From simultaneous to synergistic PET-MR

Biograph mMR

SIEMENS
Healthineers

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Biograph mMR

Siemens Healthineers

Biograph mMR – from simultaneous to synergistic PET-MR

In the highly competitive healthcare environment, differentiation is key to maintaining competitiveness. With the Biograph mMR, you can set the pace in diagnostic imaging by combining proven, state-of-the-art 3T MRI with molecular imaging, fully integrated in one system. With our latest platform *syngo* MR E11P, we take hybrid imaging to the new level of synergistic PET-MR to increase diagnostic capabilities and standardize quality of care – for both research and clinical use. It was developed using clinical experience from more than 100,000 patients scanned.[1]

Biograph mMR – from simultaneous to synergistic PET-MR

Exceptional quality and speed in PET-MR and MR

- Shorten breath-hold time with TWIST-VIBE and CAIPIRINHA

- Anatomy-true, high-resolution DWI significantly reduces susceptibility-induced distortions with RESOLVE

- DotGO for faster and more efficient scanning as well as more predictable time slots

- High image quality even in difficult settings, with state-of-the-art second-order patient-specific shim coils and minimized shim time

State-of-the-art 3T MRI

- Complete range of coils for both PET-MR and dedicated MR

- Full functionality of cutting-edge, stand-alone 3T MRI

- Leading image quality and homogeneity with TrueForm

Advanced PET attenuation correction including bones

- In addition to air, fat, lung, and tissue, bones are also included in the attenuation correction (AC) model for whole-body as well as brain and head and neck scans

- Enhance AC and scatter correction accuracy by overcoming truncation artifacts in the arms with HUGE

- Achieve independence of the selected tracer in AC and scatter correction by utilizing a fully MR-based method

A new level of diagnostic imaging

- Change in therapy in 18%[2] of the patients

- Higher accuracy in soft tissue imaging[3]

- Significantly reduced radiation dose up to 48%[4]

Motion-free images with synergistic PET-MR

- The simultaneous acquisition of MR and PET enables new techniques that utilize synergies

- MR-based motion compensation beyond gating with BodyCOMPASS

- Embrace motion in MRI in challenging body regions like the abdomen with FREEZEit

"In radiology, the biggest miss you can make doesn't come from misinterpreting the findings. It comes from not making the finding in the first place. Simultaneous PET and MRI has given us the ability to see more, enabling us to find disease not previously seen."[5]

Gwen Harris, MD
Diagnostic Radiologist,
Zwanger-Pesiri Radiology, New York, USA

Benefit from motion-free images

Cancer rates are increasing globally. Over 14 million adults were diagnosed with cancer in 2012.[6] At the same time, treatment costs can be excessive: US$ 10,000–120,000 per cycle.[2,7] Biograph mMR has helped reveal additional findings and led to a change in therapy in 18%[2] of oncologic staging and follow-up patients. Utilize the synergy of simultaneous MR and PET: for example, with the unique BodyCOMPASS from Siemens Healthineers. This technology enables motion-corrected PET images with MR-based motion compensation beyond gating, even in challenging body regions like the abdomen and with multiple bed positions.

"The introduction of BodyCOMPASS with its elastic motion correction has taken our lung imaging to a much higher level – in the words of a senior oncologist, 'What have you done to the PET, because the chest imaging is exquisite, we are seeing extremely small nodules not previously seen on any of our previous PET/CT examinations.'"[5]

Michael Kean FSMRT
Chief MR Technologist,
MRI Department, Department of Medical Imaging,
The Royal Children's Hospital, Melbourne, Australia

Benefit from motion-free images with synergistic PET-MR

Embrace respiratory motion in PET with MR-based BodyCOMPASS

BodyCOMPASS enables motion-free PET images with MR-based motion compensation made possible by Siemens Healthineers' unique 3D T_1 VIBE sequence. This is achieved by continuously sampling MR and PET in free breathing to improve lesion delineation and reduce blurring, without compromising SNR.[8] BodyCOMPASS takes PET-MR from simultaneous to truly synergistic.

"Everytime we are talking about abdominal imaging or anything where breathing or other kinds of motion plays a role, it is important to correct the motion. BodyCOMPASS really helps us to improve the co-registration for it."[5]

Professor Lale Umutlu, M.D.
University Hospital, Essen, Germany

Motion-free brain scans with BrainCOMPASS

With BrainCOMPASS, simultaneous scanning is utilized to its full potential for the first time: Patient motion is registered by applying a real-time navigator in fMRI scans. This can be applied to both MR and PET data to improve diagnostic image quality, even in long studies.

Embrace motion with FREEZEit

MRI exams of the liver are more difficult due to contrast timing challenges and breathing motion. FREEZEit, which consists of TWIST-VIBE and StarVIBE, making MRI faster and more robust than ever before. It allows to overcome previous limitations and make significant changes wherever possible. Reduce motion artifacts and achieve robust free-breathing exams with StarVIBE. Patients can breathe freely throughout the scan, resulting in high-quality diagnostic images. More accurate results can lead to improved treatment, shorter throughput times, and faster diagnosis without rescans.

BodyCOMPASS
50% sharper images with
no compromise in SNR[8]

BrainCOMPASS
Sharp brain PET images
even with motion

FREEZEit
Motion-free MRI in
challenging body regions

*"Concurrent PET-MR acquisition provides, for the first time, an effective means to remove respiratory and cardiac motion blur from PET images."[5]*

Fernando Boada
Professor of Radiology
NYU Langone Medical Center, New York, USA

BodyCOMPASS

Reduce PET acquisition time and improve image quality with just one scan,
using MR information to efficiently manage respiratory motion in PET.
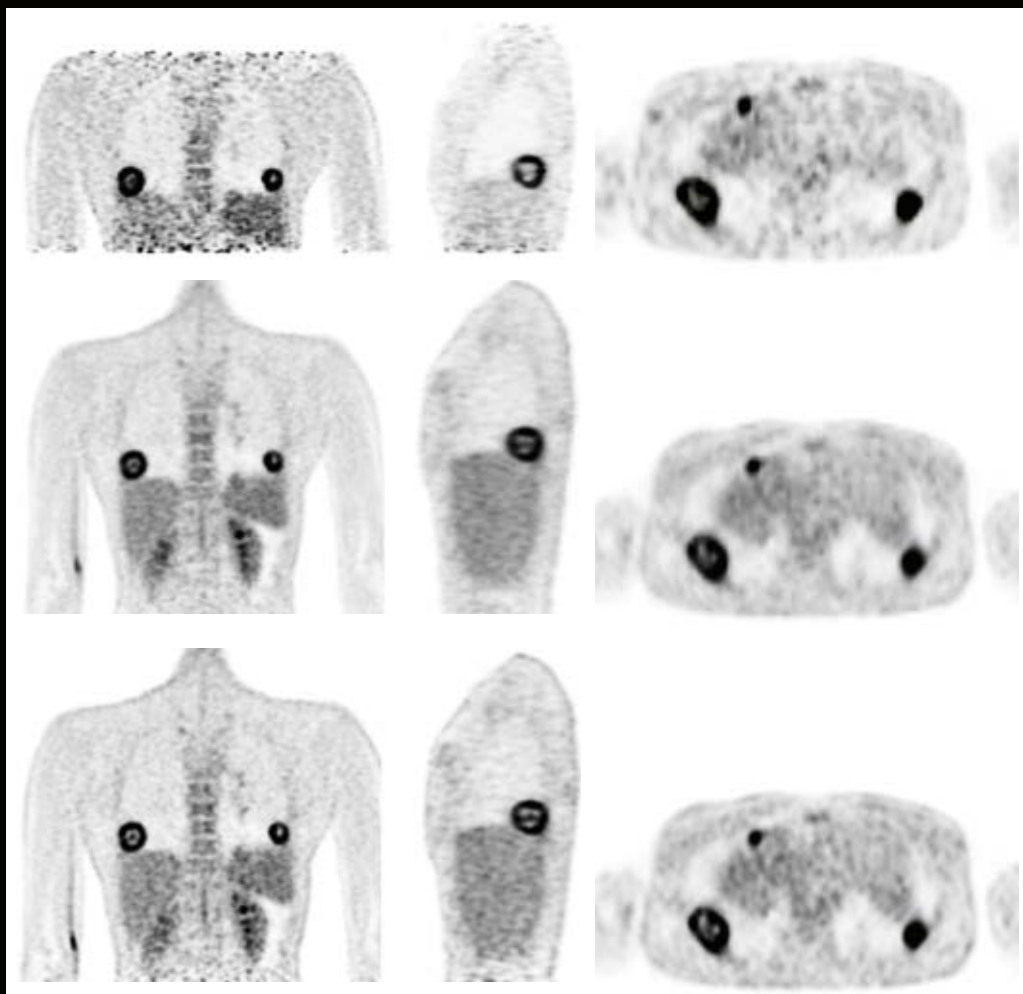
**Respiratory Gated
with HD·Chest**

12 min acquisition
recon. matrix:
172 x 172 (3.4 mm)

Single-bed

BodyCOMPASS

6 min acquisition
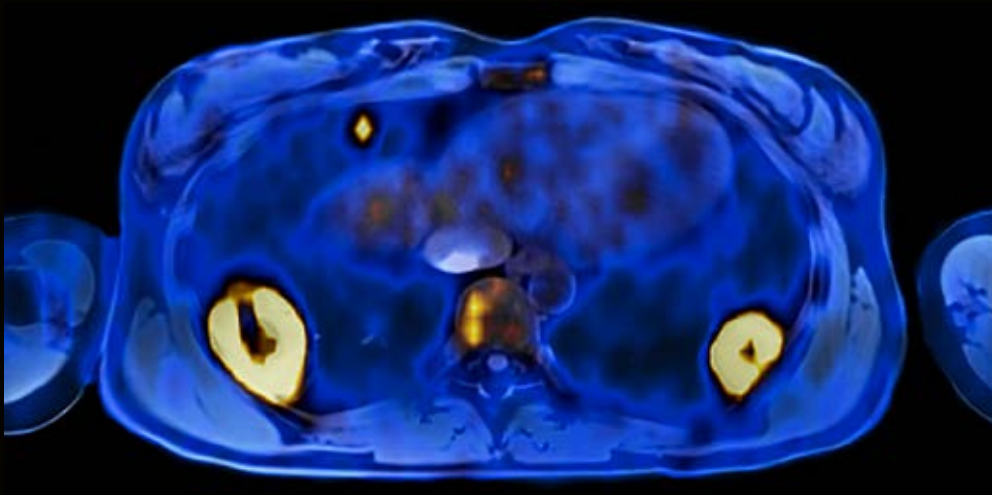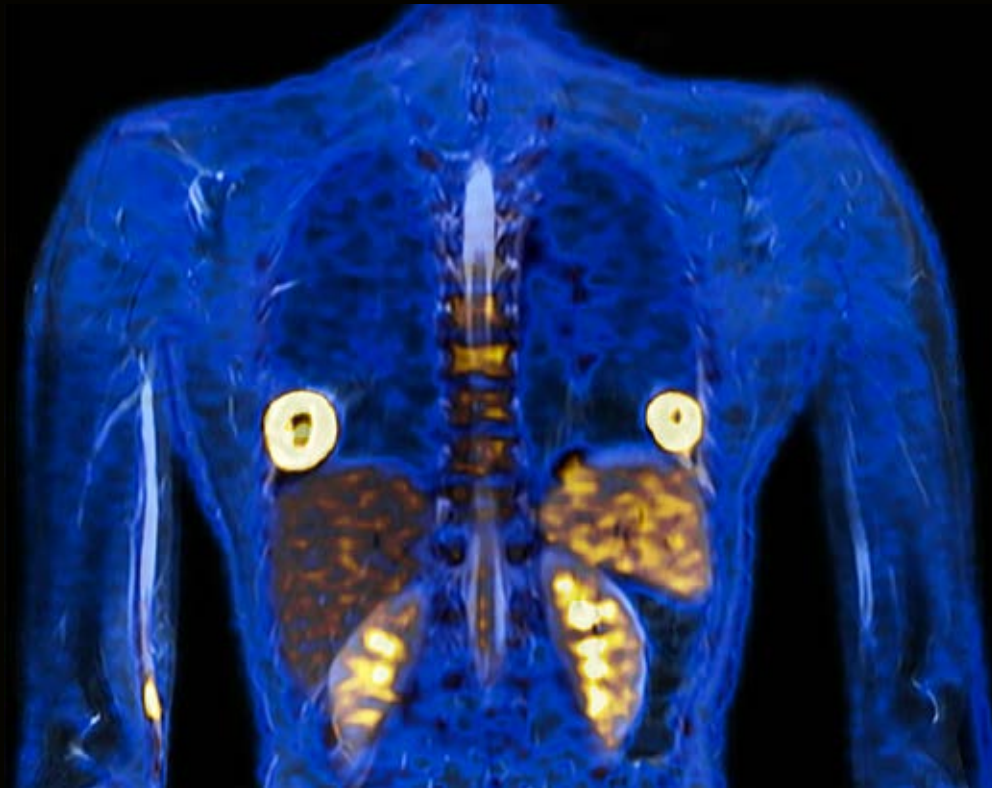recon. matrix:
172 x 172 (3.4 mm)

Multi-bed capability

BodyCOMPASS

6 min acquisition
recon. matrix:
256 x 256 (2.3 mm)

Multi-bed capability

The Royal Children's Hospital, Melbourne, Australia

15-year-old female with granulomatous lesions in chest

Imaging prior to initial therapy and post biopsy
Injected activity: 34.2 MBq
Uptake time: 60 min
Reconstruction: 3D OP-OSEM 4 iter
Post-filter: Gaussian 4 mm FWHM

The Royal Children's Hospital, Melbourne, Australia

FREEZEit: TWIST-VIBE

Consistent contrast in all clinical situations and patients.

The challenge in CE-MRI is capturing the right point of the arterial phase, which differs from patient to patient. If missed, crucial information may go undetected.

TWIST-VIBE offers high temporal and spatial resolution for multi-arterial imaging with 100% precise contrast timing.
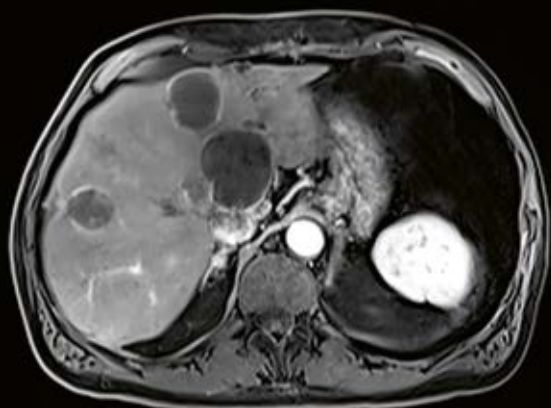
Your benefits:

- Robust and fast imaging with full 4D coverage
- Excellent images for planning surgical interventions
- Reliable images and greater detail in every exam
- Reduce need for rescans
- Time and cost savings

Temporal resolution: 2.05 s
Image matrix: 162 x 162

University Hospital IKRN, Mannheim, Germany
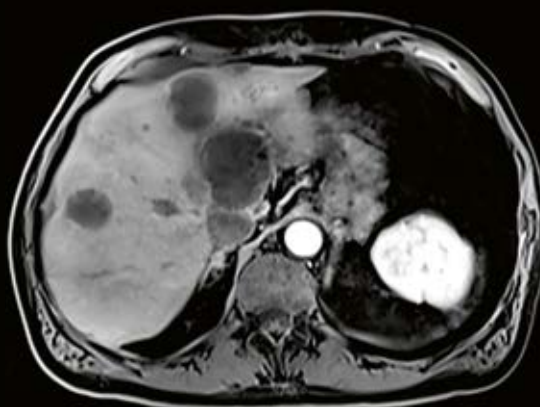
Time Point 1

Time Point 5

Time Point 9


Time Point 14

FREEZEit: StarVIBE

Eliminate motion in MR imaging.

Involuntary motion can lead to severe artifacts, compromising diagnosis.

StarVIBE is a 3D T1-weighted gradient-echo sequence that efficiently counters involuntary motion in the body and is the method of choice in every region where involuntary motion (lung, pelvis, orbits, head and neck, bowel) can compromise image quality.

Your benefits:

• Patients can breathe freely throughout the scan

• Reliable imaging of patients otherwise excluded from MRI

• Free-breathing T1-weighted 3D measurements with very high spatial resolution

• StarVIBE effectively compensates breathing, swallowing, bowel motion, and other sources of motion artifacts

• Reduced need for rescans due to substantially reduced motion artifacts
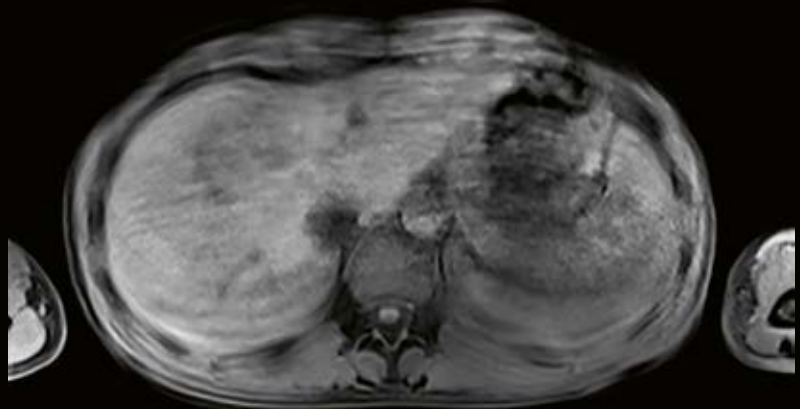
Conventional breath-hold exam in free breathing
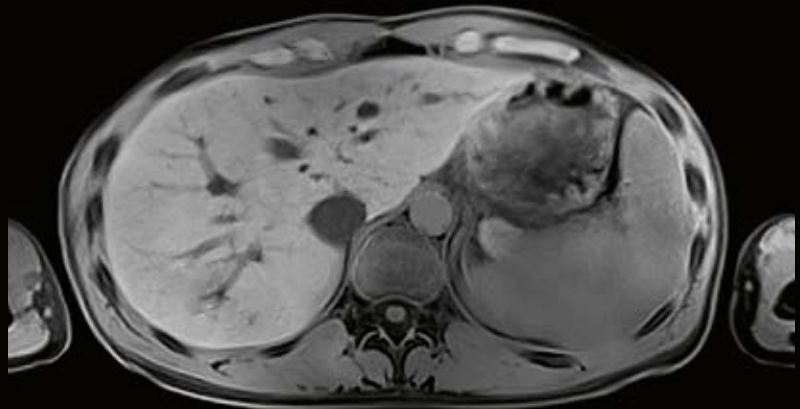
StarVIBE exam in free breathing

4aaaa0090

Improve diagnostic capabilities

Visualizing function at the organ and cellular level using PET adds valuable insights to the morphological and anatomical findings from MRI. This is only possible, however, after the accurate implementation of scatter and attenuation correction of the estimated radiotracer distribution in the human body. In PET-MR, this is achieved via an MR-based estimation of the attenuating and scatter properties of the human body for ionizing radiation by identifying and segmenting its major tissue classes. Until now only air, lung, adipose, and muscle tissue were included in these estimations. Now, by including all major bones in the patient attenuation map, the visual as well as quantitative evaluation of lesions in and close to bones is improved.[9]

Improve diagnostic capabilities with the unique whole-body five-compartment MR-based attenuation correction (MRAC). This improvement is another result of the synergistic nature of the two imaging modalities integrated within the Biograph mMR.

"The anatomic model-based MR AC methods demonstrate narrow line shapes closer to the origin, indicating both improved precision and accuracy of the SUV estimation."[5]

Thomas Koesters et al.
Journal of Nuclear Medicine, June 2016

Improve imaging capabilities with the 5-compartment attenuation correction model

Advance PET attenuation correction

Until now, lesions in and close to bones were more difficult to correctly assess in whole-body PET-MR imaging. In addition to air, fat, lung, and tissue, adding bones to the attenuation correction model means fewer errors in quantification and better comparability to PET/CT even within bones.[9,10]

"The method was shown to improve PET quantification, especially in bony tissue, bone lesions, and tissue near bone, by reducing the SUV underestimation that occurs with the Dixon-based μ-map."[5]

Daniel Paulus et al.
Journal of Nuclear Medicine, July 2015

Extended MR FoV for precise PET imaging with HUGE

Mismatch of MR and PET transaxial FoV results into inaccurate PET images. Matching the MR to the PET FoV could previously only be achieved by utilizing PET signal from the arms, with limited spatial resolution and applicability. HUGE, (B0 Homogenization Using Gradient Enhancement) extends the MR FoV to the edges of the bore based on an MR-only method, and making it independent of the selected tracer.
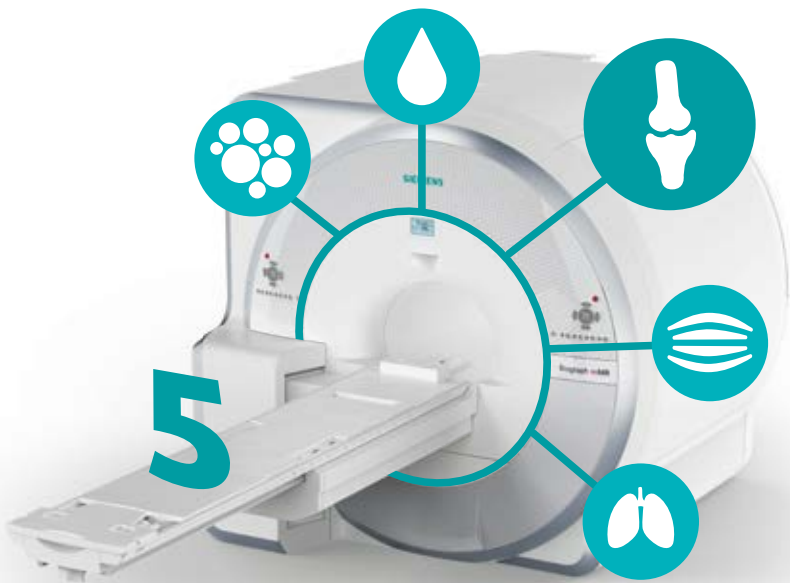
Accurate truncation compensation of patient arms using HUGE

Tracer independence in AC with HUGE

Improved PET accuracy with the **unique whole-body BoneAC** consisting of five tissue classes including bone

5

Advanced PET attenuation correction

Accurately quantify the radiotracer distribution and kinetics for advanced brain studies using different options for attenuation correction that incorporate the skull.

Use the dedicated Ultra-short Time Echo MR sequence or the model-based BoneAC with GRAPPA or CAIPIRINHA Dixon. Multiple options ensure the best results with complete backward compatibility.
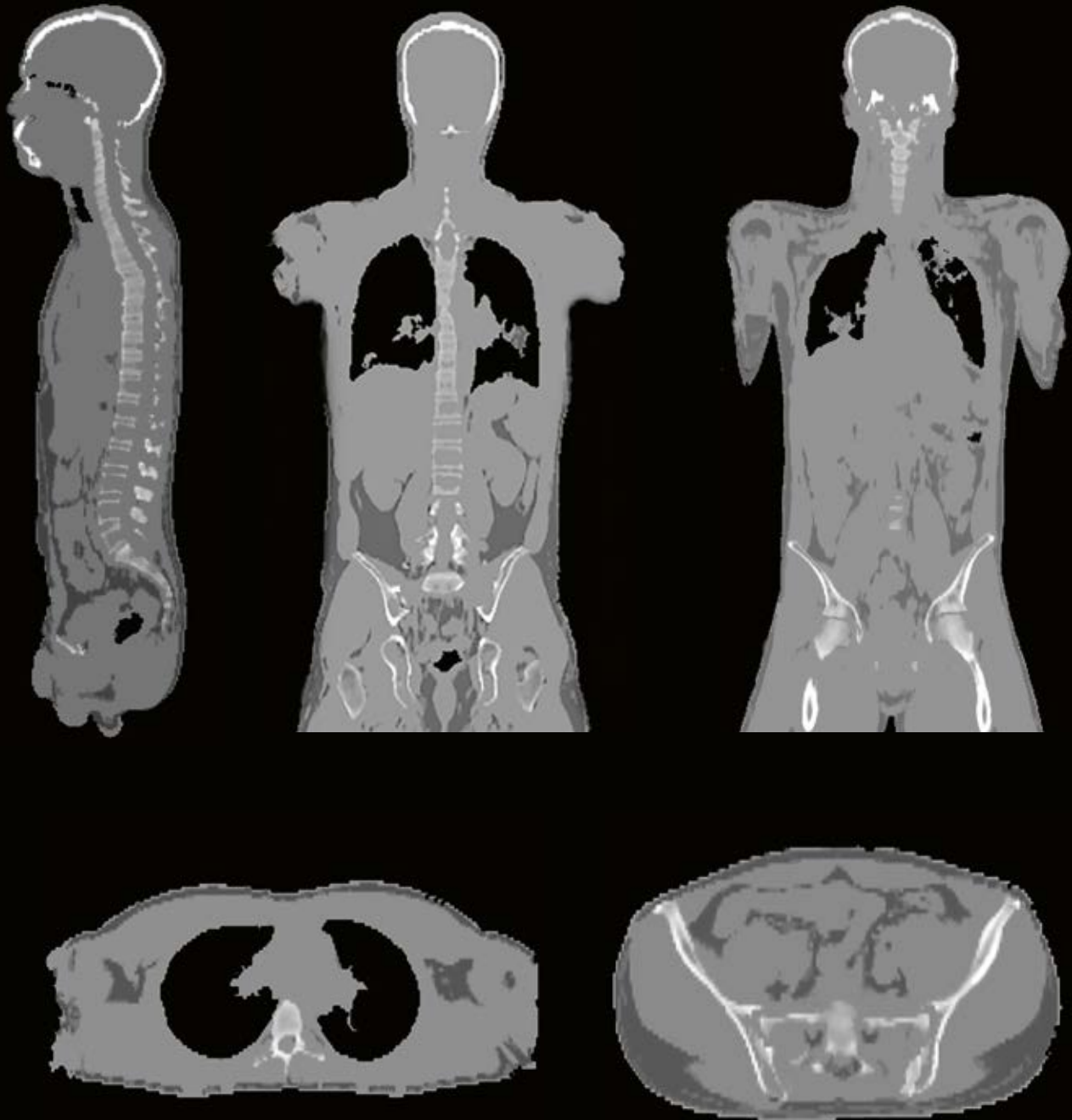
GRAPPA

CAIPIRINHA

UTE

Unique, whole-body 5-compartment attenuation correction model includes bone class and overcomes underestimation of SUV, even in bones.
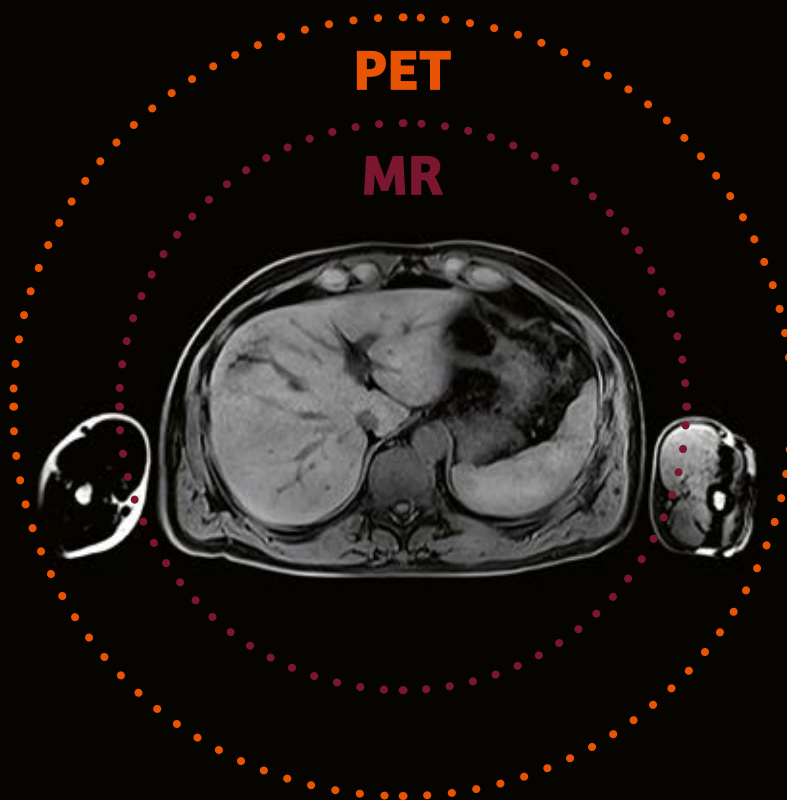
4aaaa0081

HUGE

Mismatched MR and PET Fields-of-View create truncations of patients'
arms that influence accurate attenuation and scatter corrections.
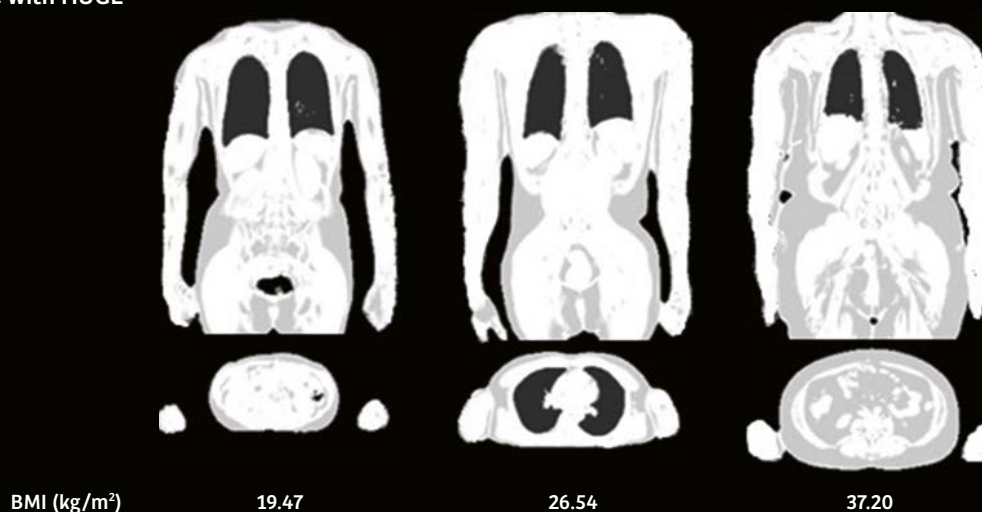
HUGE, the MR-based
truncation compensation,
works for:

• all patient sizes,

• PET tracers kinetics
(nonspecific uptake
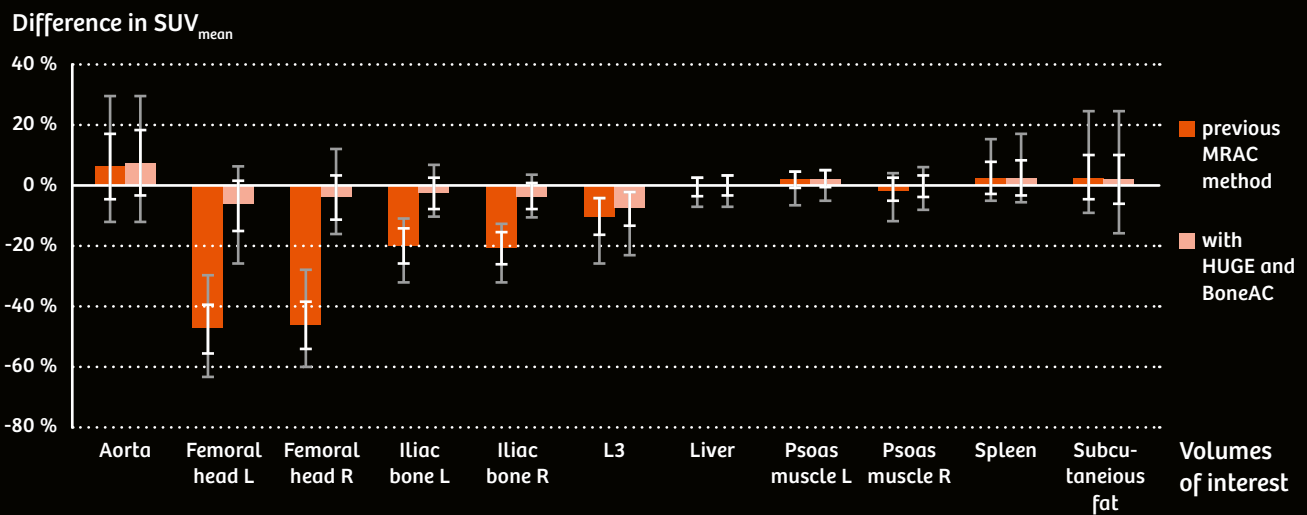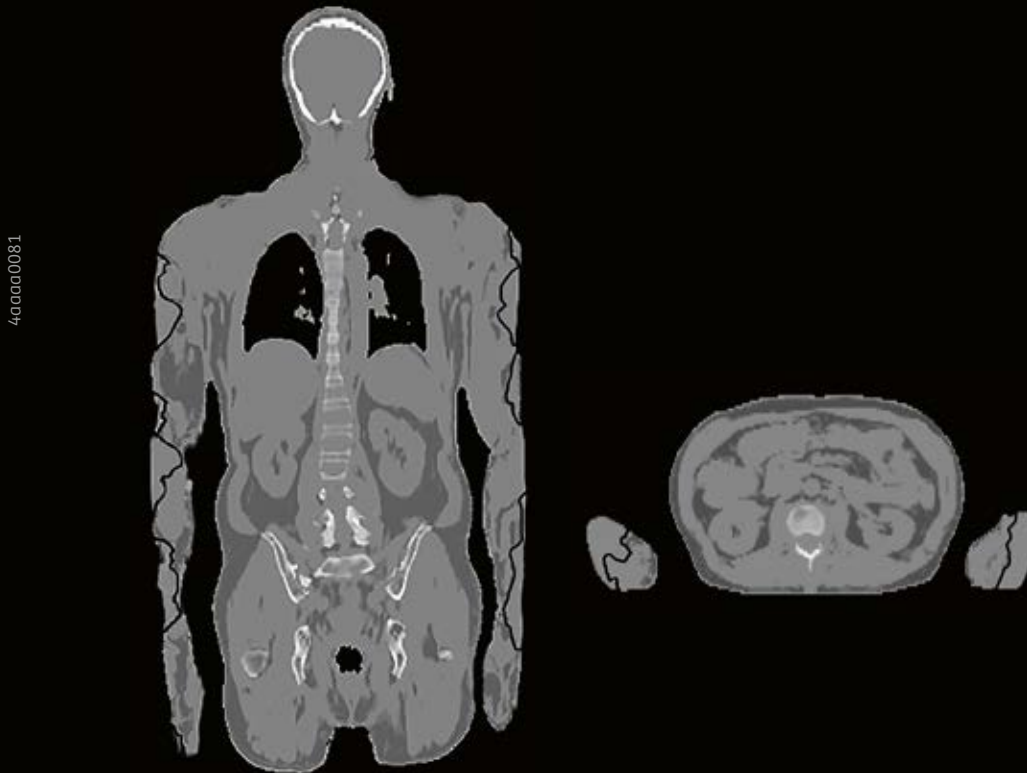in arms), and

• injected activity levels

4aaaa0076

Resulting MRAC with HUGE

BMI (kg/m²)	19.47	26.54	37.20

Prof. Harald H. Quick, PhD – High-Field and Hybrid MR Imaging – University Hospital Essen

When HUGE and Whole-Body BoneAC are combined, the results are highly accurate attenuation maps. Use SUV in PET-MR with the same confidence you have in PET/CT.

Difference in SUV$_{mean}$

Percentage difference in PET SUV$_{mean}$ of normal tissue averaged across all subjects for Dixon (orange) and model (light orange) compared with CT AC. Vertical bars indicate mean ± SD (white) and total range (gray).

Paulus, Quick et al, JNM 2015

Ensure consistent and standardized quality of care

Diverse requests from referrers and levels of patient compliance – for example, from children or very ill patients – create even more challenges in an already competitive healthcare environment. With the latest platform *syngo* MR E11P, Biograph mMR helps overcome these challenges and provide consistent and standardized quality of care.

"syngo E11P has changed the mMR environment in a manner similar to how high gradients have revolutionised DWI imaging. The improvement in workflows and robust attenuation correction algorithms has enabled us to provide a more disease specific examination rather than a one scan fits all."[5]

Mike King FSMRT
Chief MR Technologist
MRI Department, Department of Medical Imaging,
The Royal Children's Hospital, Melbourne, Australia

Ensure consistent and standardized quality of care with the latest MR innovations

RESOLVE

Particularly useful for evaluating smaller lesions, RESOLVE provides an outstanding balance between imaging speed and quality compared with other diffusion-weighted imaging sequences. The result is distortion-free DWI by overcoming susceptibility challenges.

Quiet Suite

With Quiet Suite, we offer complete, quiet MR examinations for neurology and orthopedics without compromising image quality – with an up to 10 dB(A) reduction in sound pressure.

DotGO and workflow improvements

Benefit from intuitive protocol management, consistent quality results for each exam, and fewer rescans with standardized workflows and less than one minute in exam-time variation.[11]

2nd order shimming

The second-order shim is important in cases of failing fatsat, distortion/signal cancellation in DWI-EPI due to insufficient shimming in cases of challenging susceptibility artifacts.

"With RESOLVE the DWI by readout-segmented-EPI was significantly better than DWI by single-shot EPI for visualizing the medial longitudinal fasciculus, lateral lemniscus, corticospinal tract, and seventh/eighth cranial nerves, and offered significantly less distortion of the brainstem."[5]

Naganawa S et al.
Magnetic Resonance in Medical Sciences 2011/10(4)

High image quality in all settings with **second-order**, patient-specific **shim coils**

Fewer susceptibility distortions and anatomy-true, high-resolution DWI with **RESOLVE**

Full range of dedicated MR **surface coils** for all clinical applications

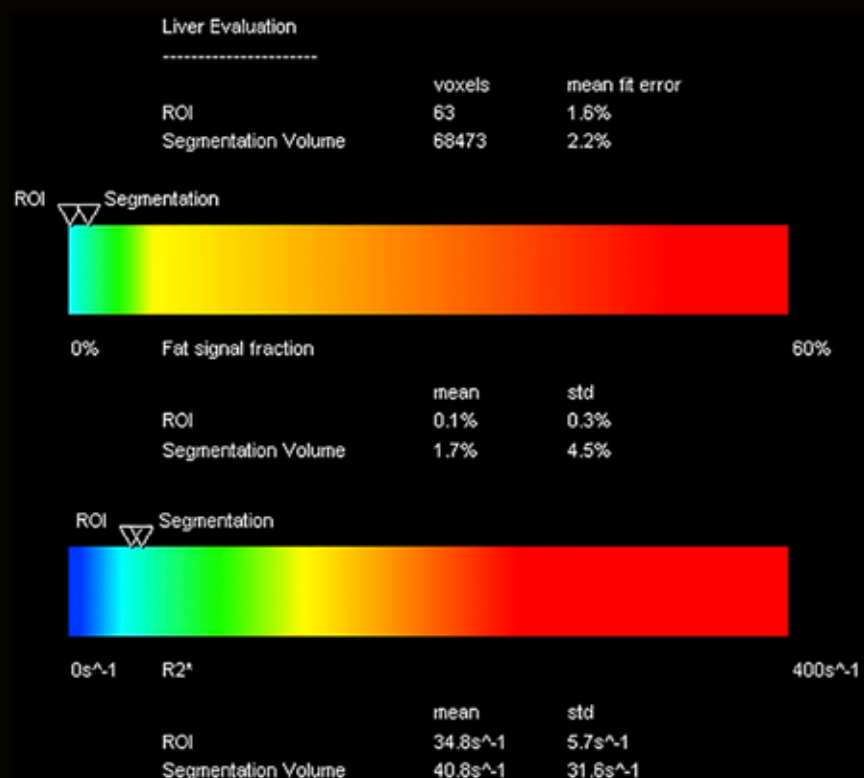**DotGO** for faster and more efficient scanning leading to improved productivity and standardization
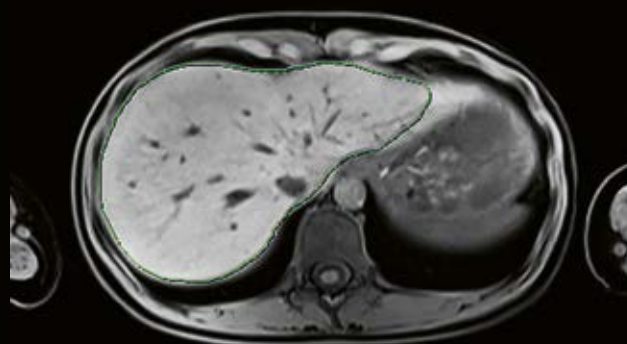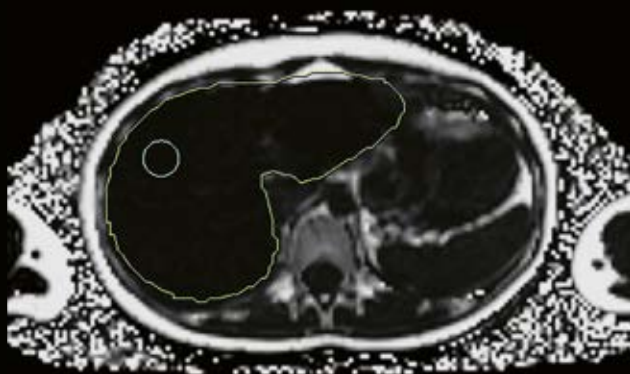
syngo MR E11P

Trendsetting applications with *syngo* MR E11P

LiverLab

Enables non-invasive identification of fatty liver and iron overload at an early disease stage.

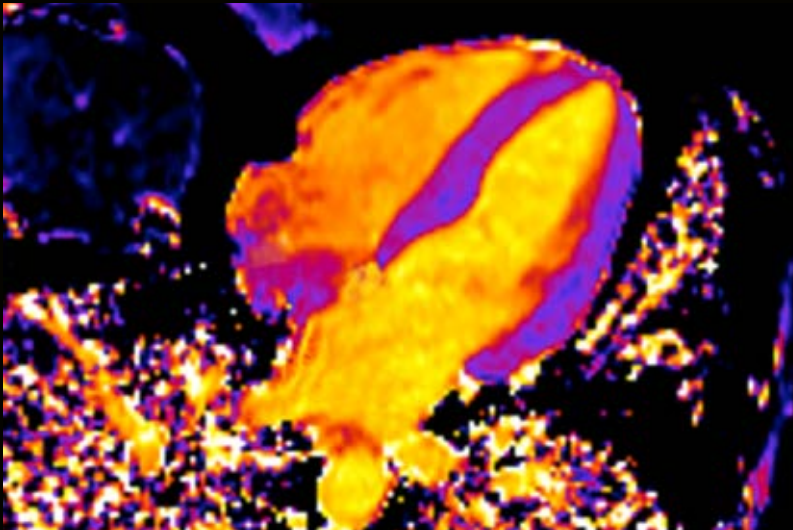# Trendsetting applications with *syngo* MR E11P

MyoMaps

Provides an additional layer of valuable diagnostic information about even subtle changes in tissue composition in the heart.

MyoMaps offers the option to acquire pixel-based quantitative myocardial tissue characteristics – efficiently and on the fly. MyoMaps has the clinical potential to help you assess myocardial pathologies with new information, such as:

• Detection of global, diffuse, and sometimes subtle myocardial pathologies (T1 Map)
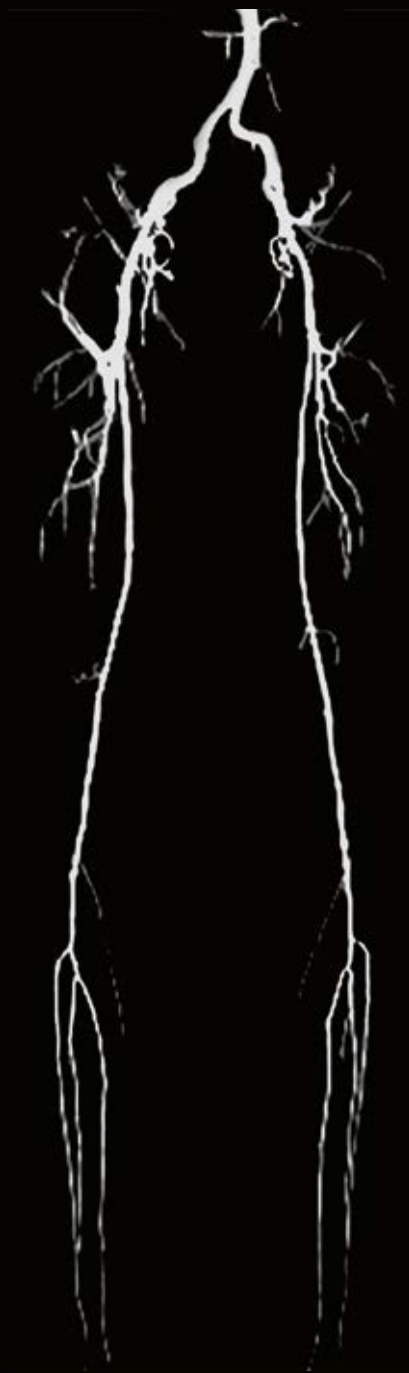
• Depiction of cardiac edema (T2 Map)

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T1 Map

T2 Map
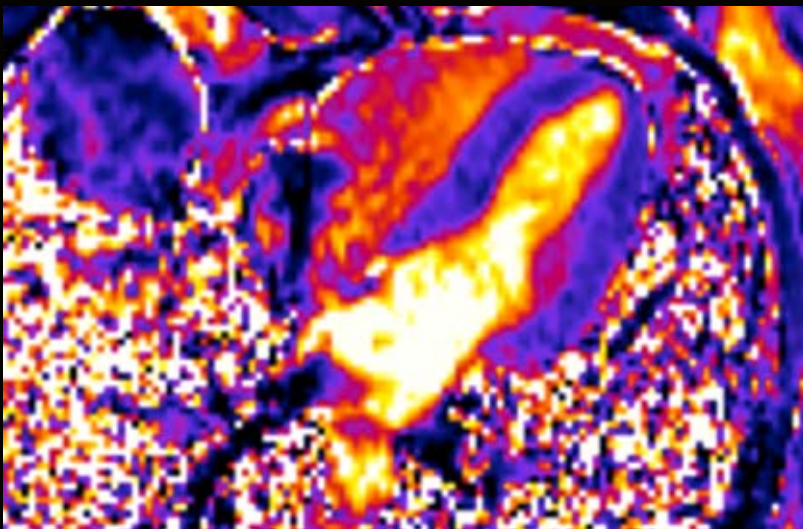
Trendsetting applications with *syngo* MR E11P

QISS

A non-contrast MR angiography technique that improves patient safety and compliance for greater accuracy[12] and better disease management, while maintaining the diagnostic certainty you need in peripheral MRA exams.
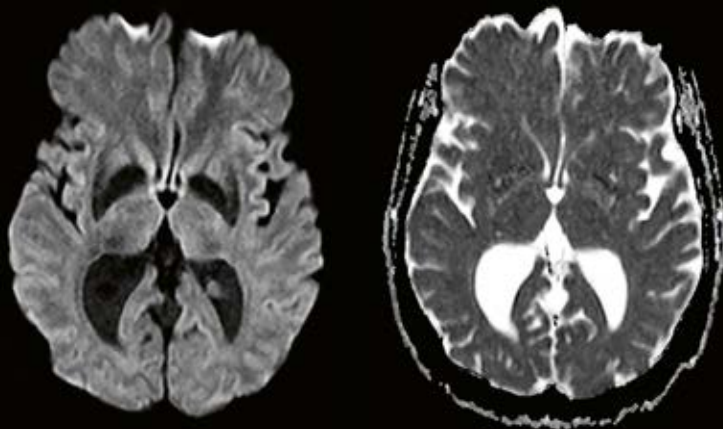
Trendsetting applications with *syngo* MR E11P

RESOLVE

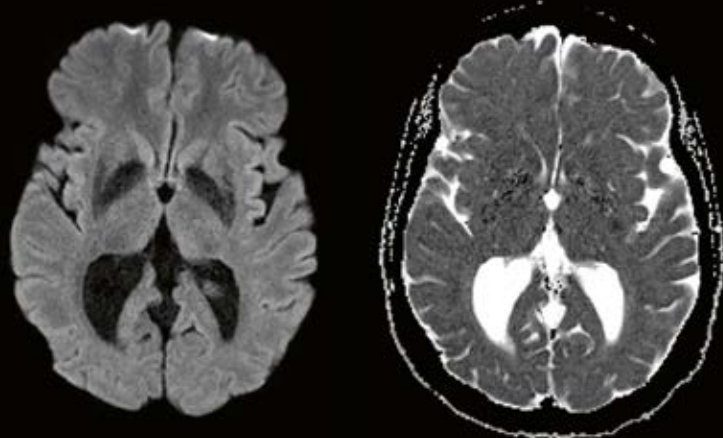Distortion-free, anatomy-true, high-resolution diffusion imaging of the brain, spine, breasts, and prostate.

4aaaa0070

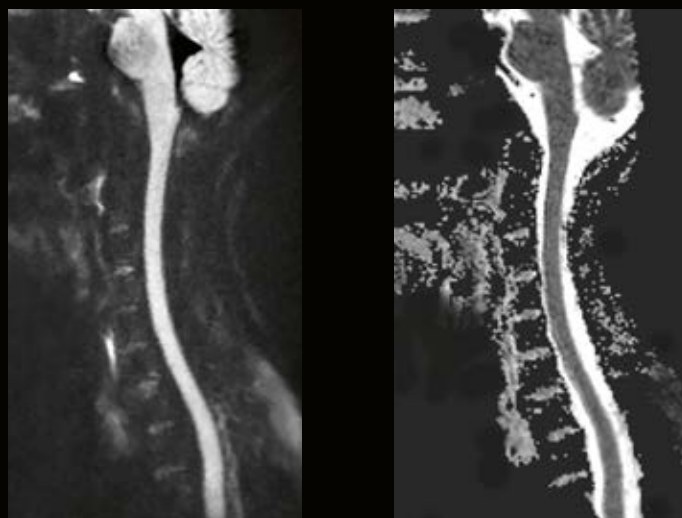**Conventional DWI**

TA 1:59
Matrix 192 x 192
B-value 1000

RESOLVE

TA 2:58
Matrix 224 x 224
B-value 1000

RESOLVE
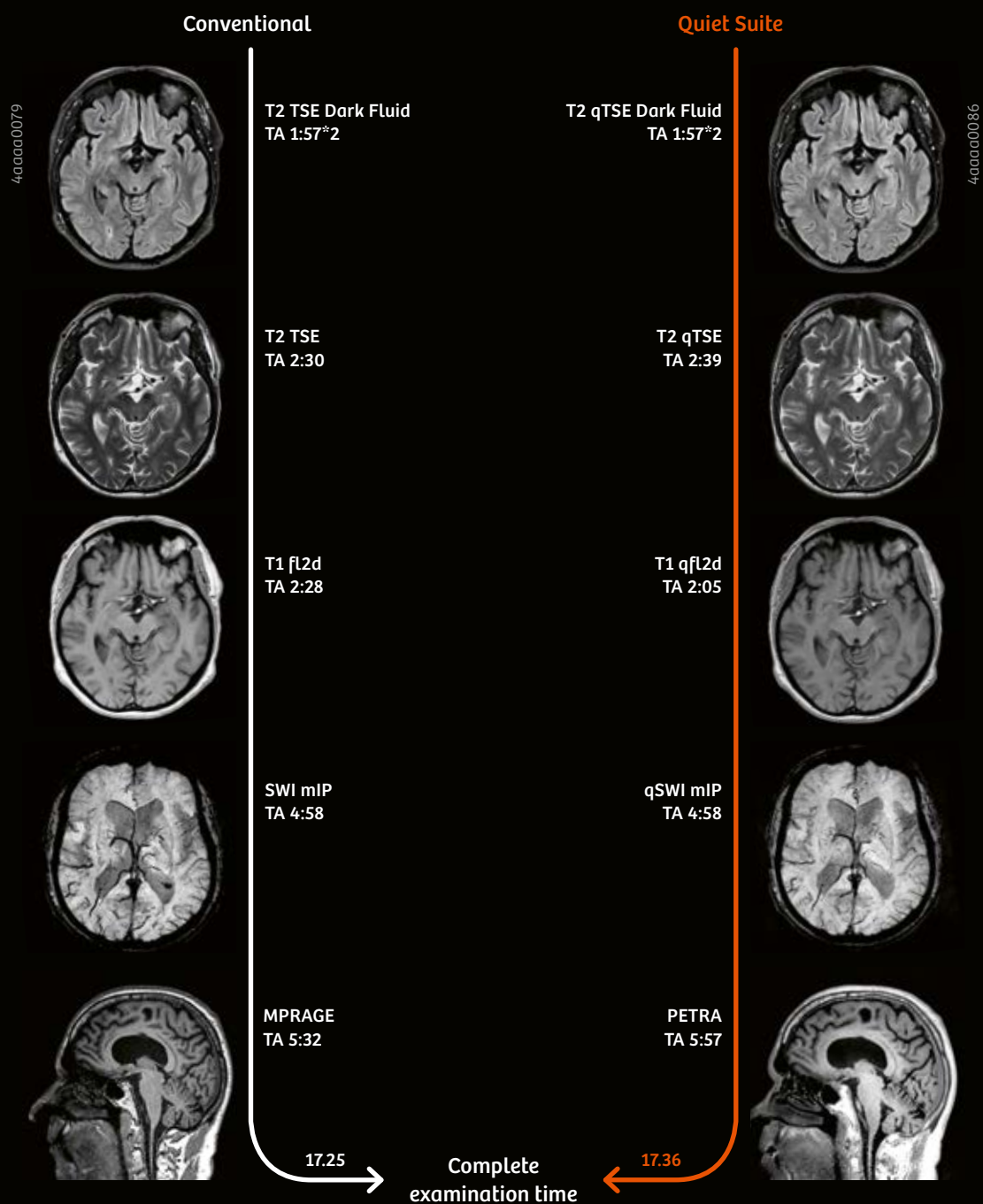
TA 1:40
Matrix 80 x 160

ADC

Trendsetting applications with *syngo* MR E11P

Quiet Suite

Imaging is to be seen, not heard.

Complete, quiet examinations for neuro and orthopedics.

• Up to 10dB(A) reduction in sound pressure[13]

• No compromise on image quality, no need for hardware modification

Conventional		Quiet Suite
	T2 TSE Dark Fluid TA 1:57*2	T2 qTSE Dark Fluid TA 1:57*2
	T2 TSE TA 2:30	T2 qTSE TA 2:39
	T1 fl2d TA 2:28	T1 qfl2d TA 2:05
	SWI mIP TA 4:58	qSWI mIP TA 4:58
	MPRAGE TA 5:32	PETRA TA 5:57

4aaaa0079

4aaaa0086

17.25

17.36

Complete examination time

Dedicated PET-MR workflow

High efficiency and consistency in PET-MR imaging accross patients, follow-ups, and scanners.

DotGO Cockpit and engines

High efficiency and consistency in PET-MR imaging accross patients, follow-ups, and scanners.

Dot engines:

Standard	**Optional**	
• Brain Dot Engine	• Abdomen Dot Engine	• Angio Dot Engine
	• Breast Dot Engine	• TimCT Angio Dot Engine
	• Spine Dot Engine	• TimCT Onco Dot Engine
	• Large Joint Dot Engine	• RT Dot Engine
	• Cardiac Dot Engine	

Tim coils for hybrid and MR-only scans

Tim is Siemens Healthineers unmatched coil design and architecture when it comes to flexibility, accuracy and speed. For Biograph mMR, we've incorporated low-attenuation materials to minimize attenuation of the PET signal. The result is outstanding 3T MR and PET performance.

Shoulder Array Coil (4ch)

Peripheral Angio Coil (36ch)

Wrist (8ch)

Tx/Rx 15-channel Knee Coil

Foot/Ankle (8ch)

mMR Head/Neck, A Tim Coil (12 + 4ch)

mMR Spine, A Tim Coil (24ch)

mMR Body, A Tim Coil (6ch x 5)

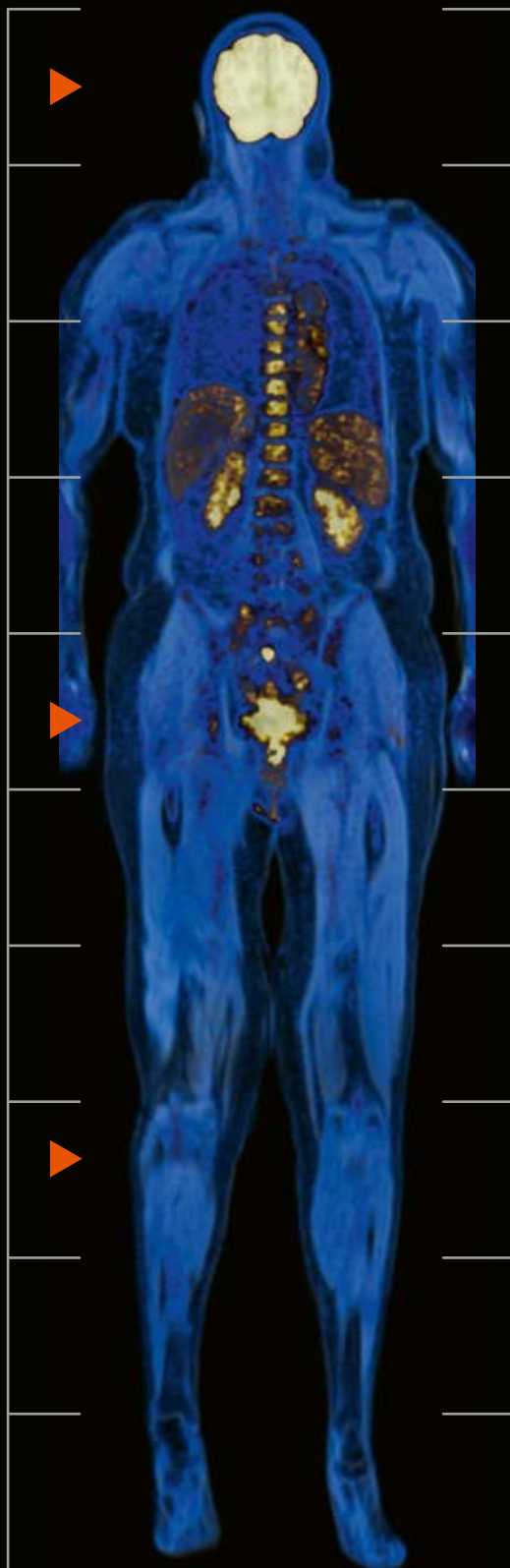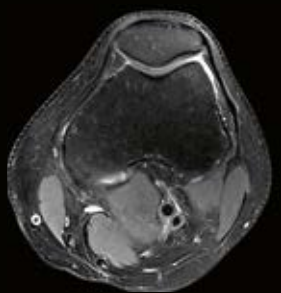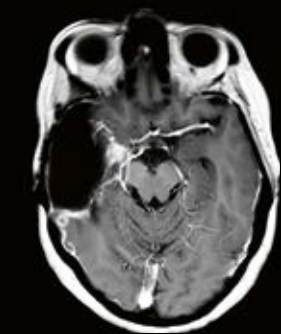4-Channel Flex Coil, large and small, PET-MR compatible

mMR Breast, A Tim Coil (4ch, for imaging and biopsy)

Special-purpose Coil (4ch), PET-MR compatible

Total-body

The extensive range of PET-compatible MR coils enable Total-Body, simultaneous PET-MR scans with up to 10 bed positions covering a FOV from head to toes in a single patient set-up.

Diagnostic-quality dedicated MR-sequences can be obtained with the same coils and set-up.

Ensure:

- fast throughout,
- more patient comfort, and
- less radiation exposure for your staff

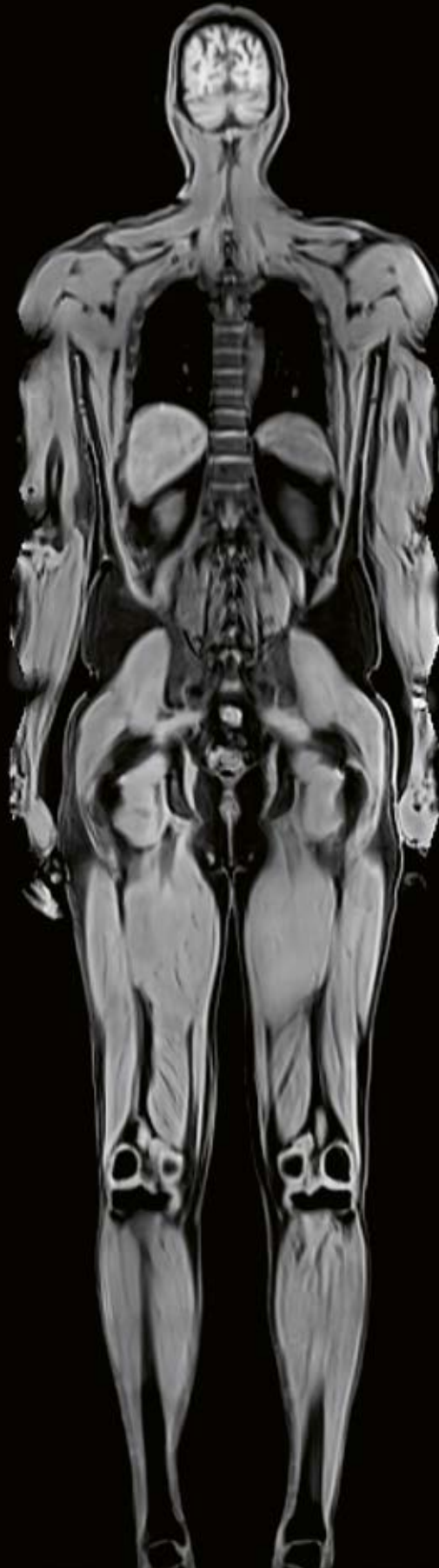only with Biograph mMR.

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ZEMODI, Bremen, Germany

Total-body

4aaaa0119

Injected activity: 298 MBq
T1 Dixon water

Malignant melanoma metastasis in the lung and liver with lymph node involvement.

ZEMODI, Bremen, Germany

Top performance MR imaging with Biograph mMR – Ankle

Outstanding results also as stand-alone MRI.

Biograph mMR utilizes Siemens Healthineers leadership in MRI technology. A history of innovation and MRI solutions that can put you at the forefront of your field. Take the lead and achieve outstanding results for your patients, your research and your business.

T2w TSE, Cor
0.3 x 0.3 x 3.0 mm
TA 1:50 min

PDw, FS, Sag, GRAPPA 2
0.3 x 0.3 x 3.0 mm
TA 2 :21 min

PDw, FS, Cor, GRAPPA 2
0.3 x 0.3 x 3.0 mm
TA 2:18 min

Top performance MR imaging with Biograph mMR – Knee

Outstanding results also as stand-alone MRI.

4aaaa0037

PDw, FS, Tra, GRAPPA 2
0.3 x 0.3 x 3.0 mm
TA 2:56

PDw, FS, Sag, GRAPPA 2
0.35 x 0.35 x 3.0 mm
TA 3:07

T1w, Sag, GRAPPA 2
0.35 x 0.35 x 3.0 mm
TA 1:54

Prostate Cancer – case study

Ga68-PSMA[14]
Injected activity: 91 MBq
Uptake time: 50 min

4aaaa0082
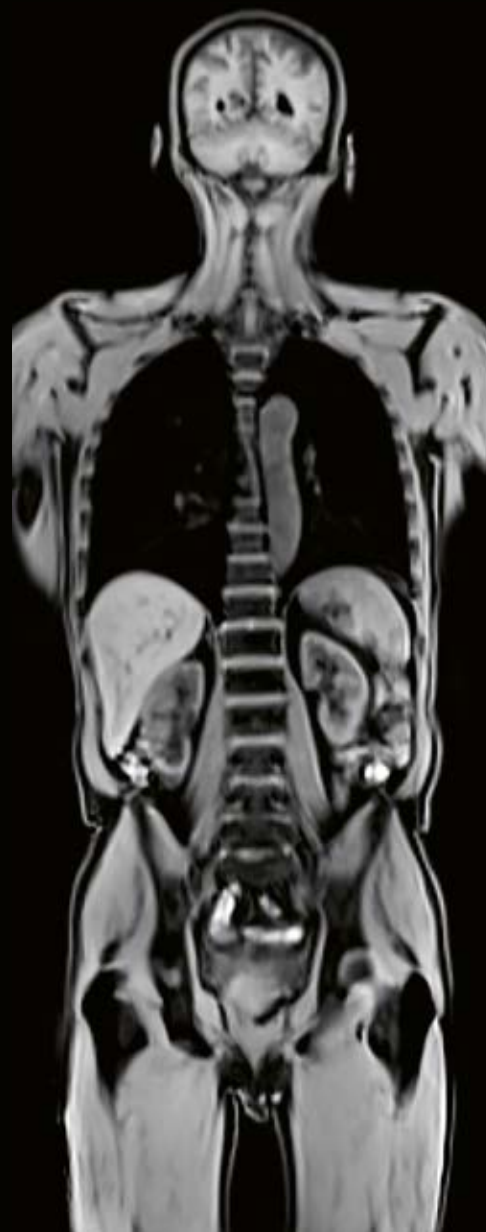

Dixon in-phase

ZEMODI, Bremen, Germany

Case 2
Known prostate cancer in the left peripheral zone. Solitary lymph node metastasis on the right iliacal region, as well as bone metastases on the pelvic bones (both sides) and on a left dorsal rib.

4aaaa0082

T2 tirm   Dixon water

Breast cancer – case study

Injected activity: 262 MBq
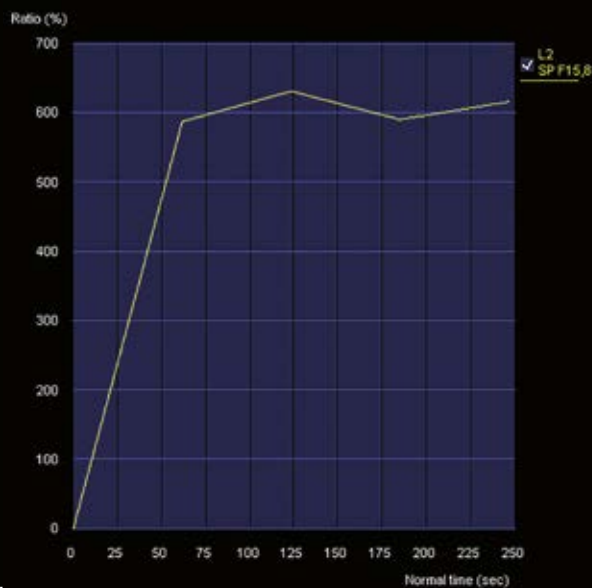**Uptake time: 60 min**

fl3D fs post CE

Fused

Series 3
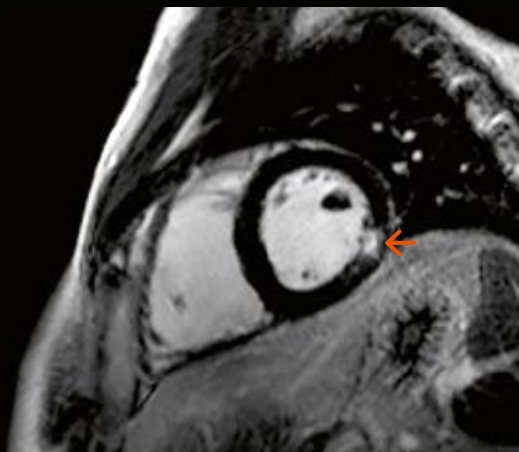Subtraction Mean Curve from dynamic MR in the lesion ROI.

Metabolically active lesion concurring with the MR finding, but PET data also indicate a potential extent (arrow) of the tumor beyond the MR finding.

Radiology Department, University Hospital, Tübingen, Germany

Myocarditis

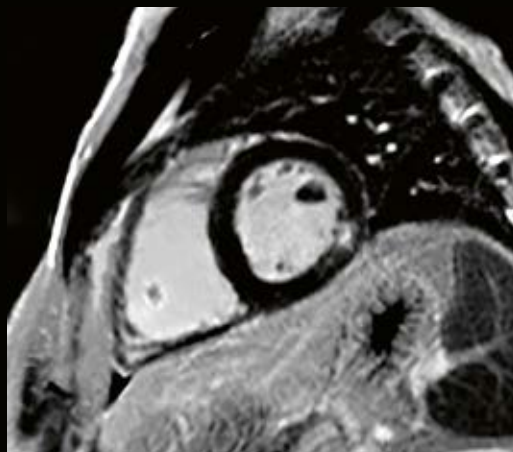**Injected activity: 585 MBq**
Uptake time: 10 min
90 min dynamic acquisition

High-res MAG

High-res PSIR
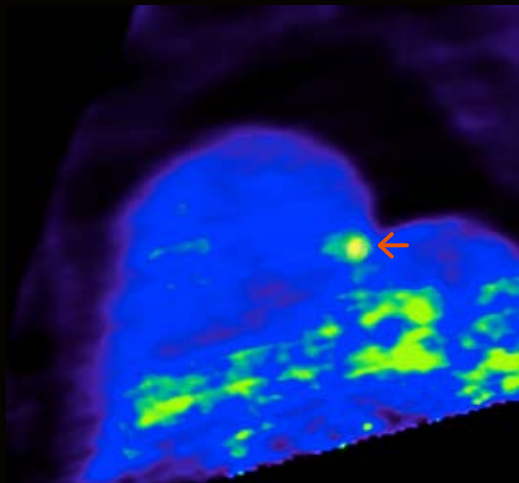
PET
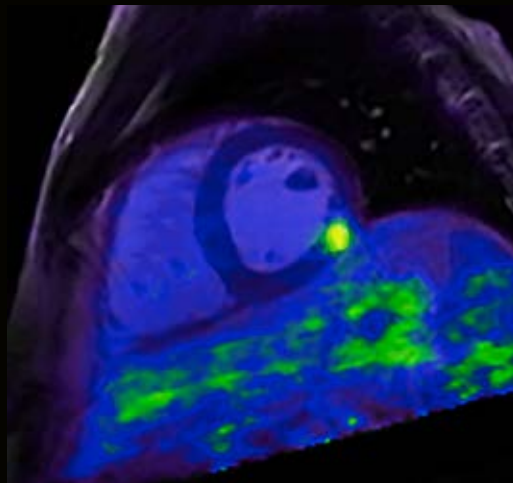
Fused

Short-axis view of both ventricles showing a discrete lesion in the infero-lateral wall (arrow). Focal activity increase near the inferior wall of the myocardium and adjacent to the liver as seen in the PET alone.

Mt. Sinai CSM Hess Center, New York, USA

Prostate Cancer – case study

Case 1
Primary lesion profiling with extensive MR contrasts and accurate prostate gland PET
imaging. Extent of metastatic disease is revealed with a whole-body Ga68-PSMA PET.

Ga68-PSMA[14]
injected activity: 108 MBq
Uptake time: 115 min
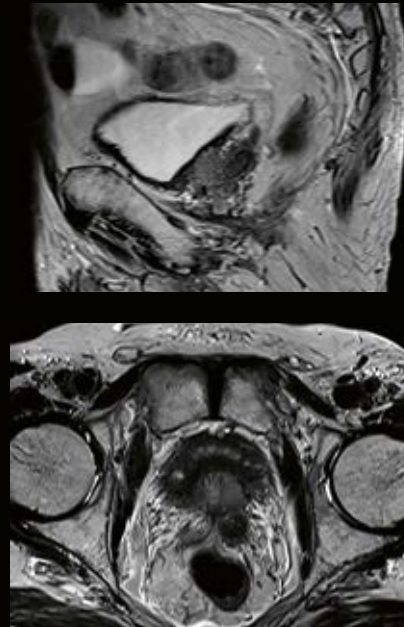
T2 weighted TSE images
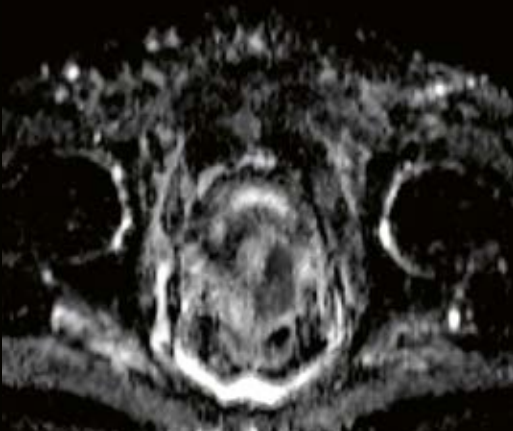
Diffusion weighted ADC map
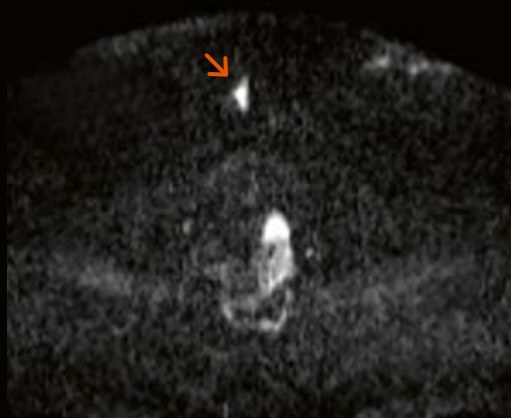
Diffusion, Trace weighted image

ZEMODI, Bremen, Germany
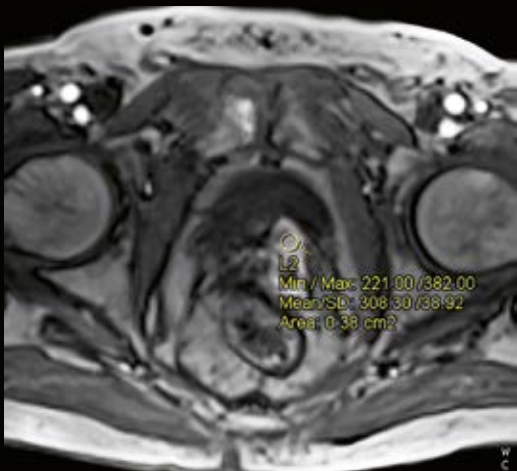
VIBE
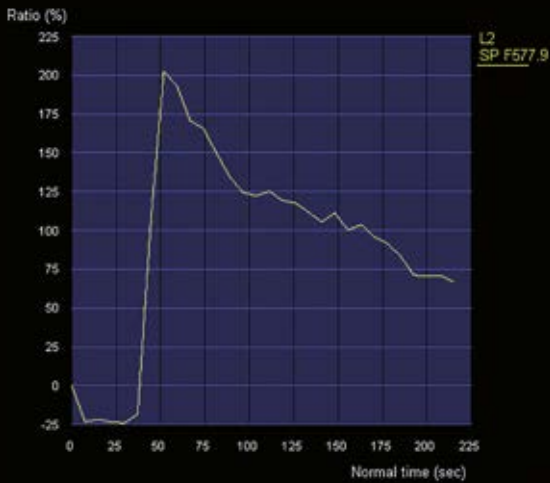
Contrast agent signal-time curve in the prostate lesion

MIP image

Fused PET and MR image with proximal metastatic disease as indicated by PET (arrow).

ZEMODI, Bremen, Germany

Recurrence of glioblastoma after treatment – case study

F18-FET[14]
Injected activity: 216 MBq
Uptake time: 30 min
Patient weight: 63 kg

Fused

DWI

ADC

ce-T1

ZEMODI, Bremen, Germany
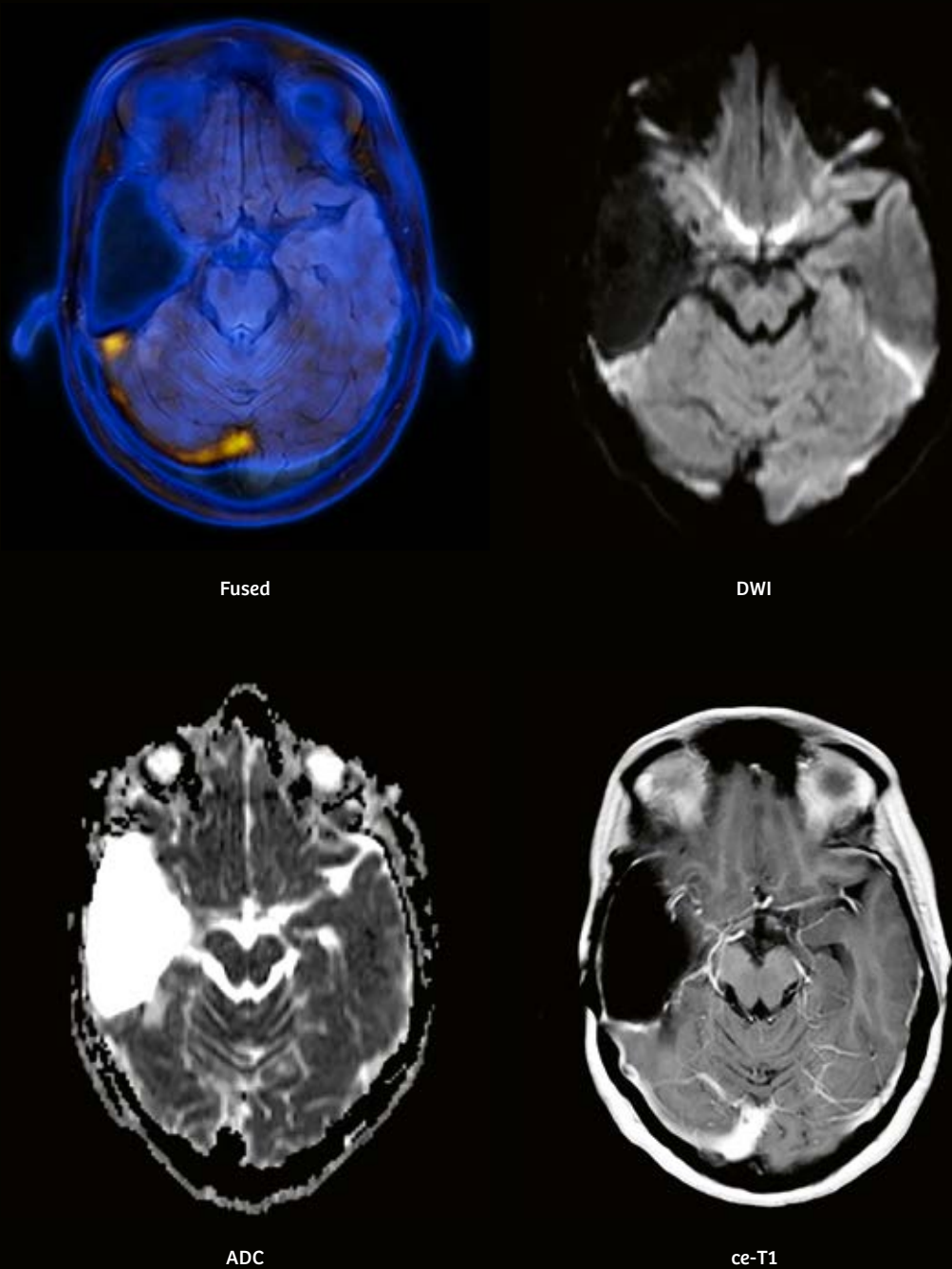
Recurrence of glioblastoma after treatment – case study

Same patient.
Follow-up PET-MR scan after therapy.

F18-FET[14]
Injected activity: 224 MBq
Uptake time: 30 min

4aaaa0015

The combination of FET-PET with a contrast enhanced MR examination left no doubt of the existence and location of malignancy in the follow-up scan.

Fused

DWI

ADC

ce-T1

ZEMODI, Bremen, Germany
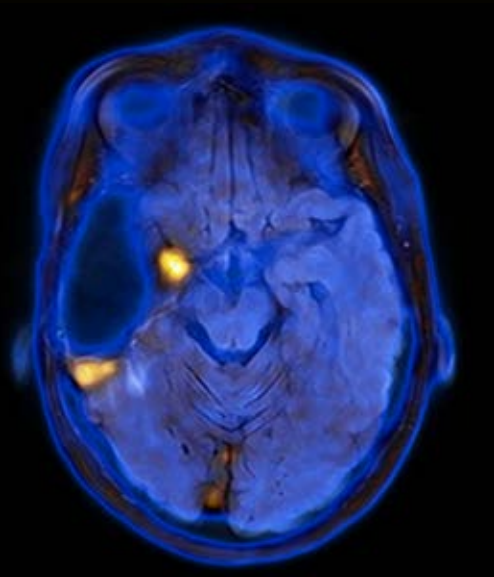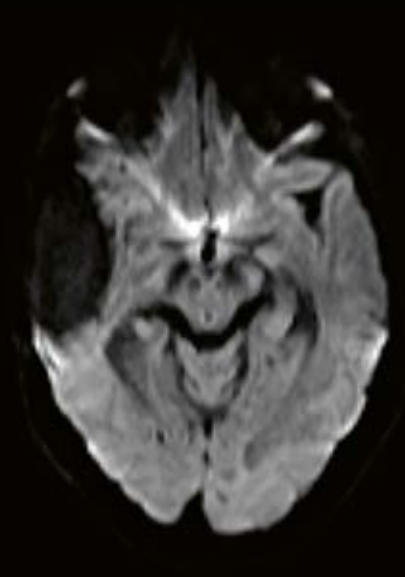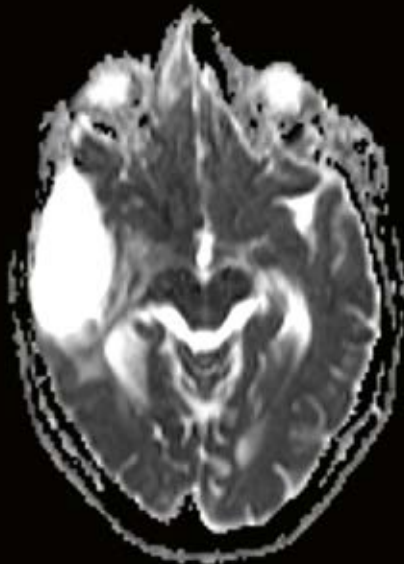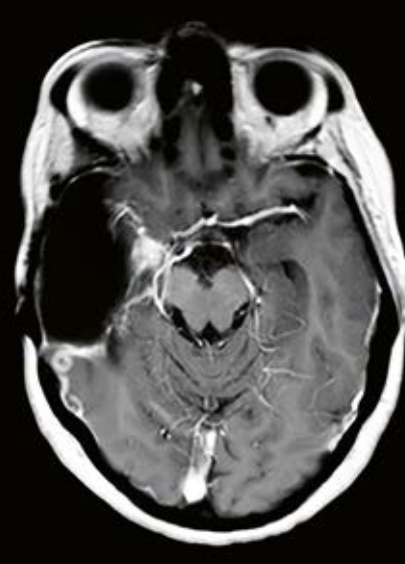
Service and exchange – comprehensive services

teamplay
Make fast and well-informed decisions

teamplay Fleet
Comprehensive fleet management – more control, less hassle

Siemens Guardian Program™
Providing proactive service with real-time monitoring

Proven upgrade paths
Future-proof your investment

Evolve Program
Stay in the future

Siemens Utilization Management
Make the most of your equipment's potential

The service offerings from Siemens Healthineers ensure that you stay at the leading edge of 3T technology throughout the entire MRI lifecycle – from installation and operation to upgrades and ongoing support. Our active communication platforms and communities – like MAGNETOM World – keep you up to speed on the world of MRI and enable you to share your ideas and experiences with your peers.

teamplay

teamplay grants instant[15] access to statistics from your imaging device fleet. Its multi-vendor support empowers you to identify improvement potential on all levels of execution. teamplay provides an easy-to-grasp overview of an institution's imaging workflow for enhancing efficiency, competitiveness, and quality of care in one intuitive and efficient plug-and-play solution.

teamplay Fleet

More control and less hassle, with a personalized control center safeguarding your fleet's productivity. This Web-based portal bundles all service-related activities, documents, and reports in one comprehensive online resource available 24/7, whenever it's needed. teamplay Fleet is provided at no charge to all Siemens Healthineers customers.

Siemens Guardian Program™

By continuously monitoring systems for possible deviations from current norms, the Siemens Guardian Program helps maximize the level of system availability, makes it easy to detect and resolve system errors, and prevents costly downtime and the resulting rescheduling that disrupts patient care.

Proven upgrade paths

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

Evolve Program

This is an "anti-obsolescence" program that enables you to cost-effectively keep your imaging system technology current and extend the life of your equipment investment. Expand your imaging equipment with the latest software versions and cutting-edge applications, so that you can be more accurate in your diagnoses and speed up your performance.

Siemens Utilization Management

Leverage your system's utilization and aim for maximum transparency to get the most from the potential for your mMR scanner. This service allows you to monitor KPIs and benchmark your system against other mMR machines from Siemens at any facility or organization under a comparable contract. So you can keep track of your mMR's performance, and reap the maximum reward from your scanner.

Service and exchange – peer-to-peer information

MAGNETOM World
Online MRI community

IDEA[15]
Development platform

MAGNETOM Flash
MRI publication

User Group
Biograph mMR User Forum

On MAGNETOM Flash: "An excellent and useful combination of technological and clinical articles that both keep one up to date with advances in MRI and provide practical assistance for day-to-day practice – good and interesting learning material."[5]

Mark Lourensz
St Vincent's Hospital, Fitzroy, Victoria, Australia

MAGNETOM World

Siemens Healthineers' global MRI community offers peer-to-peer support and information. Radiologists, cardiologists, technologists, and physicists have all contributed with publications, presentations, training documents, case studies, and more – all freely available to you in this unique network.

MAGNETOM Flash

Published quarterly, the MR customer magazine features up-to-date clinical case studies, application tips, and technical and product information relevant to you. All content is carefully compiled by experts to meet the needs of today's MRI users in both clinical and research scenarios. In fact, 98.5% of readers report that MAGNETOM Flash is clinically relevant.[17]

Biograph mMR User Group

This user group is a network for Biograph mMR professionals that provides easy access to relevant information and a place to connect with colleagues and peers so you can benefit from knowledge exchange. Connect with Siemens Healthineers Biograph mMR experts to ask questions about the products and applications.

IDEA/UHF online discussion board

IDEA[16] is an open development platform for the largest and most active MR research community in the world. It brings together users from across the globe and fosters innovation in the field of mMR. Members collaborate online at *www.mr-idea.com*

siemens.com/ magnetom-world

Visit MAGNETOM World

Technical specifications

**MAGNETOM Biograph mMR
Technical specifications**

Field strength	3 Tesla
Bore size	60 cm
System length[18]	199 cm
System weight (in operation)[18]	6.3 tons
Minimum room size[18]	31 m^2
Maximum number of channels[19]	102
Number of independent receiver channels that can be used simultaneously in one single scan and in one single FOV, each generating an independent partial image	32 / 18
Gradient strength	MQ gradients (45 mT/m @ 200 T/m/s)
Helium consumption	Zero Helium boil-off technology

PET specifications

Crystal material	LSO
Crystal element dimension	4 mm x 4 mm x 20 mm
NEMA NU-2 2012 Transverse spatial resolution FWHM @ 1 cm	4.2 mm
Sensitivity	14.1 cps/kBq
Peak NEC rate (@ ≤26 kBq/cc)	180 kcps

Attenuation correction methods

Human AC	MR-based segmentation and truncation correction
Hardware-based AC	Head/Neck Coil, Spine Coil, Breast Coil, patient table

Magnetic Resonance Imaging

Our innovative MRI technologies offer you exceptional image quality, efficiency, and speed, while providing patient friendliness and investment protection. Equipped with these technologies and a very strong global collaboration network, we enable you to lead in MRI.

Life Design

Biograph mMR

MAGNETOM C!

Trendsetting Applications

MAGNETOM Terra

MAGNETOM ESSENZA

MAGNETOM Prisma

MAGNETOM Sempra

MAGNETOM Vida

BioMatrix

MAGNETOM Amira

MAGNETOM Skyra

MAGNETOM Aera

MAGNETOM Spectra

DotGO Workflow

Tim Technology

syngo.via

Women's Health

Neurology

Oncology

Orthopedics

Men's Health

Cardiology

Angiography

Pediatrics
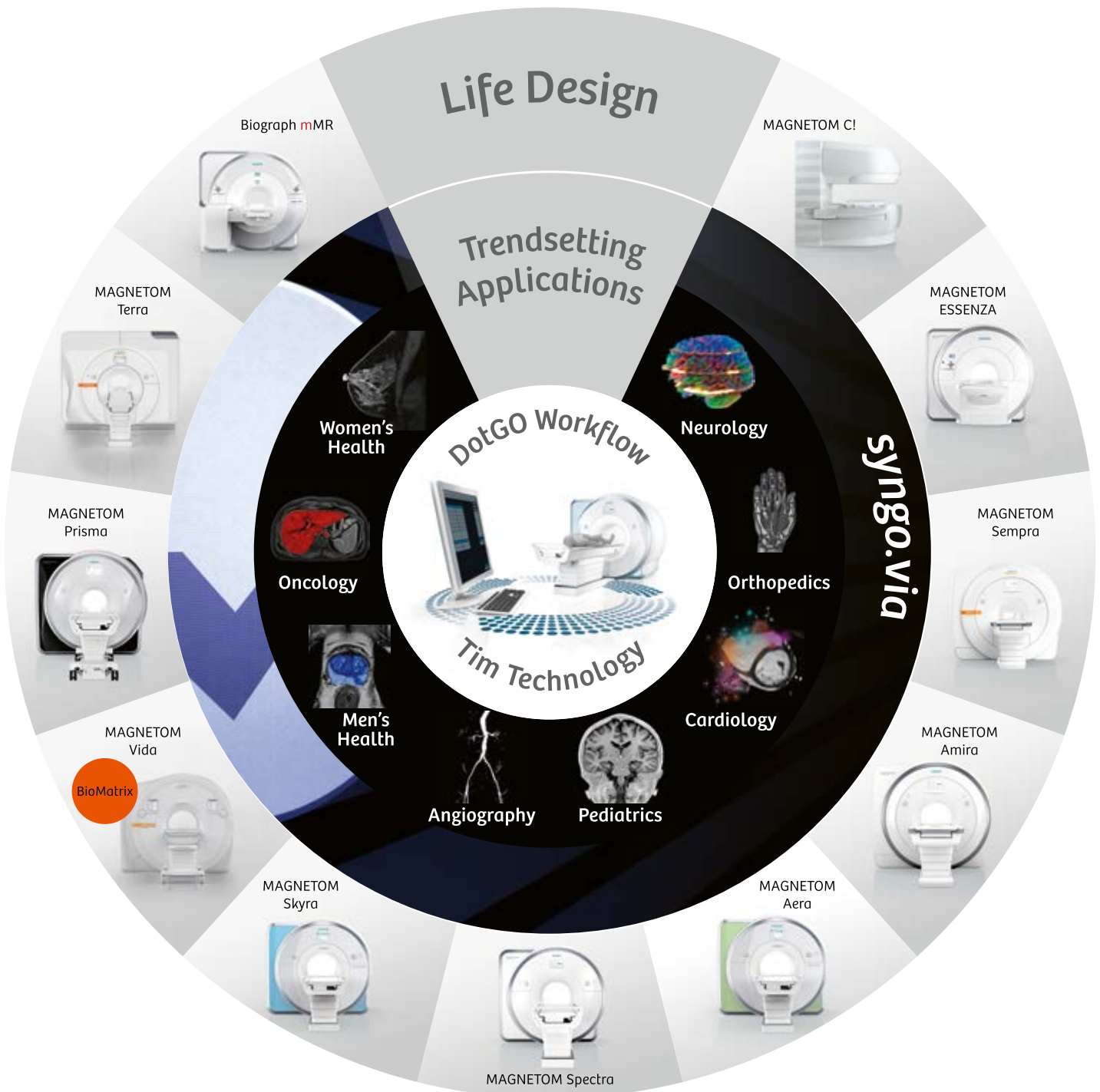
Why Siemens Healthineers?

At Siemens Healthineers, our focus is to help healthcare providers succeed in today's dynamic environment.

Healthcare providers around the world have long relied upon our engineering excellence – leading-edge, high-quality medical technologies across a broad portfolio. Our technologies touch an estimated 5 million patients globally every day.[20] At the same time, they help hospital departments to continuously improve their clinical, operational, and financial outcomes.

We now consolidate this unprecedented volume of data and insights and turn them into pioneering enterprise and digital health services. With those, we maximize opportunities and share risk for the success of your entire health system.

Partnerships are built on people. With Siemens Healthineers, there is no team more committed and more connected than we are to realize your success together.

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For accessories, please visit:
www.siemens.com/medical-accessories

1   Internal Status Report IB@Monitoring, Status 08.2017.

2   Catalano et al.: Clinical Impact of PET/MR Imaging in Patients with Cancer Undergoing Same-Day PET/CT: Initial Experience in 134 Patients – A Hypothesis generating Exploratory Study; Radiology, 2013.

3   Beiderwellen et al, PLoS 2015.

4   Gatidis S. et al., Invest Radiol. 2016 51(1):7-14.

5   The statements by Siemens Healthineers' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

6   Fact Sheet WHO on Cancer, Fact sheet N°297, Updated February 2015, http://www.who.int/mediacentre/factsheets/fs297/en/.

7   www.wsj.com

8   Schneider M. et al., SNMMI Conference 2016 #642. The image sharpness was evaluated using a frequency-threshold metric, which detects theoccurrence of high spatial frequencies and resembles a more realistic assessment of improved object appearance.

9   Paulus, Quick et al, J Nucl Med 2015; 56:1061–1066.

10 Koesters et al, J Nucl Med. 2016 June ; 57(6): 918–924.

11 Zhongshang Hospital Fudan University, Fudan, CN, Abdomen Dot Engine Workflow Study.

12 Hodnett, AJR-197-1466.

13 Data on file.

14 The Imaging Biomarkers referenced herein are not currently recognized by the US FDA as being safe and effective, and Siemens does not make any claims regarding their use.

15 Prerequisites include: wireless connection to clinical network, meeting recommended minimum hardware requirements, and adherence to local data security regulations.

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

17 2013 MAGNETOM Flash reader survey. Data on file.

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

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

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