

3T Unlimited



iPAT on MAGNETOM Trio
The Importance of iPAT at 3T

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The Rise of 3T Whole-Body Imaging

3T MR imaging has reached a new milestone with the arrival of the MAGNETOM Trio on the market. MAGNETOM Trio is the first whole-body 3T MR machine of a new generation, offering a whole set of local coils for 3T applications from head to toe.

The advantages of 3T field strength are twice the signal-to noise Ratio (SNR) of 1.5T field strength or increased chemical shift. However, some 3T challenges still remain. Susceptibility effects and consequently image distortions are more pronounced compared to 1.5T. Specific Absorption Rate (SAR – or the energy deposited in the body by the radio frequency transmission) increases by factor of 4 when going from 1.5T to 3T.

Siemens overcomes these challenges with Integrated Parallel Acquisition Techniques (iPAT). iPAT is a technique that uses multiple element coils to receive signal in parallel therefore reducing the total acquisition time or increasing the resolution of a scan. MAGNETOM Trio is equipped with iPAT as a standard feature!

How does iPAT serve 3T applications?

1. Overcome susceptibility effects and blurring

iPAT in single-shot techniques reduces blurring and minimizes susceptibility artifacts – which are typically twice as large at 3T than 1.5T. Therefore, iPAT helps overcoming susceptibility induced geometric distortions. This is particularly useful in echo planar imaging based techniques.

2. Keep SAR low

SAR increases by a factor of 4, when going from 1.5T to 3T. This means that SAR limits are more rapidly reached. iPAT reduces the number of RF excitation pulses and therefore reduces SAR deposited in the patient. Note that iPAT is only one component of the unique Siemens 3TCare initiative, which consists of developing new methods to reduce SAR for best 3T whole-body applications.

3. Utilize the extra 3T SNR to minimize acquisition time or maximize resolution

Because SNR at 3T is twice the SNR at 1.5T, the signal loss associated with iPAT – proportional to the square root of the acceleration factor – is not clinically relevant. This means you can use higher iPAT factors at 3T compared to 1.5T. In turns, this allows you to speed up your acquisitions or increase your resolution.

3T Unlimited



MAGNETOM Trio RF configuration

With the best RF configuration on the market, MAGNETOM Trio enables you to take advantage of the benefits of iPAT at 3T. Leader in RF technology, Siemens offers eight 1 MHz fully equivalent, iPAT-compatible, RF channels. MAGNETOM Trio is equipped with 8 channels as standard.

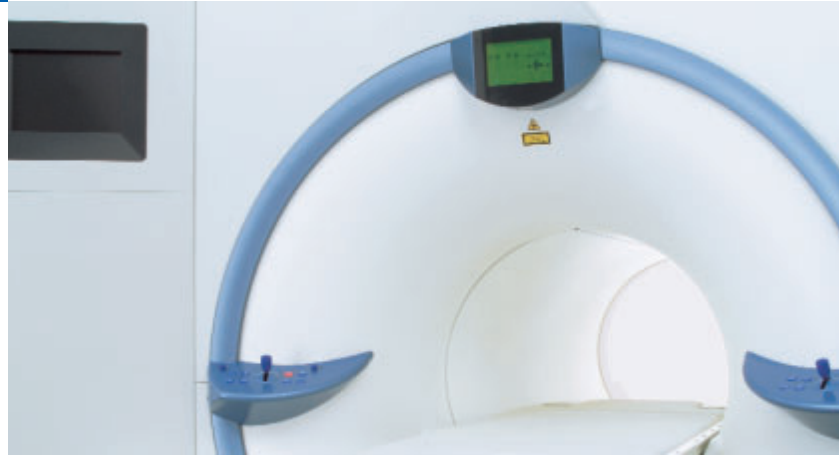
MAGNETOM Trio iPAT compatible coil family

MAGNETOM Trio features a whole set of local coils. Thanks to the standard 8 RF channels, all these coils have the largest number of elements available on the market, enabling to use iPAT to the highest factors.

Available with *syngo* MR 2003T and *syngo* MR 2003A are:

- 8-channel Head Array, iPAT-compatible
- Spine Array, 12 elements, iPAT-compatible
- Cardiac Array, 8 elements, iPAT-compatible
- Body Array, 8 elements, iPAT-compatible
- Neurovascular Array, 8 elements, iPAT-compatible

MAGNETOM Trio iPAT compatibility



iPAT is a standard feature of MAGNETOM Trio, with acceleration factors up to 4 in 2D imaging!

The MAGNETOM implementation of iPAT covers all sequences you can think of.

MAGNETOM Trio to take advantage of iPAT benefits at 3T

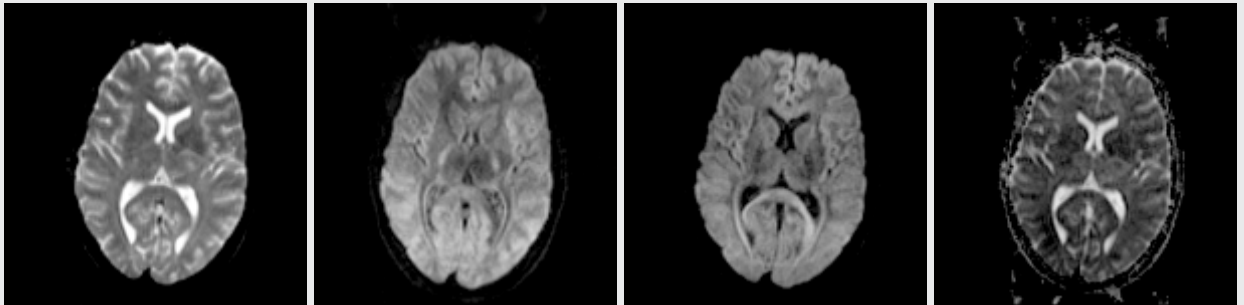
iPAT at 3T provides best image quality with low SAR. It also offers an alternative to trade-off the extra 3T SNR for acquisition speed.

Equipped with its standard 8 RF channels and its diversity of multi-element RF coils, MAGNETOM Trio is the best 3T MR machine to profit from the great benefits of iPAT.

[Figure 1]

Single-shot diffusion-weighted EPI of the brain with iPAT 3
8-channel Head Array, iPAT-compatible

Susceptibility effects in EPI are reduced with fast gradients.
In addition, iPAT reduces the remaining 3T susceptibility effects.

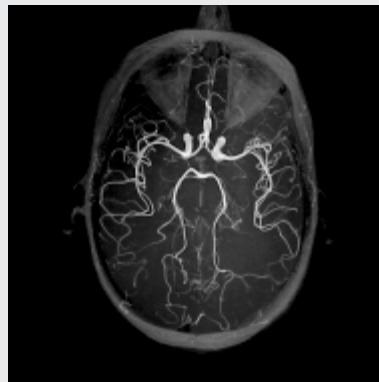


With iPAT 3
 $b = 0$

$b = 500$

$b = 1000$

ADC map



[Figure 2]

Ultra high resolution with iPAT 2
1024 matrix 3D ToF in 5 minutes
8-channel Head Array
iPAT compatible

[Figure 3]

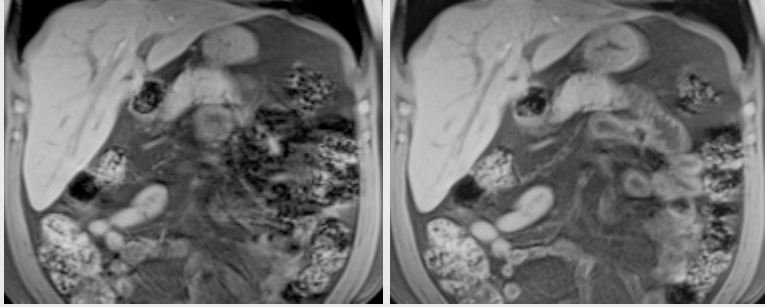
2D TSE-RESTORE of the
lumbar spine without and
with iPAT 4
TR/TE 2600/110 ms,
507x512 matrix, SL 2 mm,
FoV 400x400 mm
Spine Array, 12 elements,
iPAT-compatible

iPAT at 3T can be used at
high acceleration factors
as 3T SNR is greater than
at 1.5T and iPAT-related
signal reduction do not
affect diagnostic quality



Without iPAT (TA = 2:36 min)

With iPAT 4 (TA = 0:44 min)



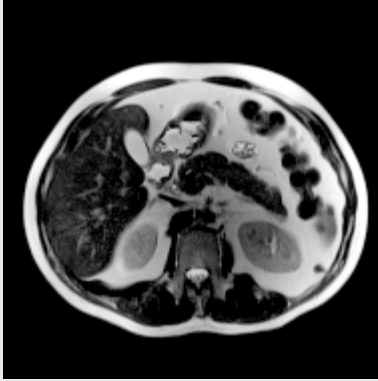
[Figure 4]

2D FLASH FatSat on a large FoV coronal abdominal plane
400x400 mm, 256x256 matrix
Body Array, 8 elements, iPAT-compatible

iPAT sequences are compatible with a variety of sequences, including those with FatSat. The resulting quality at 3T is excellent.

Without iPAT (TA = 25 s)

With iPAT 3 (TA = 11 s)



[Figure 5]

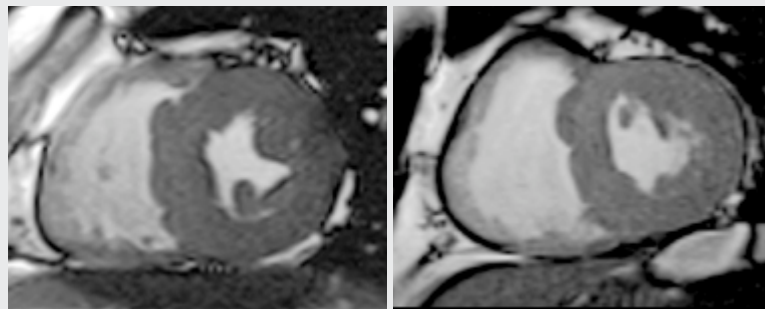
High-resolution 2D HASTE with iPAT 2
Body Array, 8 elements, iPAT-compatible

With iPAT factor 2

[Figure 6]

2D cine TrueFISP of the heart
Cardiac Array, 8 elements, iPAT-compatible

The large SNR of the TrueFISP and 3T magnetic field strength of MAGNETOM Trio results in the very good SNR of the heart at in extremely short acquisition times.



Without iPAT (TA = 15 s)

With iPAT 2 (TA = 8 s)

Temporal resolution: 25 ms, 256x256



MAGNETOM Trio^[UHF Class] 3T Unlimited

Siemens' successful 3T strategy is called simply 3T Unlimited. Our 3T systems match all the performance parameters of a high-end 1.5T system: 3T Technology – Unlimited.

We have developed applications offering all the 3T benefits without the 3T limitations: 3T Applications – Unlimited.

We provide systems that include all the workflow benefits expected in a MAGNETOM: 3T Efficiency – Unlimited.

3T Technology – Unlimited

- Uncompromised homogeneity in a 40 x 40 x 40 cm field of view
- 8 fast RF-channels are standard
- Fastest gradients in the industry: 200 T/m/s

3T Applications – Unlimited

- 3TCare to reduce SAR and maximize anatomical coverage (Hyperechoes, iPAT, and body coil)
- Largest diversity of array coils
- iPAT to get a hold on susceptibility

3T Efficiency – Unlimited

- *syngo* – optimized for clinical workflow
- Inline Technology – processing instead of post-processing
- EVOLVE – a subscription for the future

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

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