Tim Upgrade, Quality Up and Cost Down

MAGNETOM Symphony, A Tim System

www.siemens.com/healthcare

SIEMENS

Tim Matrix coils

"**Tim** is one of the most significant developments in MRI in the past ten years".

New York University Medical Center, New York, USA

Tim Upgrade. It's all about Tim.

Tim proves it – Around the world, Tim (Total imaging matrix) technology has become the standard in MRI. With thousands of installations, Tim is proving it every day, with exceptional flexibility, accuracy, and speed.

Tim: A revolution in flexibility. Select exams, not coils.

- Create a total imaging matrix through the combination of up to 76 seamlessly integrated coil elements and 32 independent RF channels.
- Scale the matrix to the desired anatomy and the individual patient, with flexible combinations of up to 10 different coils.
- Streamline workflow with AutoCoil Detect, the automatic detection of coils, and AutoCoil Select, the automatic selection of coil elements within the field of view (FoV).

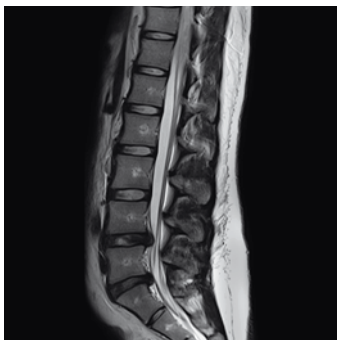
Tim: A revolution in accuracy. Local and total.

- Unleash the high signal-to-noise ratio (SNR) only local coils can provide, using Matrix coils.
- Perform exams without repositioning patients or coils, including whole CNS, whole abdomen, and peripheral MR angiography (MRA) studies.

Tim: A revolution in speed. Parallel in all directions.

- Achieve unlimited parallel imaging, from head to toe, front to back, and side to side.
- Reduce acquisition times with PAT (Parallel Acquisition Techniques) factors up to 16.

ceMRA, GRAPPA 4, TA 27 s.
Courtesy of VZW Regionaal Ziekenhuis, Jan Yperman, Ieper, Belgium.



T2-weighted Turbo Spin Echo (TSE), Restore, GRAPPA 2, Protrusion.
Courtesy of Methodist Hospital, San Antonio, USA.

32-channel head coil.

32-channel body coil.

From MAGNETOM Symphony and Sonata to a new MAGNETOM Symphony, A Tim System

How would you like to have your system upgraded to state-of-the-art Tim technology, and enjoy its exceptional flexibility, accuracy and speed?

Now you can! Upgrade your system to a MAGNETOM Symphony, A Tim System. As you can see based on the extensive list of new components and applications that you will receive with the Tim Upgrade, it is like having a new system.

You will have:

New hardware

- New RF system with 18 or 32 independent channels for faster imaging and higher signal-to-noise ratio (SNR)
- New Quantum Gradient Coil* (30 mT/m with 125 T/m/s)
  *If Quantum Gradient not already installed
- New Integrated Tx/Rx Body Coil
- New table for easier patient handling
- New covers
- Audio Comfort improvements for quieter, more relaxed examinations

New standard coils

- New Head, Neck and Spine Matrix coils – all integrated into the patient table, allowing faster workflow and higher throughput

New optional coils, available with a Tim system

- Body Matrix Coil
- Peripheral Angiography Matrix Coil
- 4-channel large flex coil supporting PAT factors up to 4
- 4-channel small flex coil supporting PAT factors up to 4
- 8-channel foot-ankle coil
- 8-channel knee coil
- 8-channel wrist coil
- 32-channel head coil
- 32-channel body coil

New Computer system for faster reconstruction

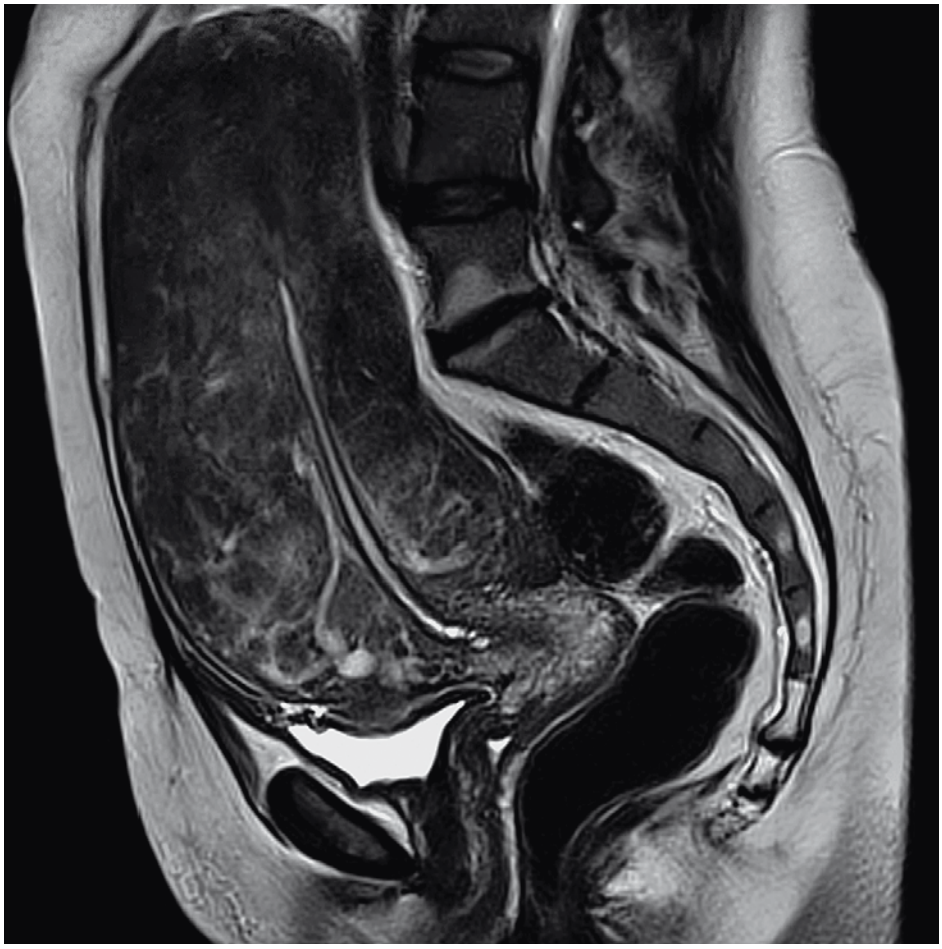
- New host computer
- New Image processor

New standard applications, available with a Tim system

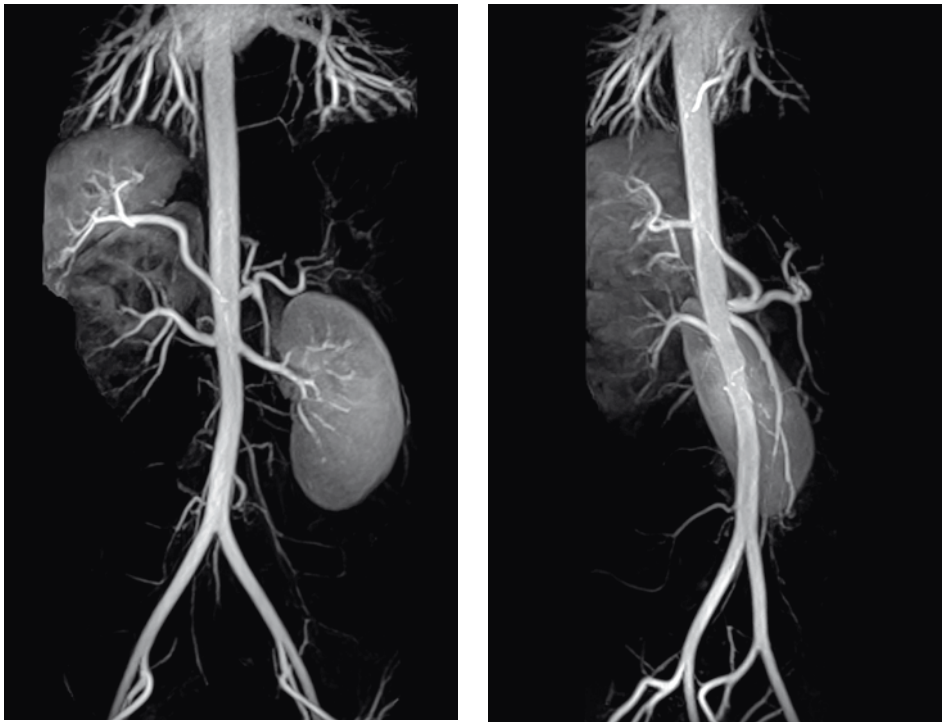
- Enjoy the new and comprehensive Tim Application Suite, as well as many other unique Siemens features. (Please see insert for further details.)

New optional applications, available with a Tim system

- Have access to dozens of new features that will allow you to broaden your referrals. (Please see insert for further details.)



T2-weighted TSE Restore with *syngo* BLADE motion correction, tumor.



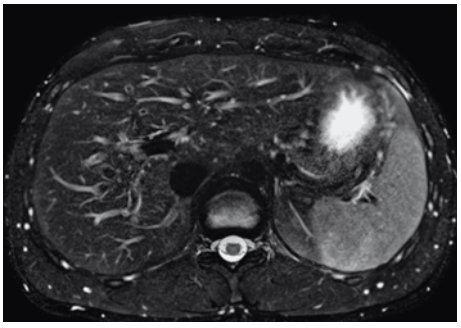
ceMRA of the abdominal vessels, MIP. *Courtesy of H Lee Moffitt Cancer Center, Tampa, USA.*

Tim Upgrade:
It's all about Quality Up and Cost Down

Quality Up:
Improved Image Quality

A Tim Upgrade, with its new RF system, Matrix coils, and applications, means you will enjoy a wide range of new applications with improved image quality.

***syngo* SPAIR** – for better homogeneity and reliable fat saturation, *syngo* SPAIR uses an adiabatic frequency selective inversion pulse used to null the fat signal.



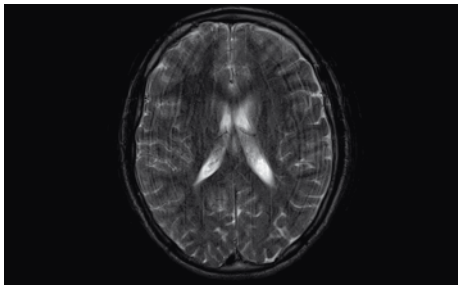
T2-weighted Turbo Spin Echo image using *syngo* SPAIR fat suppression, 2D PACE (Prospective Acquisition CorrEction) and GRAPPA 2.

***syngo* SPACE** – take advantage of the parallel imaging capabilities of your new system. Now you can be faster and more accurate with one 3D acquisition in back pain patients. Just perform one 3D isotropic acquisition for a perfect MPR in any orientation.

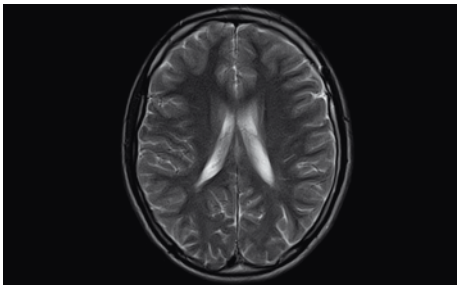
T2-weighted *syngo* SPACE image, Restore, GRAPPA 3, scoliosis.

T2-weighted image, Restore, GRAPPA 3, coronal MPR (multiplanar reconstruction), scoliosis. These MPRS were done on the SPACE image.

***syngo* BLADE** – for motion free image results and therefore the best choice for non-cooperative patients. Fewer re-examinations save money with this motion correction technique for all body regions, all contrasts and all orientations. For brain, spine, abdomen or extremities. *syngo* BLADE is compatible with iPAT, the integrated Parallel Acquisition Techniques.



T2-weighted TSE image without motion correction. *Courtesy of Imelda Ziekenhuis, Brussles, Belgium*



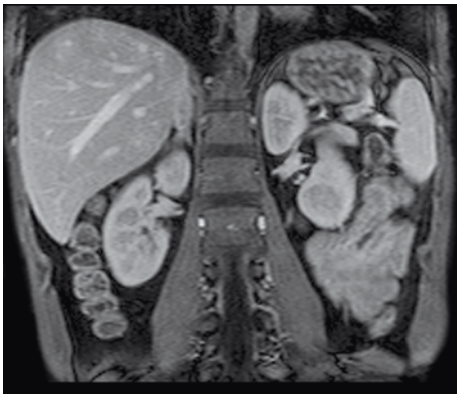
T2-weighted TSE image with *syngo* BLADE. *Courtesy of Imelda Ziekenhuis, Brussles, Belgium*

Quality Up:
Improved Image Quality

"With the **Tim** Upgrade for my **MAGNETOM** Symphony, the image quality has increased significantly. The results of the upgrade exceeded our expectations".

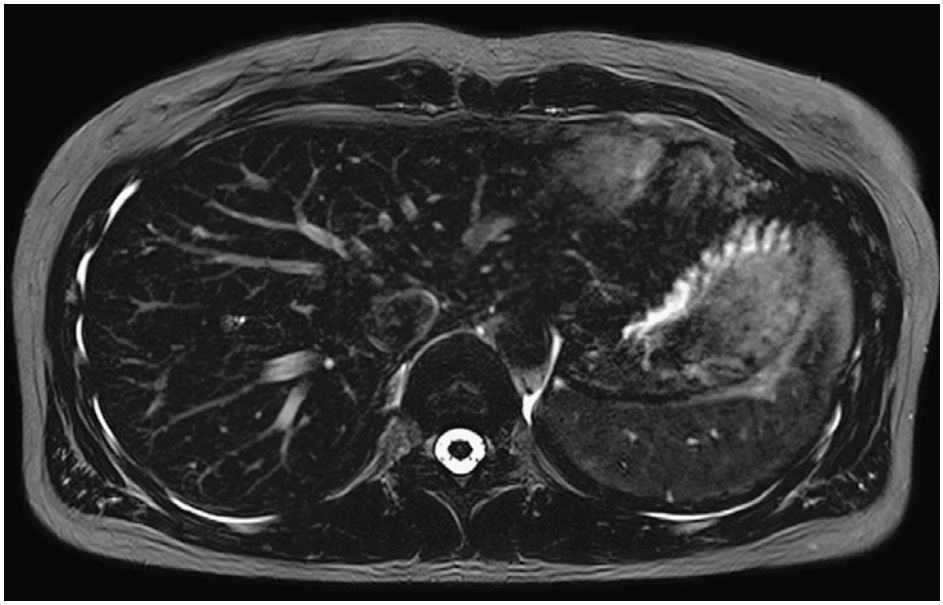
Prof. Dr. Franz Fellner, AKH Linz, Austria

***syngo* dynaVIBE** – for optimal evaluation of the enhancement kinetics of the small body lesions, with Inline motion correction of multi-phase VIBE (Volume Interpolated Breathhold Examination) data sets.



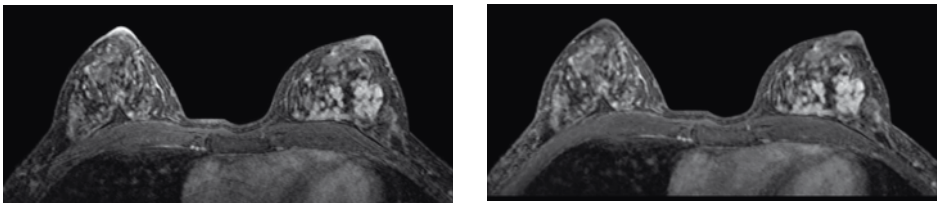
VIBE (Volume Interpolated Breathhold Examination) using GRAPPA 2. *Courtesy of VZW Regionaal Ziekenhuis, Jan Yperman, Ieper, Belgium.*

***syngo* PACE** – make body imaging easy with the siemens-unique 2D PACE (Prospective Acquisition CorrEction) technique, allowing for multi-breathhold examinations as well as free breathing during the scans. 2D PACE Inline Technology further reduces motion artifacts.



T2-weighted *syngo* SAPCE image, Restore, with 2D PACE (Prospective Acquisition CorrEction) and GRAPPA 2.

Soft Tissue Motion Correction – allows higher conspicuity and accuracy especially for multi-focal lesion detection in the breast. It is a 3D elastic motion correction for offline 3D correction in all directions over entire 2D and 3D data sets.

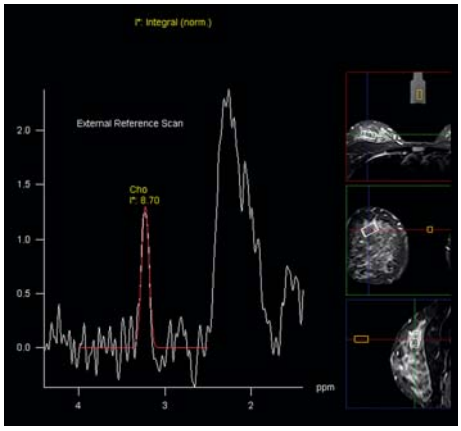


Transversal, contrast-enhanced (ce) high-resolution isotropic image.
Left: without motion correction. Right: with soft tissue motion correction.

Quality up:
Exciting New Applications

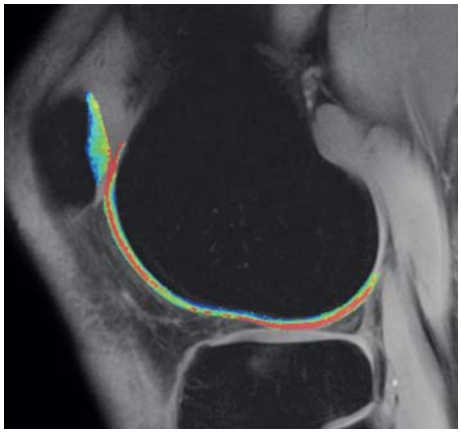
With the Tim Upgrade, you will have access to dozens of new applications from all clinical fields. Use this opportunity to broaden your range of examinations and increase your referrals.

***syngo* GRACE** – an additional new tool for the diagnosis of breast cancer using optimized spectroscopy capabilities for the evaluation of breast tissue in short scan times. *syngo* GRACE focuses on the evaluation of the choline metabolite, which acts as a biomarker that gives essential information about a breast lesions biochemical composition. With *syngo* GRACE you now have the absolute quantification of choline containing compounds for more reliable diagnosis of breast cancer.



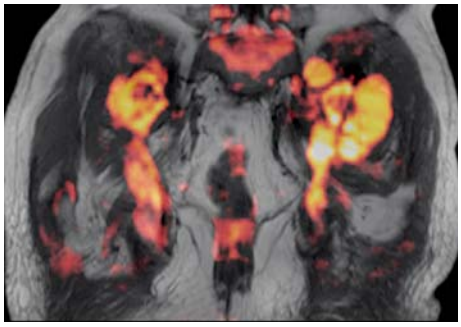
syngo GRACE single voxel breast spectroscopy.

***syngo* MapIt** – for early diagnosis of osteoarthritis before it is visible with standard routine imaging methods. Combine the best of both worlds: physical and anatomical information. *syngo* MapIt is the ultimate orthopedics tool, with the protocols and Inline calculation of parametric maps of T1, T2 and T2* properties of the imaged tissue. and more.

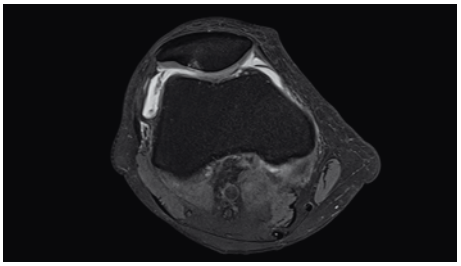


T2*-weighted *syngo* MapIt

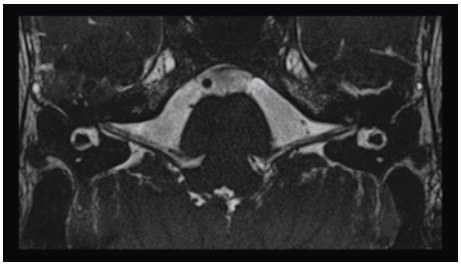
***syngo* REVEAL** – differentiate malignant from benign tumors in body imaging. REVEAL is a body diffusion technique showing high sensitivity to potential malignancies. On Tim systems it provides a new mechanism to clearly localize lesions locally and in the entire body. With iPAT (mSENSE and GRAPPA), REVEAL gives you additional information in just a few extra minutes.



Colored fusion: *syngo* REVEAL, b-value 800, GRAPPA 2 with T1-weighted SE image, GRAPPA 3. *Courtesy of Saint Louis Hospital, Paris, France.*



3D DESS (Dual Echo Steady State), water excitation (WE), GRAPPA 3. *Courtesy of VZW Regionaal Ziekenhuis, Jan Yperman, Ieper, Belgium*



3D CISS (Constructive Interference in the Steady State)

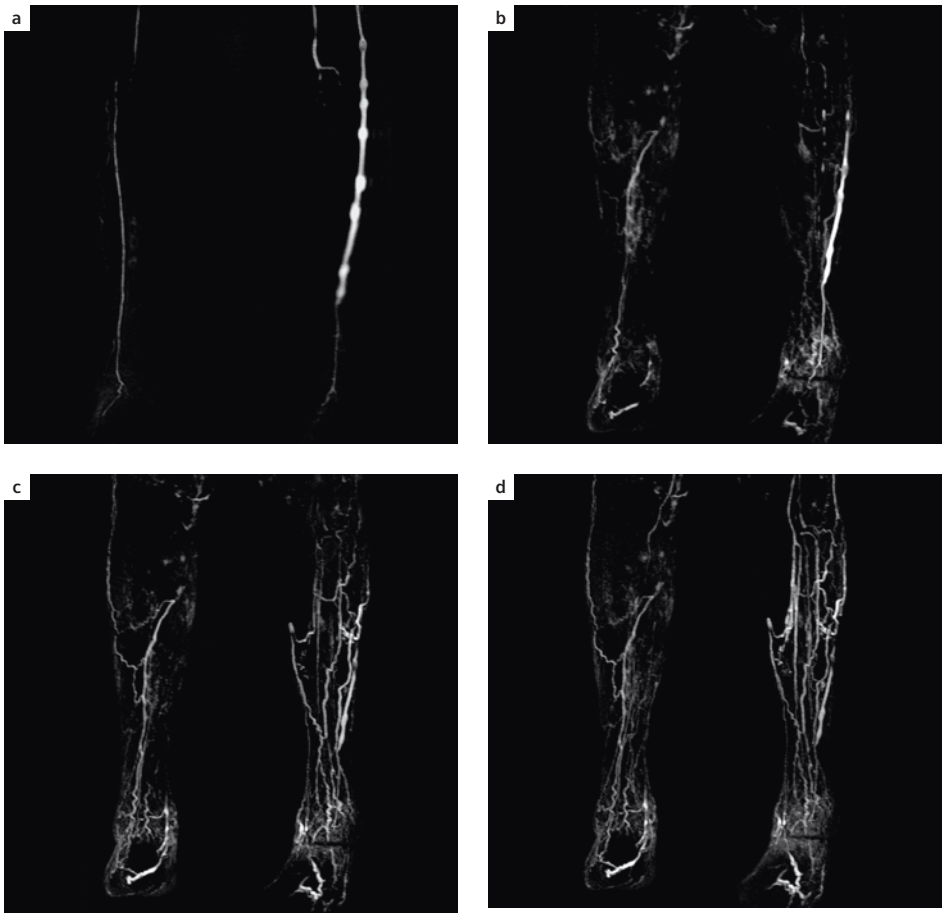
3D CISS and 3D DESS – unique Siemens sequences and protocols.

3D DESS (Double Echo Steady State):
- T2/T1-weighted
- Excellent fluid-cartilage differentiation in orthopedic imaging

3D CISS (Constructive Interference in Steady State):
- Excellent visualization of fine structures such as cranial nerves
- High-resolution imaging of inner ear and spine

Quality Up:
Exciting New Applications

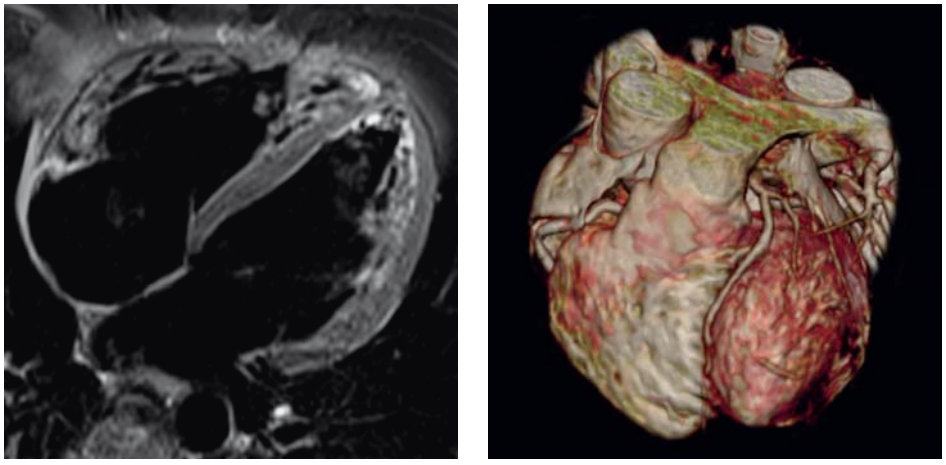
***syngo* TWIST** – the new vascular MR application for time-resolved MR angiography providing fast, high-resolution, time-resolved MR angiography in all body regions.



syngo TWIST, GRAPPA 2, dynamic MIP, matrix 448, vascular disease.
Courtesy of St. Marien Hospital, Amberg, Germany.

***syngo* BEAT** – enjoy fast set up for congenital heart patients with this unique tool that allows one click optimization of cardiac acquisitions

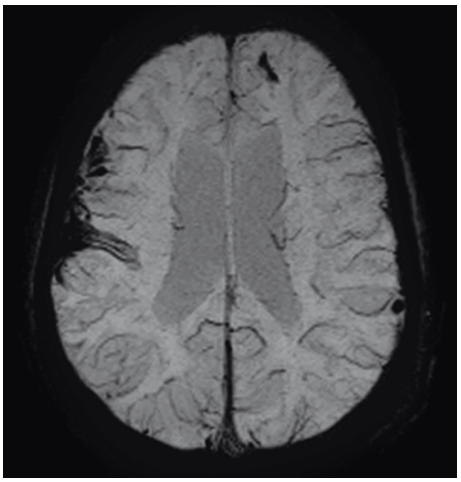
- 1 click to switch arrythmia rejection on/off
- 1 click change from FLASH to TrueFISP for easy contrast optimization
- 1 click change from cartesian to radial sampling to avoid folding artifacts in large patients
- 1 click switch from cine imaging to tagging for wall motion evaluation
- 1 click switch from 2D to 3D imaging



Dark Blood, Fat Sat, GRAPPA 2 (left). Whole heart (right).

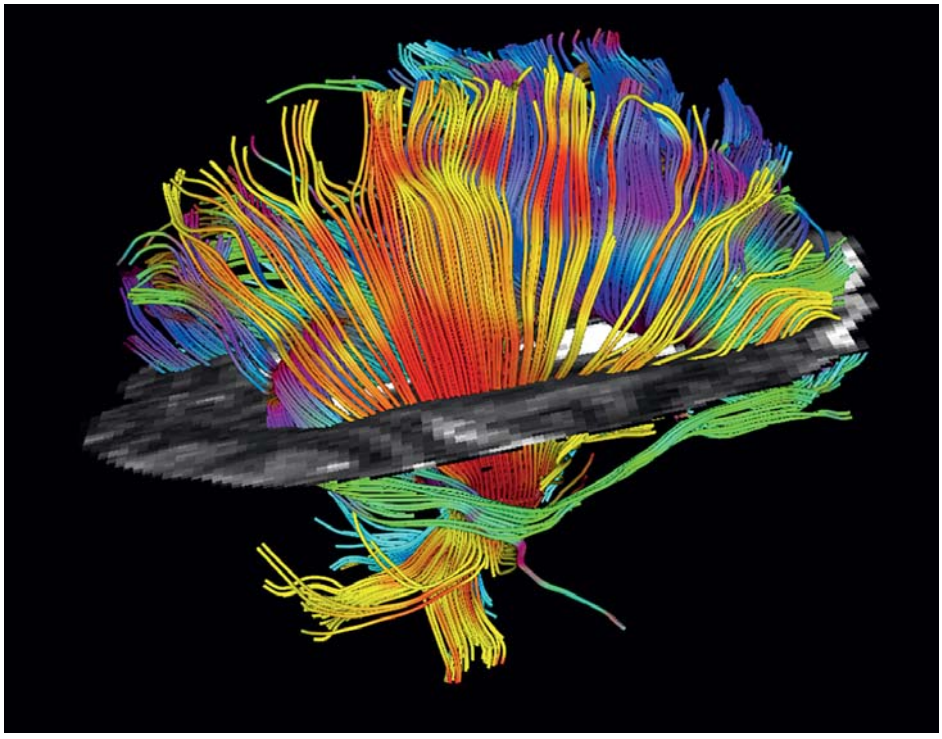
***syngo* SWI** – the best MR tool for detecting intracranial bleeding and vascular anomalies, with the siemens-unique sequence for susceptibility-weighted imaging:

- Visualization of local changes of the magnetic field due to the presence of deoxygenated blood or blood decomposition products
- 3D GRE sequence with full flow compensation to support venous angiography
- Enhanced susceptibility weighting of the magnitude images by combination with phase information to increase sensitivity to intracerebral hemorrhage



syngo SWI (susceptibility-weighted imaging), minIP, GRAPPA 2, multiple lesions.

***syngo* DTI Tractography** – improve your preoperative planning and your neuro physiological research by visualizing the multiple white matter tracts. DTI Tractography is optimized for connectivity and white matter pathology.



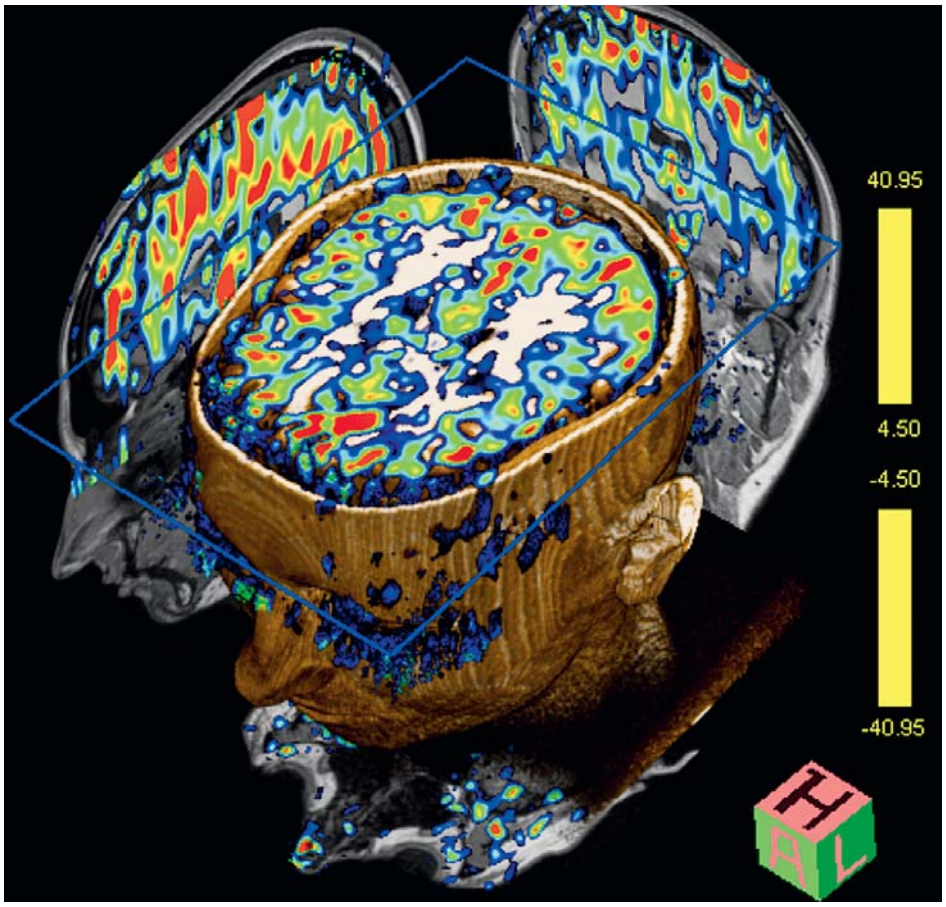
syngo DTI Tractography.

Quality Up:
Non CE Applications

Enter a world of exciting non-contrast enhanced applications with siemens-unique *syngo* ASL and *syngo* NATIVE.

***syngo* ASL (Arterial Spin Labeling)** – save money and possible complications by performing perfusion studies without IV contrast media! *syngo* ASL provides unique insight into human brain perfusion and function physiology by evaluating cerebral blood flow. *syngo* ASL is capable of high spatial resolution perfusion imaging, making the technique very appealing in the evaluation of stroke, tumors, degenerative diseases, epilepsy but also in basic neuroscience, e.g. for studies of functional cerebral blood flow (CBF) changes.

- Fully compatible with iPAT (integrated Parallel Acquisition Techniques)
- Includes 3D PACE motion correction for increased reliability
- Fully automated Inline calculation of regional blood flow color maps



syngo ASL (Arterial Spin Labeling).

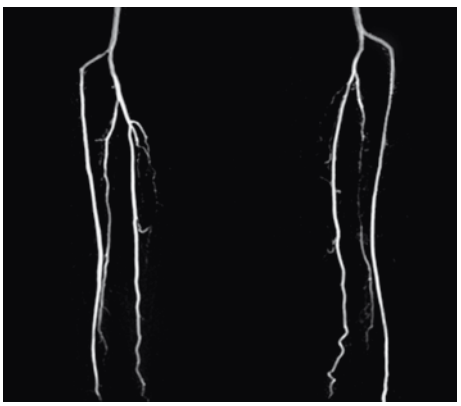
***syngo* NATIVE** – high-resolution non-ce MRA for:

- Contrast-free thoracic, abdominal and peripheral angiography
- Fast 3D acquisition in high spatial resolution
- Accurate artery/vein separation
- Imaging patients with a high risk of developing NSF (Nephrogenic Systemic Fibrosis)

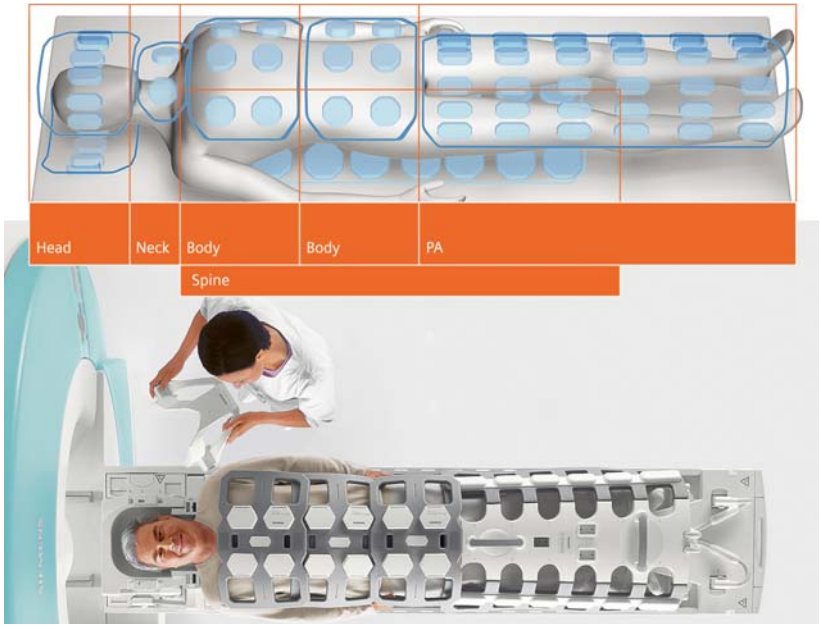
NATIVE consists of two non-ce MRA applications:

syngo NATIVE TrueFISP, optimized for the use in thorax (e.g. thoracic aorta) and abdomen (e.g. renal arteries)

syngo NATIVE SPACE, optimized for the use in peripheral angiography – with Inline Subtraction and maximum intensity projectin (MIP)



3D *syngo* NATIVE SPACE image, GRAPPA 3, matrix 384.



Tim Matrix coil technology.

Quality Up: Whole-Body Applications

From local to total. Up to 200 cm field of view.

Tim puts it all together, for the very first time. Exploit the maximum signal-to-noise (SNR) while doing seamless, head-to-toe imaging with a total FoV of up to 200 cm at full surface coil quality.
All that without repositioning the patient or changing a single coil, not even once.
Tim, the Total imaging matrix, revolutionizes MRI and resolves typical limitations of local anatomical MR imaging.
Your advantage: Revolutionary accuracy – Local becomes total.

"We see a lot of patients with multiple sclerosis or with other diseases that affect brain and spine. With the **Tim** technology, we can scan the patient from head to toe very quickly".

National Neurological Institute Milan, Italy

T2-weighted Turbo Spin Echo image.

T2-weighted Turbo inversion recovery (TIR) image, 6 steps, GRAPPA 2.

Cost Down:
Higher Throughput with Tim's revolutionary coil concept

Cost down on a day-to-day basis. Let's see just how MAGNETOM Symphony, A Tim System saves you time and money in routine clinical imaging.

"The biggest thing with Tim is that we get patients in and out faster. We have actually converted to 30-minute* slots versus the old 45-minute slots".

St. Francis Care Hospital,
Hartford, CT, USA
*Results may vary. Data on file.

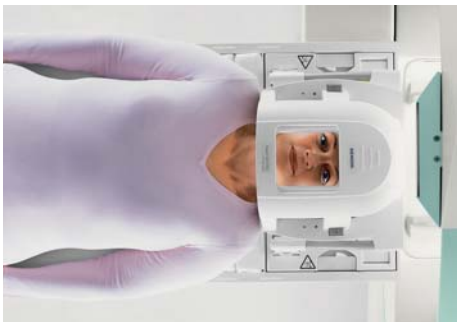
"One of the main advantages that if we see something that we didn't expect in the brain and we have to move to the spine – we can do it right away without having to alarm the patient".

Instituto Nazionale Neurologico
"Carlo Besta", Milano, Italy

"It is such a great benefit for patients to be able to use multi coils and not have to move the patients in between exams or have them sit up to change coils. That's a huge benefit when you have a patient who's in pain".

Novant Health Inc. Salem MRI Center,
Winston-Salem, NC, USA

Patient 1: Head examination
With Tim technology the lower parts of the Head and Neck Matrix coil as well as the Spine Matrix coil remain on the patient table for 95% of the examinations. For patient number 1, the only part that needs to be put on is the upper part of the Head Matrix coil. This considerably accelerates coil positioning for subsequent examinations.



Patient 2: Lumbar spine examination
In preparation for this patient, only the upper part of the head coil has to be removed. No need to position any additional coils. The examination can start immediately. The Spine Matrix coil (24 coil elements), the Head Matrix coil and the Neck Matrix coil (lower parts) are already there and do not have to be positioned again.

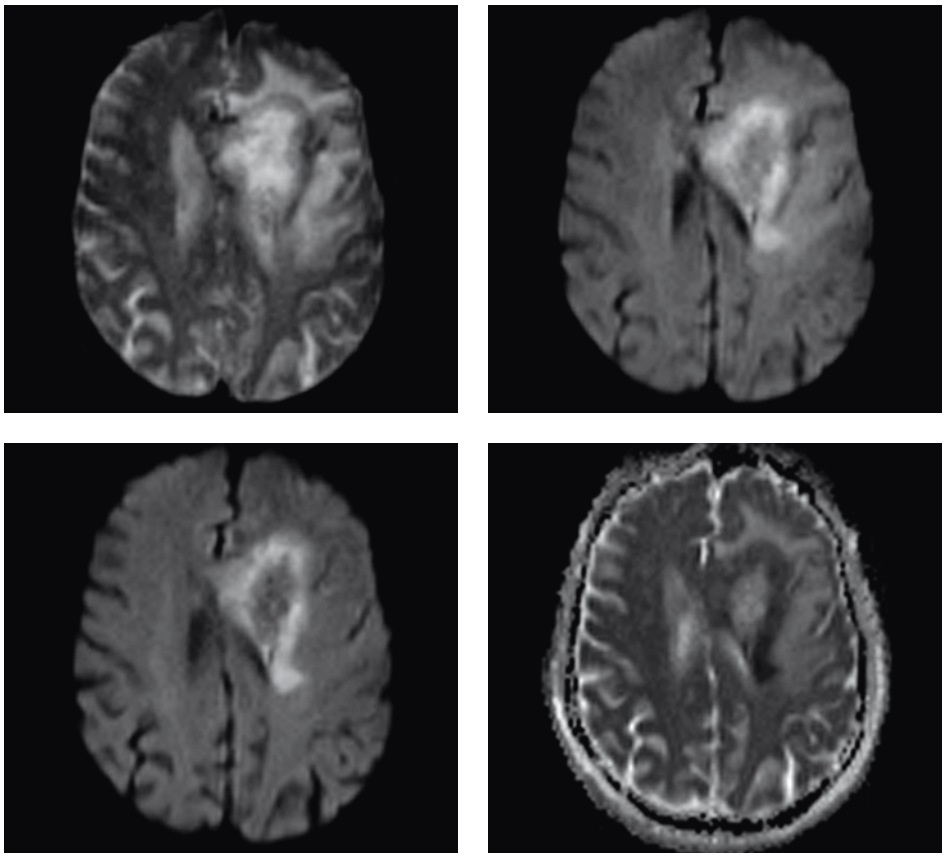
Patient 3: Abdominal examination
Only the Body Matrix coil (950 gram, 6 elements) has to be put into place for examinations of the abdomen. Together with the Spine Matrix coil it forms a "torso" coil that allows parallel imaging in all directions. After the examination, only the upper part of the Body Matrix coil is removed.

Patient 4: Whole-CNS examination
Only the upper parts of the Head and Neck Matrix coils have to be plugged in. As a result, examinations of the entire CNS are performed in two steps (head/cervical spine and thoracic spine/ lumbar spine) **without** changing coils or repositioning the patient. This is especially advantageous for examinations with contrast agent.

Cost Down:
Faster Scan Times

With the Tim Upgrade, you will be able to shorten your exam times significantly without compromizing the clinical outcome, using *syngo* GRAPPA, siemens-unique parallel imaging technique.

You can use parallel imaging in all types of applications e.g. for faster abdominal imaging, decreasing the breath-hold time; or for excellent diffusion imaging results; or 1 minute spine examinations allowing to scan even patients with pain easily and efficiently.



Echo Planar Imaging (EPI) (top left) b0/90, (top right) b500t/90, (bottom left) b1000t/90, (bottom right) ADC. *Courtesy of Barnes-Jewish Hospital, Saint Lewis, MO, USA.*

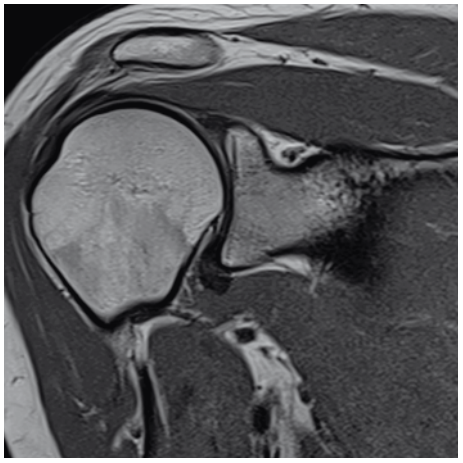
T2-weighted Turbo Spin Echo (TSE) image, GRAPPA 2, TA 2:21 min.

TA 37 s, GRAPPA 4, with contrast, SL 0.84 mm. *Courtesy of VZW Regionaal Ziekenhuis, Jan Yperman, Ieper, Belgium.*

With the improved temporal resolution of your new MAGNETOM Symphony, A Tim System, you will have faster and better MR angiography (MRA) exams.

"After the **Tim** Upgrade our run off examinations went down from 65 minutes to 35 minutes* from set up to completion, and we even increased our matrix and image quality".

Michael Marra, Methodist Hospital, San-Antonio, USA,
*Results may vary. Data on file.

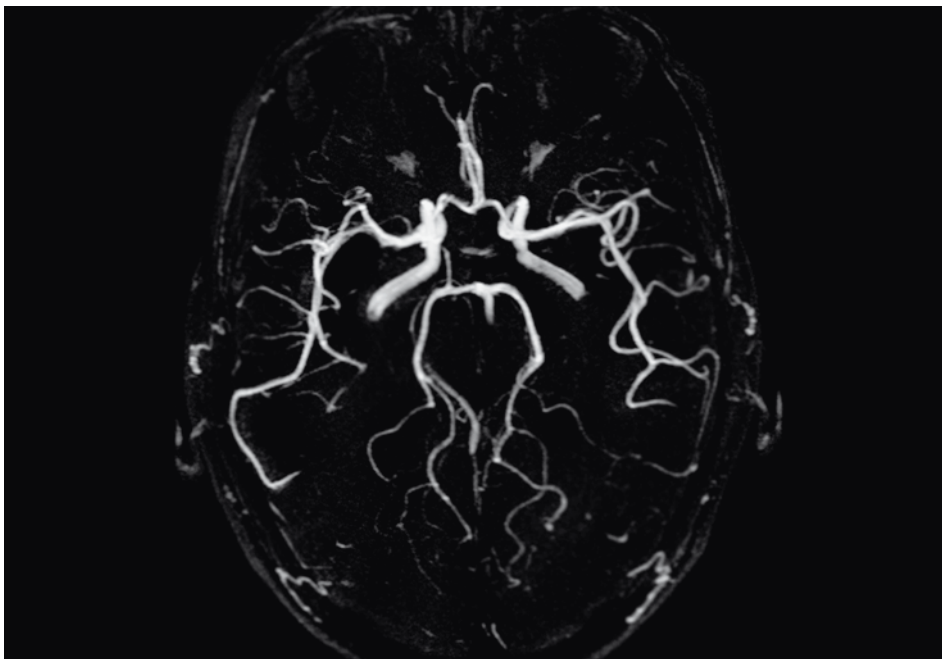


PD-weighted TSE image, GRAPPA 2, using the 4-channel large flex coil.

***syngo* GRAPPA** is compatible with all multi-channel coils, i.e. all Tim coils, and all coil combinations: Use your new 4-channel flex coil with parallel imaging for fast exams, with high image quality and high signal-to-noise ratio.

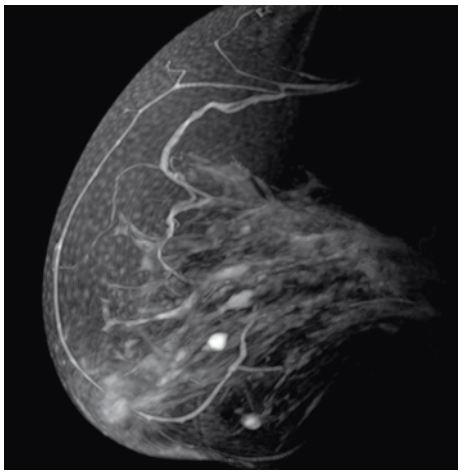
"The image resolution has significantly improved because we've been using iPAT more. With **Tim** we're able to get higher resolution in less time".

University of Utah
Salt Lake City, Utah, USA



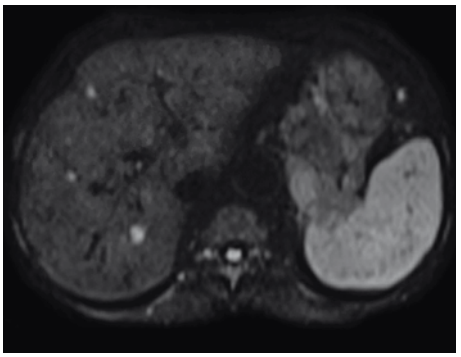
Time of Flight (TOF), water exitation (WE), TA 4:04, FoV 220.

Enjoy high resolution non-contrast-enhanced Time of Flight (TOF) angiography combining information from the Spine and Head Matrix coils.



MIP of a *syngo* VIEWS image. *Courtesy of Hospital St. Marien, Radiology, Amberg, Germany.*

Use parallel imaging for faster breast imaging with less motion artifacts and better image quality.

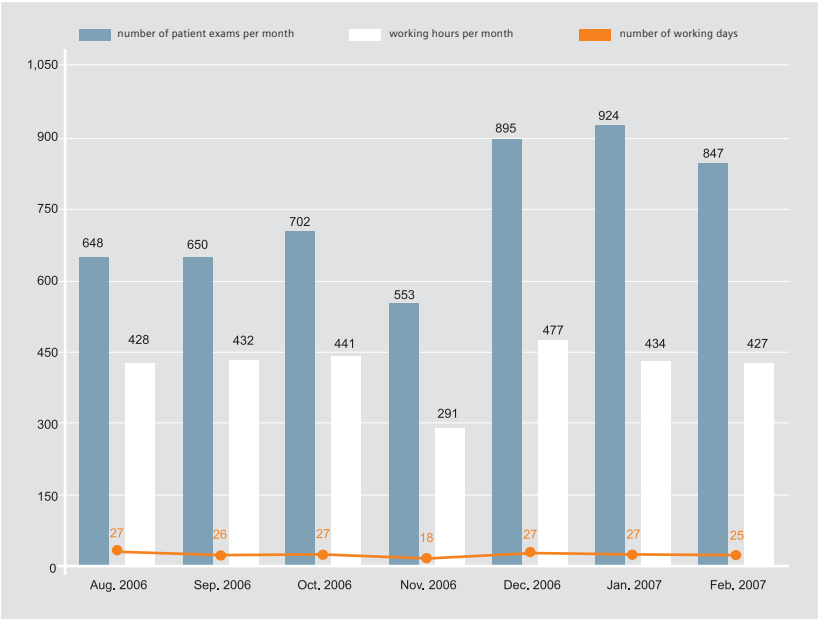


syngo REVEAL, b-value 400, with *syngo* SPAIR fat suppression, GRAPPA 2.
Courtesy of Hospital St. Marien, Radiology, Amberg, Germany.

Acquire transversal images with high temporal resolution by combining the Body and Spine Matrix coils.

Cost Down: A Fast Return on Investment*

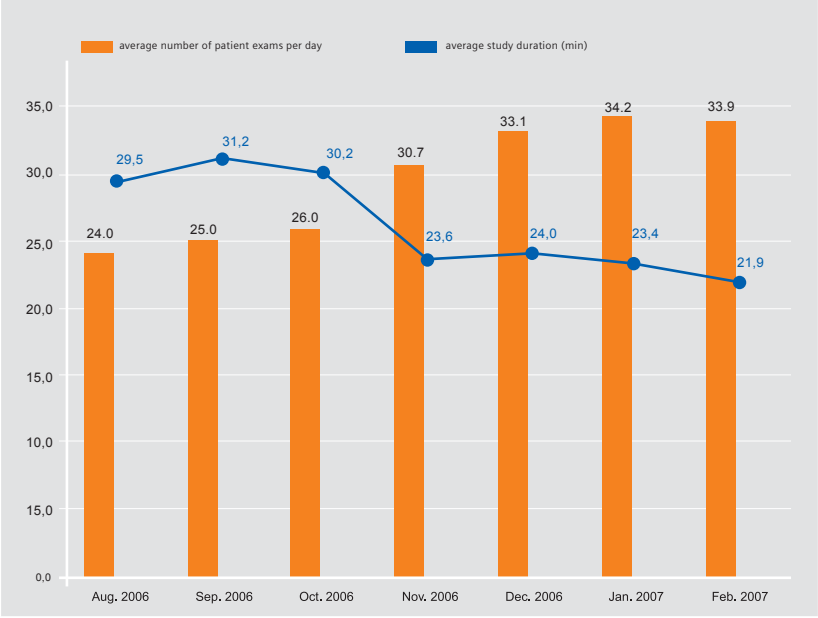
Data acquired at X-Leme Clinic in Brazil show an average increase in patient throughput by over 30% following a Tim Upgrade in November 2006. Less scan time, more patients, and a fast return on investment.



"The **Tim** Upgrade has allowed us to reduce scan times. An exam that once took us 30 minutes we can now do with the same image quality in 20 minutes*. Since we work in all clinical areas, faster scans result in more patients per day".

Dr. Heraldo Mello Neto, X-Leme Clinic, Curitiva, Brazil.
*Results may vary. Data on file.

With the faster scan times, study durations are significantly shorter – an average decrease of 25% with the same or even better image quality, and with many new applications.



"I can see 8 to10 more patients a day. Tim technology has allowed us to do that".

Swedish Covenant Hospital Chicago, IL, USA

"More patients and Return on Investment (ROI) with up to 50% higher throughput".

St. Francis Hospital, Hartford, CT, USA

"Although Tim stands for 'Total imaging matrix', after experiencing the MAGNETOM Symphony with Tim myself, I have decided that Tim actually stands for 'Total improvement".

Dr. Johan Dehem, VZW Jan Yperman, Belgium

Cost Down: Short Installation Time

Even with the significant amount of new hardware with the Tim Upgrade, a proven and fast installation process means a shorter downtime than when installing a new system. In most cases installation is within 10 days or less.

Tim upgrade. See for yourself.

With hundreds of installations around the world, you can be sure that there is a satisfied MAGNETOM Symphony, A Tim System user near to you. Just ask your local Siemens representative to set up a site visit.

* Results may very. Data on file.

"Following the latest MR development is not easy in a busy out patient clinic like ours, so MAGNETOM Flash and the MAGNETOM World website have been extremely useful for us."

Dr. Mehmet Ali Gurses, M.D.
Integra Medical Imaging Center, Ankara, Turkey

MAGNETOM World Internet Platform

The focus of the MAGNETOM World Internet platform is clinical results. At www.siemens.com/magnetom-world, you will find a variety of helpful information including case studies, clinical methods, and a wealth of Phoenix images.
Phoenix allows you to download protocols from the Internet simply by dragging and dropping the image into your measurement queue.
Visit **www.siemens.com/magnetom-world**

MAGNETOM Flash Magazine

The Siemens MR customer magazine presents clinical case studies, application tips, technical- and product information.

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 closingthe contract.

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Order No. A91MR-400-4C-7600 | Printed in Germany | CC MR WS 07082. |