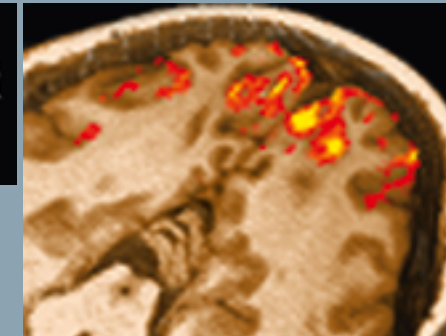
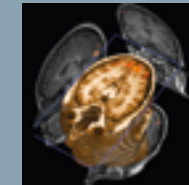
See more details – and less distortions. In less time.

Neurological Imaging

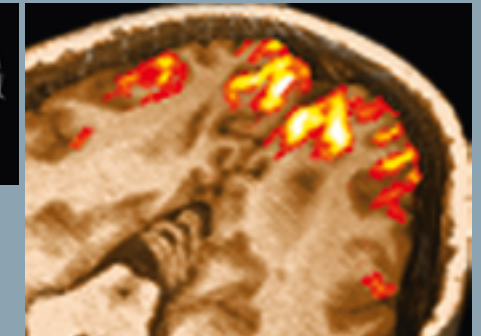
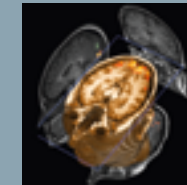
In this example of a finger-tapping experiment activation patterns become visible in the moto-cortex. On the basis of zoomed data acquisition, you see more coherent better delineated activation patterns.

Functional Brain Mapping

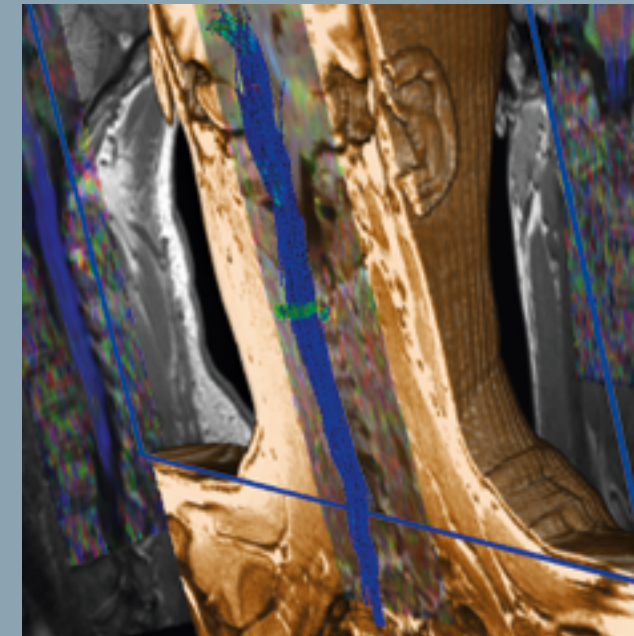
Conventional



With syngo ZOOMit



DTI of the spine



Due to susceptibility issues EPI in other body parts than the brain used to be difficult. Now, with zoomed EPI you can go down the CNS easily. In this case you see one of the first examples of tractography evaluation in the C-spine – at pristine image quality!

Adding value to Neurology, Oncology, and MSK imaging

syngo ZOOMit is especially beneficial for brain, prostate and pancreas, as well as spine applications, and in the visualization of the hip and shoulder joints.

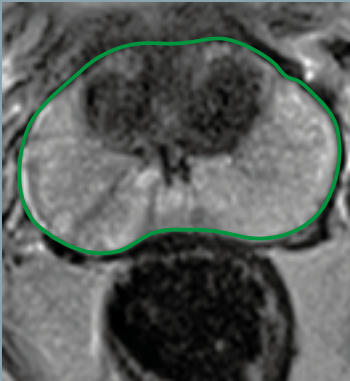
- Based on EPI or SPACE sequences
- Higher resolution, less time, less artifacts

See more details – and less distortions. In less time.

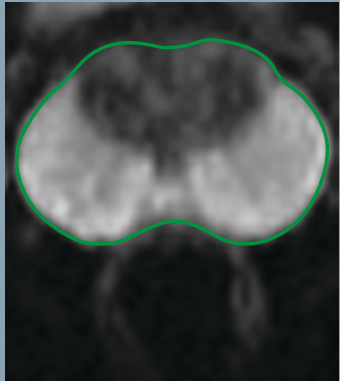
Functional Prostate Imaging

syngo ZOOMit leads to more accurate prostate imaging in multi-modal MRI. In this DWI case imaging time in the zoomed and conventional image are the same but spatial resolution increased along the phase encoding direction. With this the in-plane voxel size of the zoomed DWI is only 1.6 x 1.6 squared mm, at 3 mm slice thickness. Result: Close to distortion free DWI imaging agreeing very well with anatomical imaging.

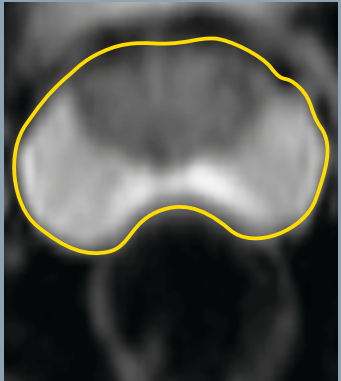
Anatomy



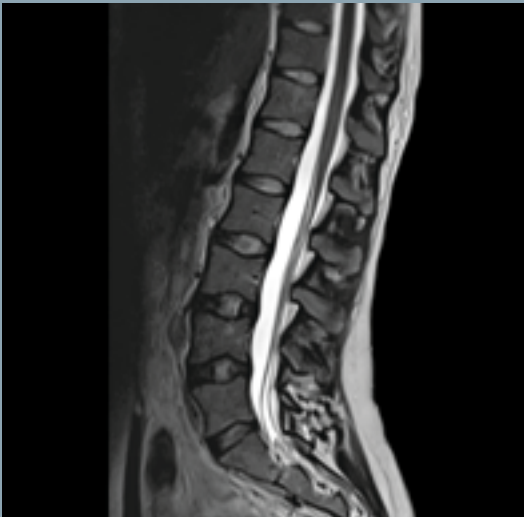
Zoomed DWI



Conventional DWI



Conventional in 6:01 min
(isotropic high-resolution SPACE)



Zoomed in 3:20 min



Musculoskeletal Imaging

You can acquire a high-resolution anatomical MRI of the lumbar spine – up to 45% faster.

Benefits of *syngo* ZOOMit at a glance:

Due to

Shorter echo trains

Focussed B1 Shimming and
B1 Mitigation on zoomed FoV

B₀ compensation

No signal from outside zoomed FoV

Only zoomed FoV must be encoded

Higher image quality

- Less distortions, less blurring
- Higher B1 homogeneity due to zooming
- Better fat saturation
- Less motion and flow artifacts
- Increased spatial resolution in region of interest

Higher image speed

Only zoomed FoV must be encoded

Fewer phase-encoding steps

- Shorter echo trains
- Shorter scan time

First parallel transmit application
now and many more in the future

Future security

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Not for distribution in USA.

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Order No. A91MR-6-1C-7600G | Printed in Germany | CC MR WS 03122.5 | © Siemens Healthcare GmbH, 2016

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