

PHILIPS

MR 7700

MR systems

PHILIPS

Unmatched performance
and precision

Our vision

For more than 130 years, we have been creating meaningful innovations to improve people's lives and make the world more sustainable.

We are inspired to continually advance the state of precision diagnosis with customer- and patient-centric solutions that deliver clear care pathways and predictable outcomes.

In MR, our mission is to achieve a fast, fully automated, and personalized exam for every patient, while acting responsibly towards our planet and society.

With AI*-driven smart connected imaging, optimized workflows, and integrated clinical solutions, we improve your MR department's productivity, enhance patient and staff experience, and deliver high quality diagnostic imaging.

Welcome MR 7700, our breakthrough innovation in 3.0T imaging with unmatched performance and precision



Unmatched performance and precision

Experience breakthrough innovation in 3.0T imaging with the unique design of the Philips MR 7700 imaging system, enhanced with XP gradients and artificial intelligence (AI)*. The system is built to address a pressing need to deliver on the clinical expectations of today, and to facilitate the most demanding research programs.

The MR 7700 XP gradients provide high accuracy, power, and endurance to support confident diagnosis for every patient. It is the system of choice for highest quality diffusion imaging and advanced neuroscience.

Extend your scanning capabilities with a fully integrated multi-nuclei imaging and spectroscopy solution to explore new clinical pathways without sacrificing clinical imaging workflow or wide-bore patient comfort.

What's more?

The MR 7700 promises a great experience for both users and patients through the ease-of-use features of a well-designed clinical 3.0T scanner together with a no compromise workflow. Now scientists and clinicians alike can schedule without conflict.

Content

Higher diffusion IQ, for all anatomies	9
Excel in neuroscience	13
Innovative imaging solutions and workflow	17
Accelerate your exams	27
Seamless integration of Multi Nuclei	31
Protect and enhance your MR investment	39



Higher diffusion IQ, for all anatomies

- ▶ Up to 35% higher SNR¹
- ▶ Up to 35% shorter scan time²
- ▶ Limits distortions, even in large FOV



Excel in neuroscience

- ▶ 20% more fMRI volumes²
- ▶ 50% more DTI directions⁸
- ▶ Easy data transfer

Innovative imaging solutions and workflow

- ▶ Reach new levels of precision
- ▶ Confident decision-making
- ▶ Patient-centered productivity

Seamless integration of Multi Nuclei

- ▶ Six different nuclei*
- ▶ Across all anatomies
- ▶ Acquisition of proton and other nuclei, without switching coils



Philips MR 7700

Higher diffusion IQ, for all anatomies

When it comes to state-of-the-art diffusion imaging, the MR 7700 XP gradients deliver the highest level of clinical performance. Excellent signal-to-noise ratio (SNR) and motion detection technology support outstanding imaging results. And the system's high homogeneity and linearity bring precision to both anatomical and functional imaging.

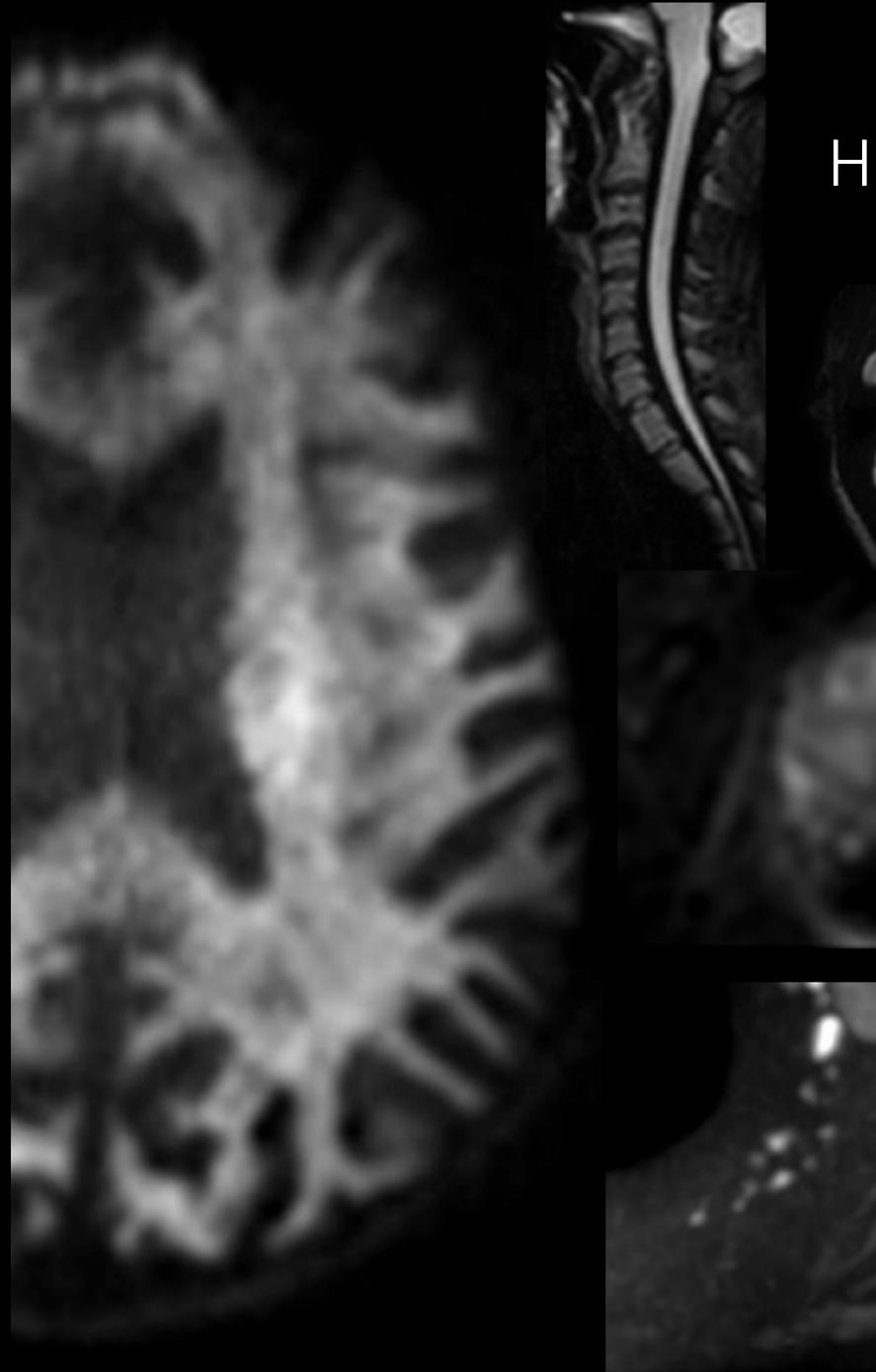
Achieve up to **35% higher SNR** in your echo-planar (EPI) diffusion imaging, in similar scan time¹, thanks to the added power of the XP gradients, which reduces time-to-echo (TE) values. These improvements in SNR in turn can help to provide a richer set of tracts in diffusion tensor imaging (DTI). Taking it further, the MR 7700 provides superb diffusion imaging at very high b-values, improving scans that typically suffer from lack of SNR. Additional SNR in your diffusion imaging also opens the possibility to scan with **increased spatial resolution**, enhancing your clinical confidence.

The high level of performance provided by the MR 7700 gradients also enable **up to 35% faster EPI diffusion imaging²** with the same spatial resolution.

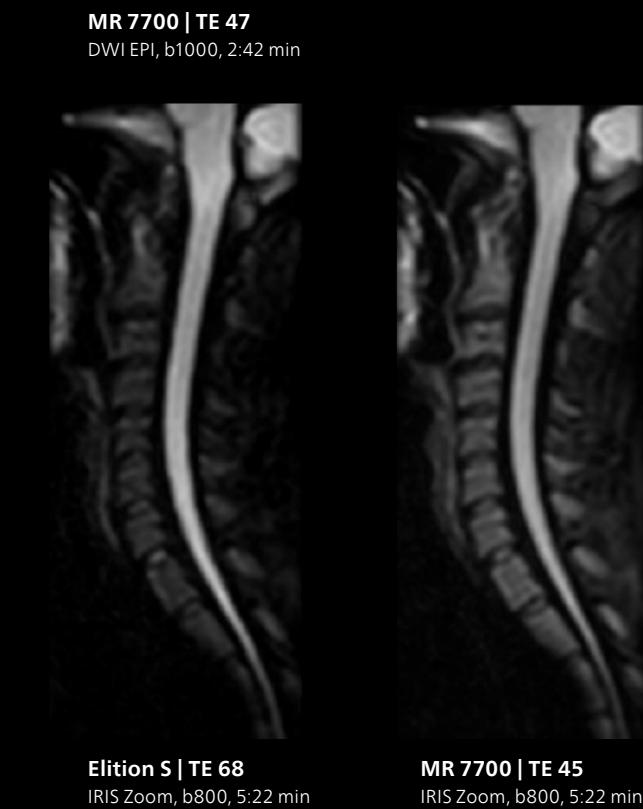
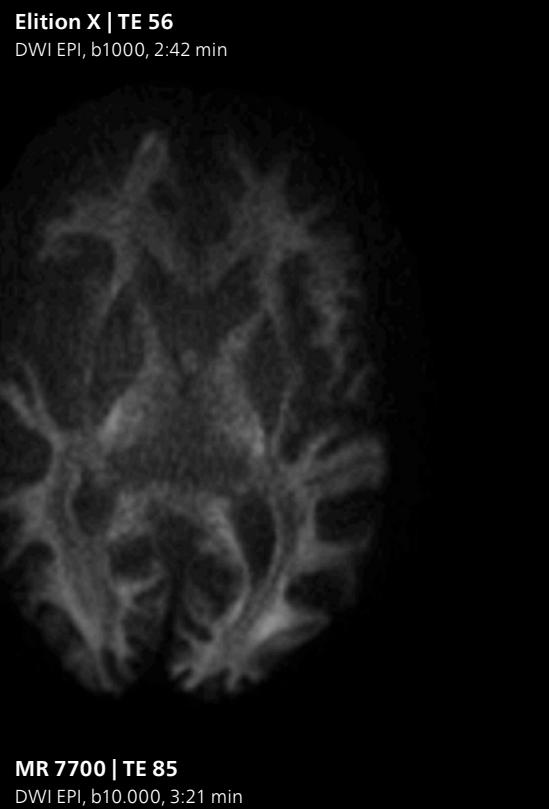
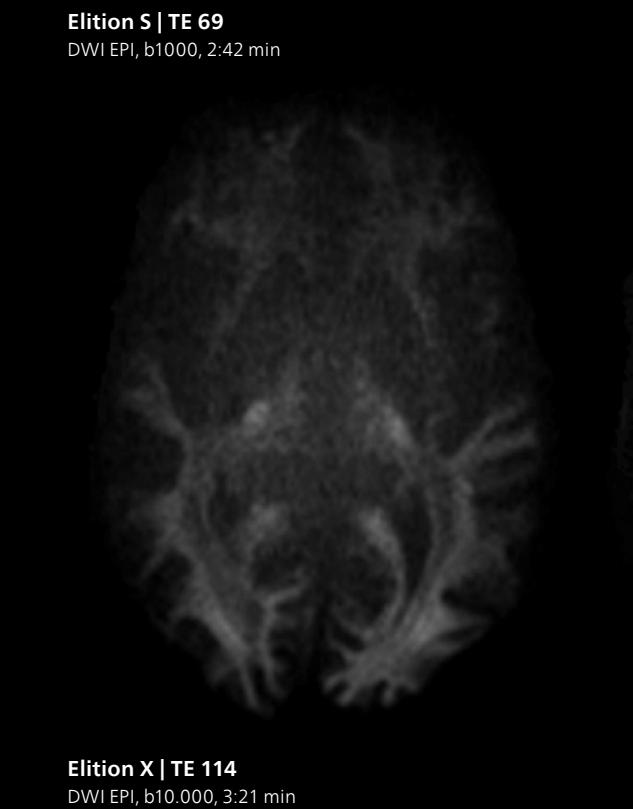
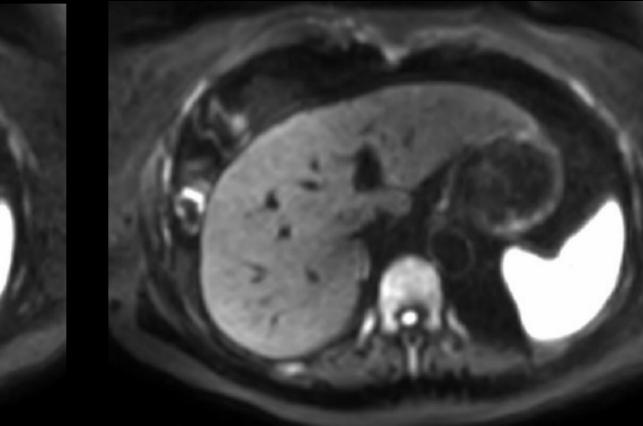
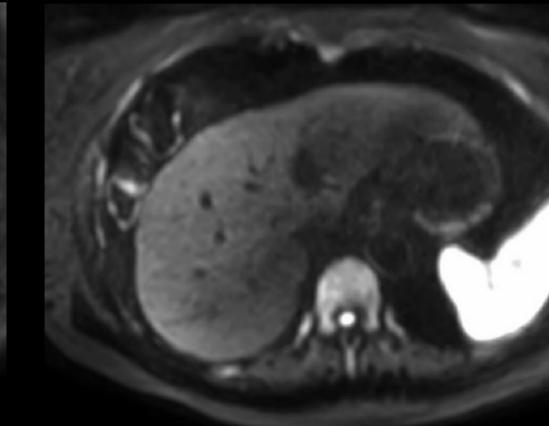
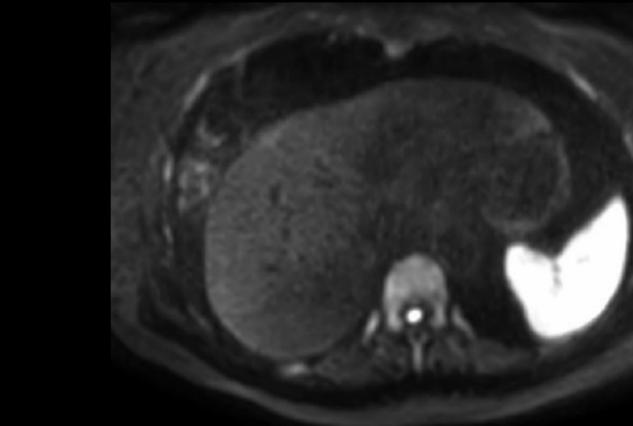
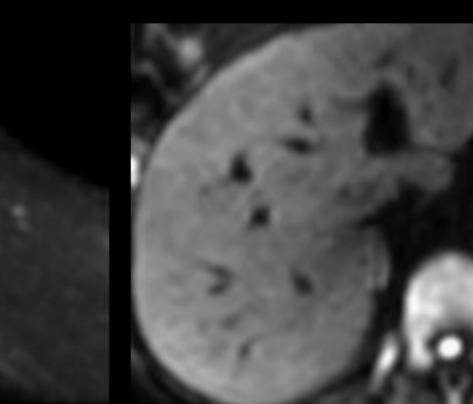
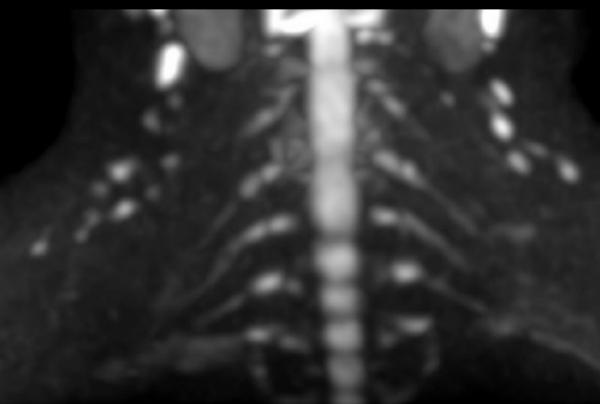
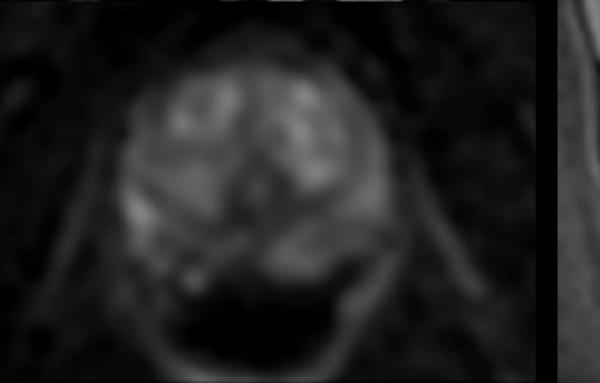
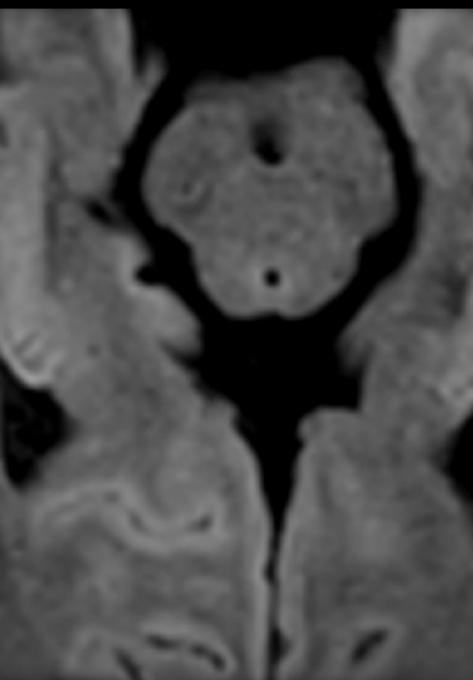
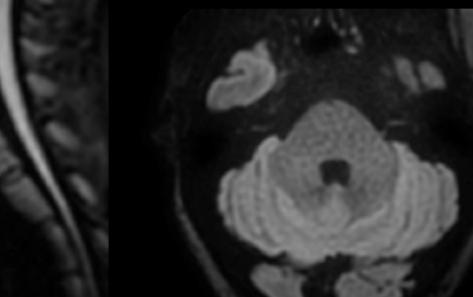
Using turbo spin echo (TSE) diffusion instead of conventional EPI diffusion, by nature, reduces sensitivity to susceptibility differences and reduces distortions in diffusion imaging. Diffusion TSE's compatibility with the Philips MultiVane XD robust motion-free imaging application contributes to **robust suppression of motion artifacts**, further enhancing diffusion image quality. Scan times can be reduced up to 15%, using the same spatial resolution², thanks to the shorter repetition times (TR's) delivered by the high power of the MR 7700.

To prevent image blurring, distortions or ghosting, the MR 7700 is designed and manufactured to deliver precise gradient waveforms across the whole performance range of the gradient system. This high accuracy is enabled by the unmatched gradient fidelity of (at least) 99.97% for t>0.5ms³. This exceptional gradient linearity **limits distortion, even in large fields-of-view (FOV)**, and supports small lesions to become visible, specifically at the edges of the FOV. It especially benefits applications like total body diffusion.

Finally, the system allows remarkable freedom in patient positioning. There is no need to place your patient into an uncomfortable 'superman' position. Thanks to the MR 7700's high linearity, you can keep the wrists to the side of their body.



High diffusion IQ, for all anatomies



Up to 35% higher SNR¹, in similar scan time



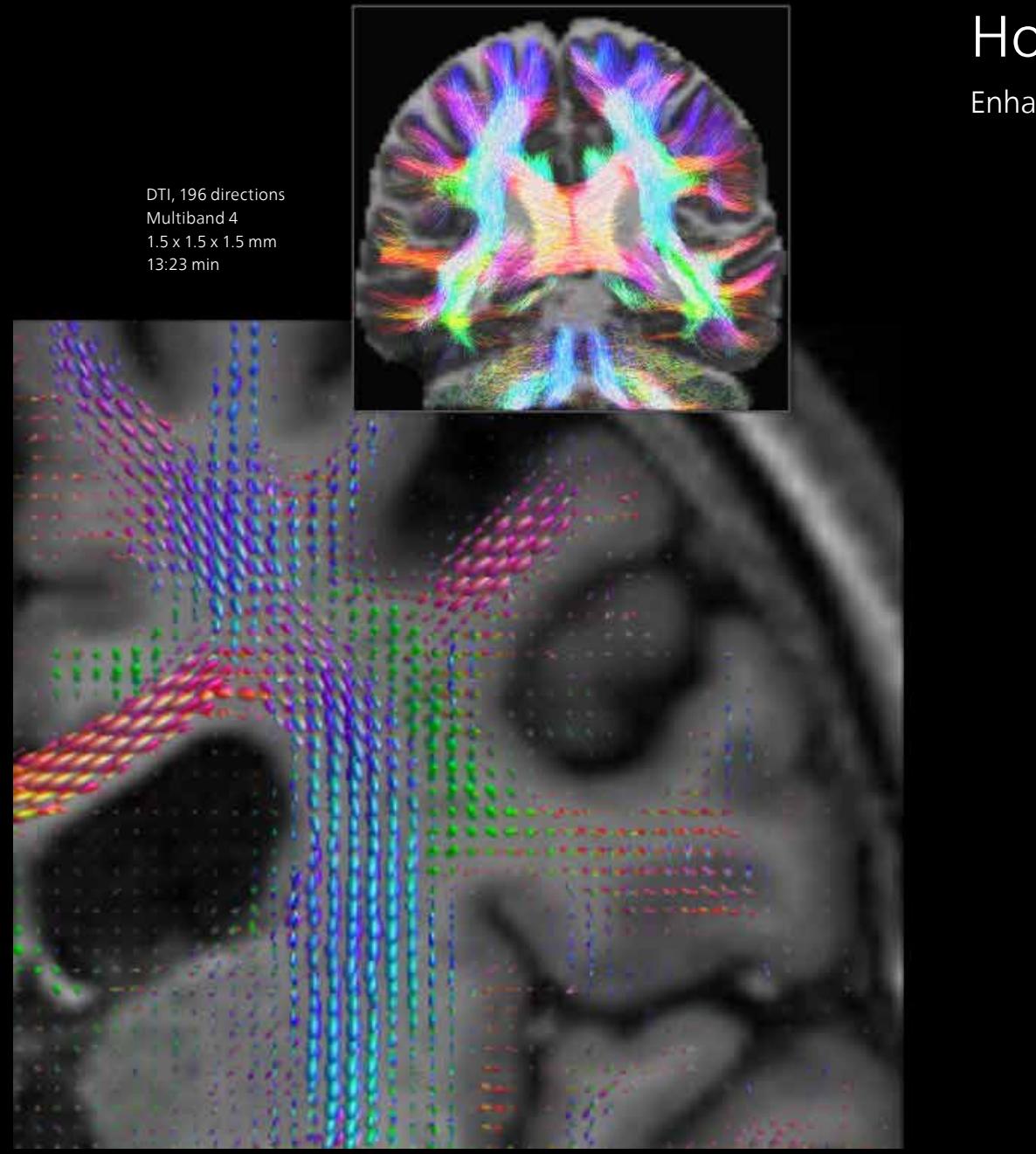
Excel in neuroscience

MR's ability to shed light on both neuro-anatomy and neuro-function has led to its use in many neuroscience studies. By offering a new level of power, based on a 2.4 MW amplifier, the MR 7700 enables high gradient amplitudes of 65 mT/m and high slew rates of 220 T/m/s simultaneously, on each cartesian axis. This meets the need of your most demanding imaging sequences by continuously delivering at peak performance to empower the search for new clinical pathways and provide a key advantage to neuroscientists – exceptional image quality and speed for diffusion and fMRI imaging.

Since neuroscience sequences typically require repetitive high gradient amplitudes and short TRs, these sequences in particular benefit from outstanding endurance. With the MR 7700 you can achieve up to **20% more fMRI sequences**, with the same spatial resolution², due to shorter TR's. The high performance gradients, in combination with MultiBand SENSE acceleration technique, allow you to acquire **50% more DTI directions** in the same scan time⁴.

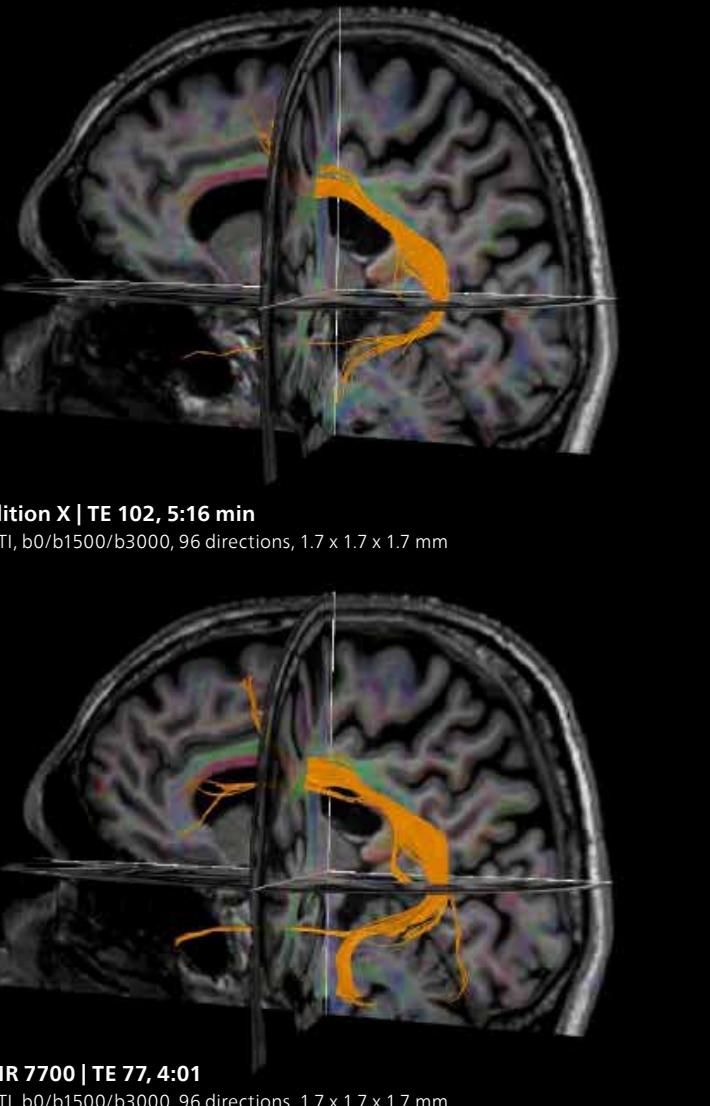
The MR 7700 has a unique – very well thought through – design to deal with power dissipation. First, the gradient system efficiently minimizes heat dissipation within the gradient coil. Secondly, due to the efficient heat management, the system can operate with the high average gradient amplitudes, required for diffusion tensor imaging (DTI) and fMRI imaging, without slowing down or overheating, and resulting in a Grms of 27mT/m.

Review of fMRI with DTI-processing can be performed on the MR 7700. fMRI, including seed-based resting state analysis, can be done in real-time to assess patient response during the acquisition. More extended functionality is achieved with the IntelliSpace Portal (ISP) advanced visualization and analysis software. Because neuroscience studies and multi-center trials often include enhanced analysis outside of the default reviewing stations, Philips enables **easy data transfer**, including other types of data export, such as SPAR/SDAT and XML-REC.



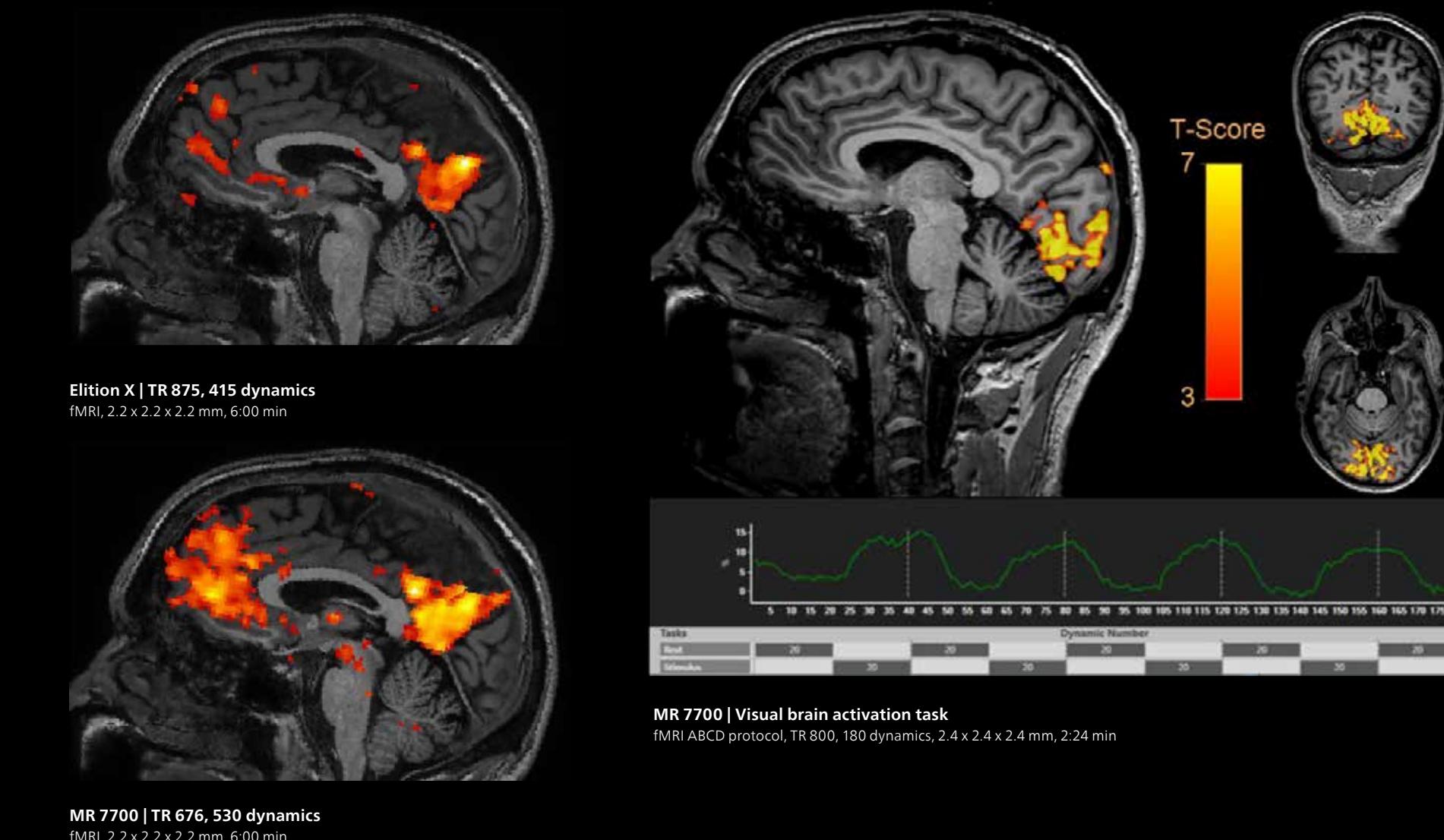
How is the brain wired?

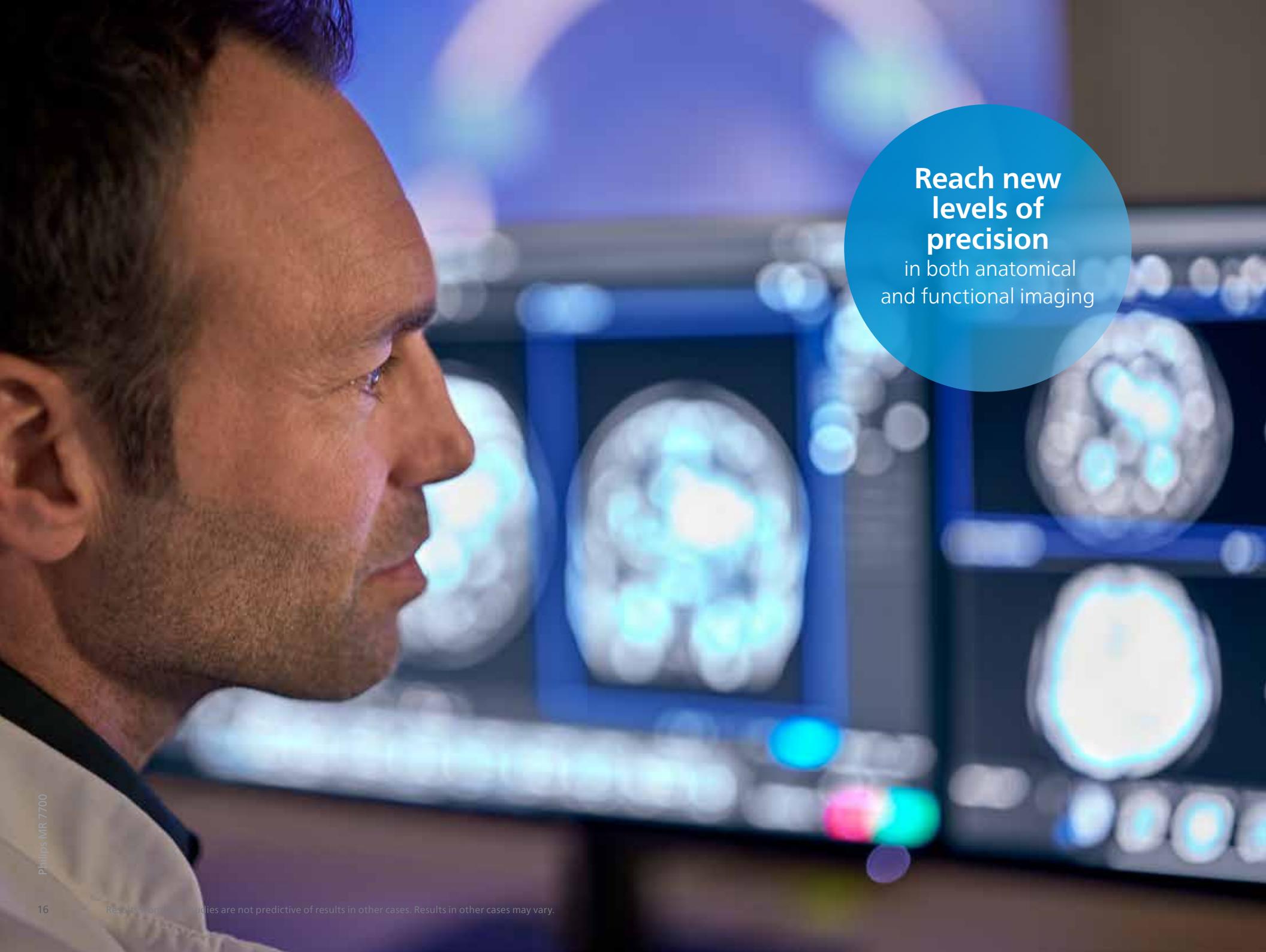
3D visualization of brain nerve tracts



How does the brain function?

More fMRI volumes in the same scan time, richer data processing





Innovative imaging solutions and workflow

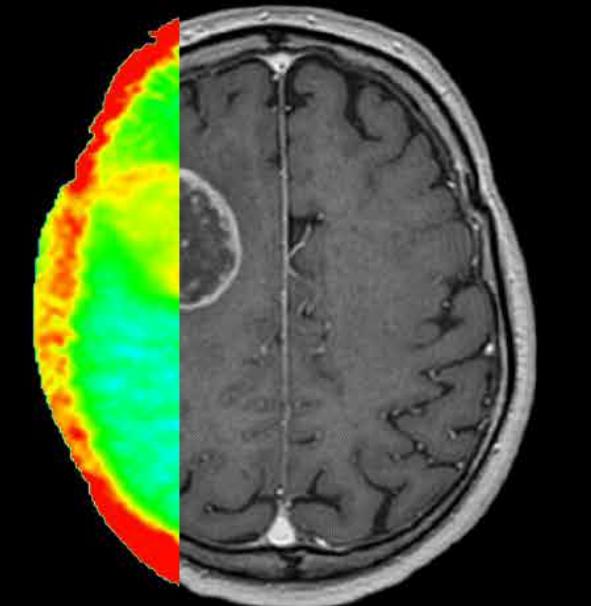
The MR 7700's gradient and radiofrequency design, combined with a wealth of unique features such as 3D APT (Amide Proton Transfer), black blood imaging, and susceptibility weighted imaging (SWIp), help you reach new levels of precision in anatomical and functional clinical imaging. With innovations on all fronts, the system supports confident decision-making and improved diagnostic imaging, even for the most complex cases. You can tackle existing, new, and future clinical demands while addressing the current upswing in patient volume experienced by many radiology departments.

3D APT is a unique, contrast-free, brain MR imaging method that focuses on the need for **more confident diagnoses in neuro oncology**. 3D APT uses the presence of endogenous cellular proteins to produce an MR signal that directly correlates with cell proliferation, a marker of tumoral activity. 3D APT can support trained medical professionals in differentiating low grade from high grade gliomas and in differentiating tumor progression from treatment effect⁵.

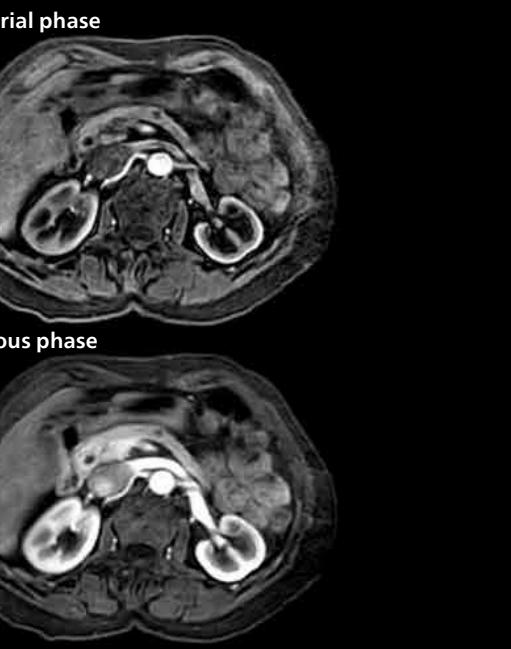
Black Blood imaging helps you better differentiate the vessel lumen from the intra lumen blood signal to enhance diagnostic confidence. You can perform your 3D brain imaging with higher and isotropic imaging resolution⁶ with a reduction of the intra-lumen brain blood signal⁷ over the complete imaging volume.

SWIp has a high sensitivity to enhance contrast for deoxygenated (venous) blood or calcium deposits. It may help when used in combination with other clinical information in the diagnosis of various neurological pathologies. SWIp offers high resolution **3D susceptibility weighted brain imaging** allowing you to easily integrate it into your mainstream practice.

4D-TRANCE is a time-resolved technique for **non-contrast angiography**, promoting patient comfort and enabling you to evaluate the patency of the vascular anatomy in the brain using endogenous contrast. 4D-TRANCE provides high temporal resolution, down to 160 msec, and MIP visualization of multiple phases.



Diagnostic confidence in Neuro Oncology
3D APT, $1.8 \times 1.8 \times 6.0$ mm, 3:45 min
3D T1w TFE with gado, $1.0 \times 1.0 \times 1.0$ mm, 3:20 min

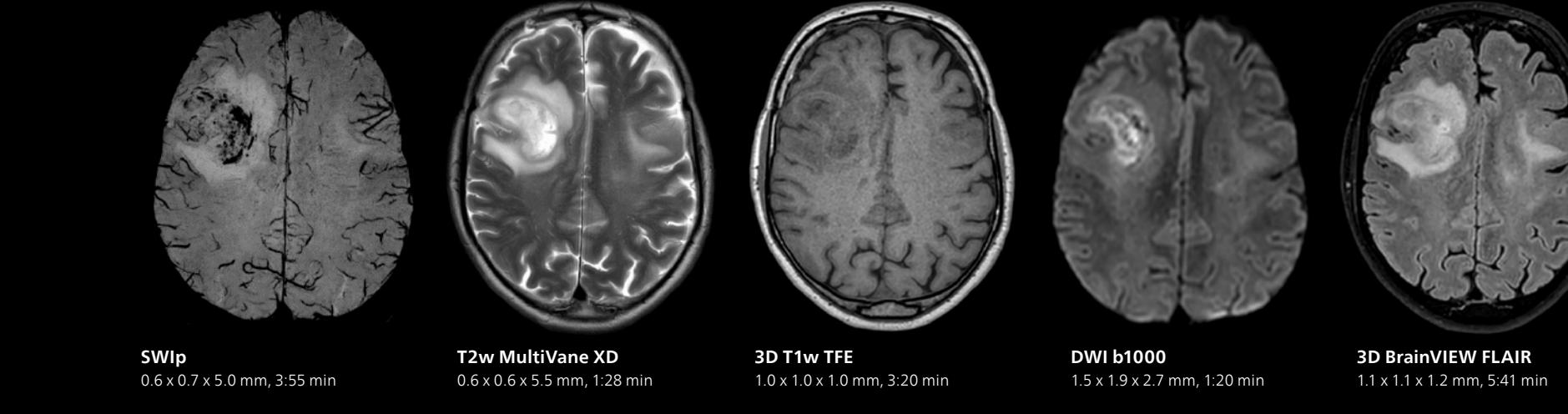


4D FreeBreathing
3 seconds per phase
 $1.7 \times 1.7 \times 3.0$ mm, 2:13 min

CE mDIXON XD MRA
3 stations mDIXON
 $1.0 \times 1.0 \times 1.0$ mm
15.9 sec (pelvis)
16.7 sec (upper legs)
21.9 sec (lower legs)



Differentiate vessel lumen from intra lumen blood signal
3D BrainVIEW Black Blood, $0.8 \times 0.8 \times 0.8$ mm, 5:20 min



SWI
 $0.6 \times 0.7 \times 5.0$ mm, 3:55 min

T2w MultiVane XD
 $0.6 \times 0.6 \times 5.5$ mm, 1:28 min

3D T1w TFE
 $1.0 \times 1.0 \times 1.0$ mm, 3:20 min

DWI b1000
 $1.5 \times 1.9 \times 2.7$ mm, 1:20 min

3D BrainVIEW FLAIR
 $1.1 \times 1.1 \times 1.2$ mm, 5:41 min



Philips MR 7700

The MR 7700 offers workflow efficiencies that keep exams on schedule and creates a positive staff experience. The system supports throughput for your research studies without disrupting your day-to-day clinical schedule.

Using technology to guide and coach where required, and automate when possible, the MR 7700 achieves excellent **patient-centered productivity**. Reducing and simplifying the number of steps necessary in an MR exam, boosts efficiency through reduced variability and supports a better experience for both your patients and your staff.

Guidance and insight are offered through two interactive VitalScreens at the front of the magnet facade. The displays provide information on exam duration, coil type, patient positioning, physiology signal captors (VCG and respiratory), contrast use, and breath holds.

Once the patient is positioned on the table, only the push of a button is required to position the patient in the center of the bore. Manual use of a laser light visor for iso-center positioning has become obsolete, thanks to automated detection of landmarks, placing the region of interest directly in the iso-center of the magnet.

With AI* driven VitalEye touchless patient sensing, the technologist no longer needs to set up an old-fashioned respiratory belt, but instead receives a continuous and robust **respiratory signal without any user interaction**. The quality of the touchless physiology signal detected is better than a belt-based approach⁸, providing superior image quality for a broad range of patient sizes.

SmartWorkflow in the exam room

Allow your staff to fully engage with patients, by reducing and simplifying the number of steps needed for patient preparation. SmartWorkflow guides and coaches where required, and automates where possible achieving high productivity.



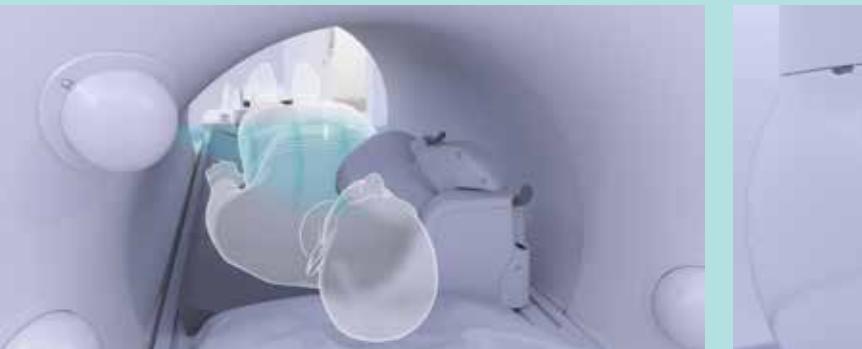
Guided exam set-up

Coaching and visual guidance are provided at the front of the magnet facade



Auto patient centering

Region of interest is automatically placed in the iso-center of the magnet



Touchless respiratory-triggering

Patient's breathing is detected without any operator interaction



In-room exam start

Exam start can be initiated with a single touch of at the patient's side

SmartWorkflow in the control room

Enhance efficiency for your clinical scans through standardized exam planning, scanning and processing. While automated patient coaching enhances your patient's experience. Guided workflow is offered to confidently image patients with MR Conditional implants.



Confidence for MR Conditional implants

Step-by-step guidance to enter the condition values as specified by the implant manufacturer



Automated planning and scanning

Fully automated geometry planning, coil element selection and execution of complete MR exams



Automated patient coaching

Patients are guided via announcements of scan duration, table movements and breath hold instructions



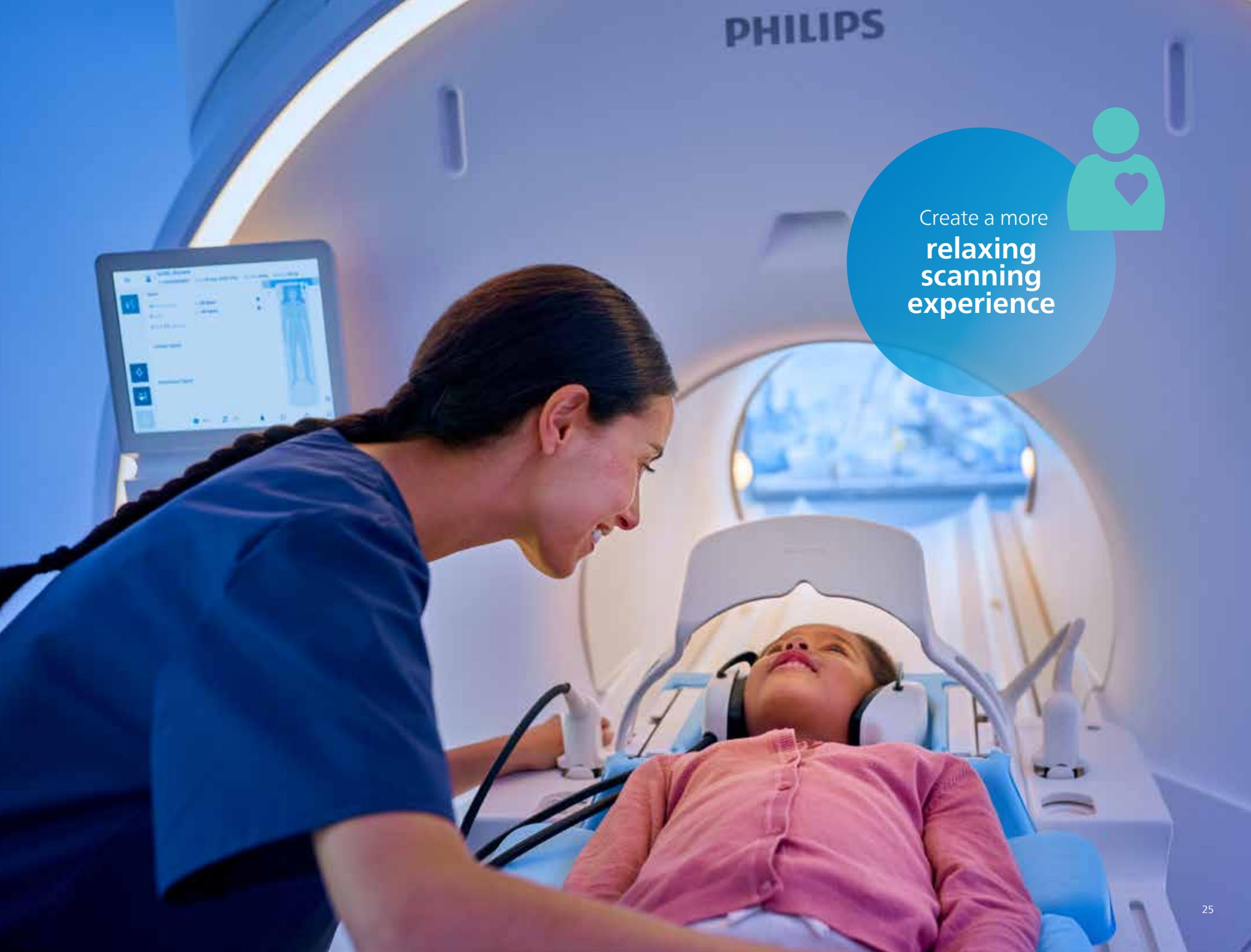
Automated post-processing

Fully automated clinical post-processing steps remove the burden of repetitive tasks

You can be confident your patients know exactly what to do and what to expect with the use of **automated, customizable, consistent patient instructions** (in 30 different languages and dialects), including announcement of scan duration and table movements. In addition, you can choose to time breath holds manually, or provide fully automated breath hold instructions with timing synchronized to the patient's respiratory cycle.

Because patient comfort enhances cooperation, which in turn contributes to efficient workflow, the MR 7700 is designed to provide a more **relaxing scanning experience**. The ComfortPlus mattresses make it easier to remain still during demanding research protocols. Patient comfort has been reported to increase after just 10 minutes⁹ of use.

Addition of our Ambient Experience solution will enhance your patients' scanning experience via positive distractions by incorporating dynamic lighting, projection, and sound. From the moment a patient is moved into the scanner (the point at which people report the most stress), through to completion of the scan, entertainment is provided.





Philips MR 7700

Accelerate your exams

Compressed SENSE can be added to **accelerate your clinical scans by up to 50%** with virtually equal image quality¹⁰. This method is suitable for all anatomies and can be used for all anatomical contrasts, in both 2D and 3D scanning. You can also use Compressed SENSE to add sequences without expanding the time slot, such as when adding functional sequences to a brain study or adding research sequences to a clinical exam.

Additionally, MultiBand SENSE acceleration can be applied to simultaneously excite multiple slices. This means your multi-direction **DTI imaging can be accelerated by up to 45%**, with virtually equal image quality⁴. The use of MultiBand SENSE with a 32-channel head coil further **reduces scan time in diffusion-weighted protocols by up to 73%**⁴. Or you can choose to maintain similar scan time and acquire twice as many diffusion directions.

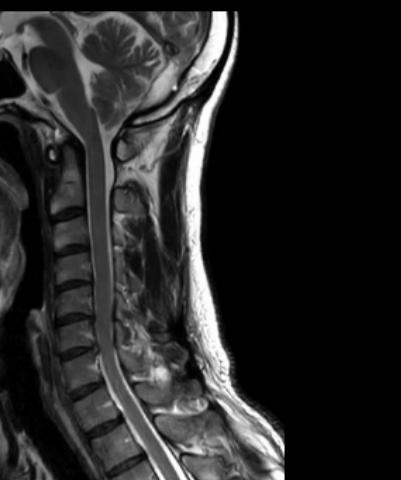
The addition of MultiBand SENSE to your fMRI studies will enable up to 2 times larger anatomical coverage at similar scan times with virtually equal image quality⁴ due to short TRs. Or you can accelerate your **fMRI studies with 2 times more volume** per unit time with virtually no compromise in SNR⁴, gathering more rich data input for fMRI analysis.

Accelerate your
clinical scans by
up to 50%
with virtually equal
image quality¹⁰

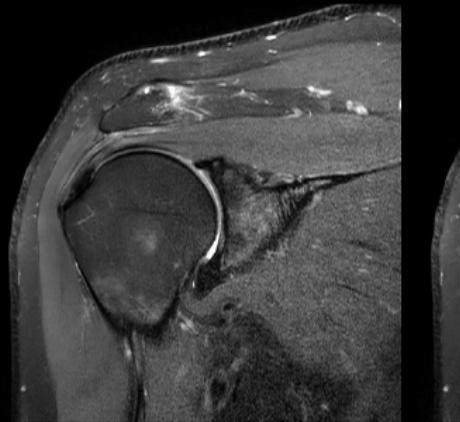
Accelerate your
diffusion protocols
up to 73%¹¹



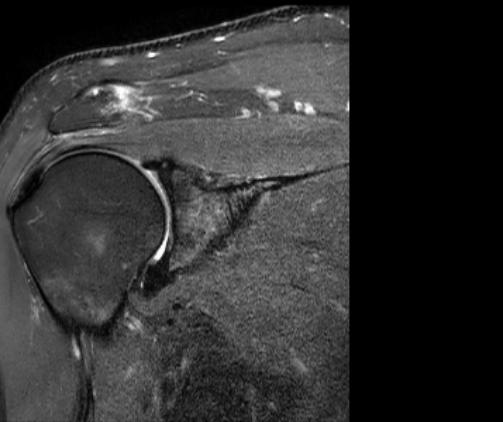
2:48 min
T2w TSE, 0.7 x 0.9 x 3.0 mm



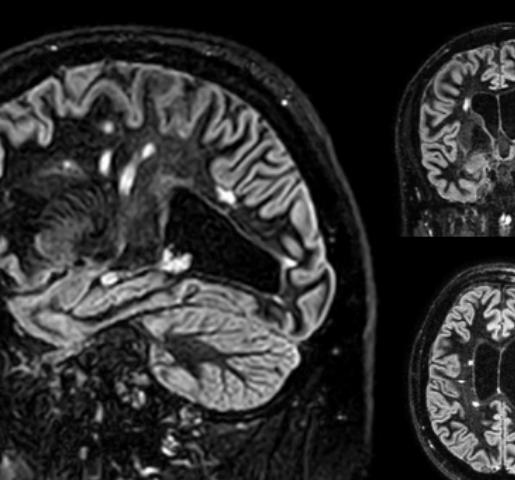
1:47 min | Compressed SENSE
T2w TSE, 0.7 x 0.9 x 3.0 mm



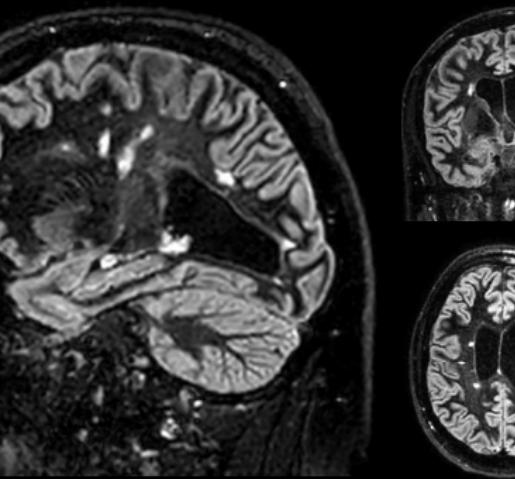
3:44 min
T2w SPAIR, 0.4 x 0.7 x 3.0 mm



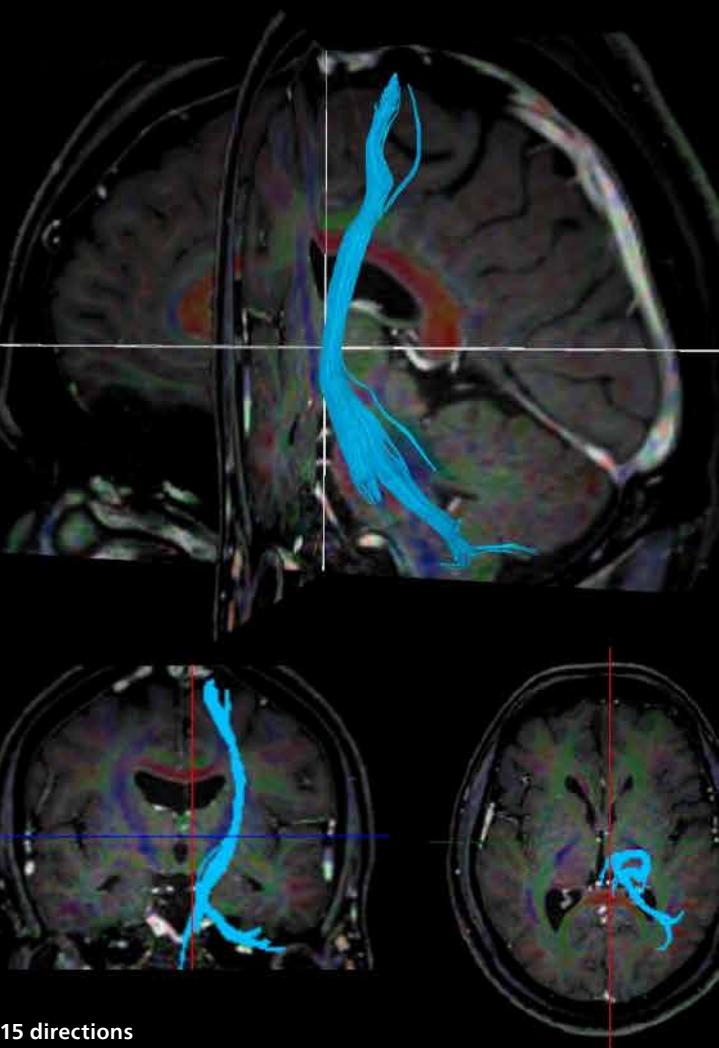
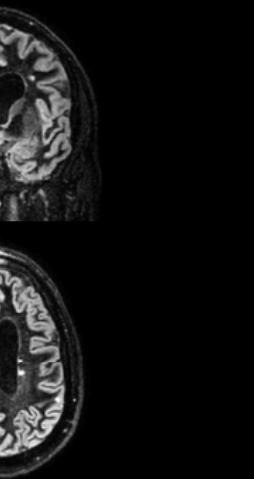
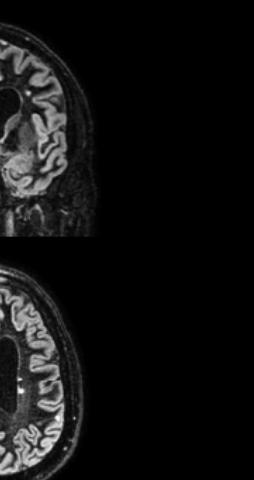
2:31 min | Compressed SENSE
T2w SPAIR, 0.4 x 0.7 x 3.0 mm



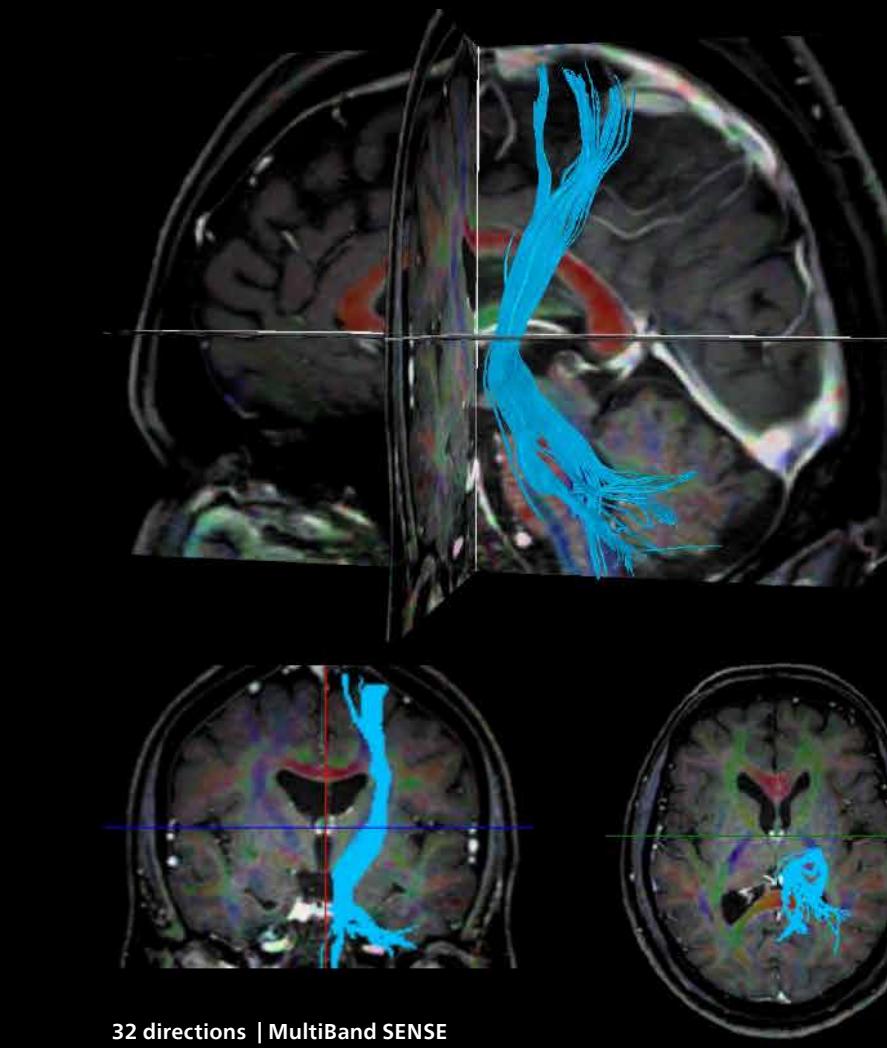
7:04 min
3D BrainVIEW, Dual IR, 1.2 x 1.2 x 1.2 mm



4:52 min | Compressed SENSE
3D BrainVIEW, Dual IR, 1.2 x 1.2 x 1.2 mm



15 directions
DTI b800, 2.0 x 2.0 x 2.0 mm, 4:13 min



32 directions | MultiBand SENSE
DTI b800, 2.0 x 2.0 x 2.0 mm, 4:13 min

Accelerate your scans, with virtual equal IQ¹⁰



Philips MR 7700

Seamless integration of Multi Nuclei

Multi-nuclei (MN) imaging and spectroscopy is a key area of leading-edge clinical investigation. However, it typically involves a different software version, cumbersome user interface, and a dedicated coil. And scan times tend to be quite long, which can disrupt day-to-day imaging throughput. To advance clinical insights in this promising area, Philips has made multi-nuclei imaging and spectroscopy become part of your daily clinical workflow. Designed for out-of-the-box implementation, our Multi Nuclei solution delivers the confidence to explore new imaging pathways and the speed to integrate multi-nuclei studies into your day-to-day workflow.

Adding Multi Nuclei to your MR 7700 opens a window of research into other nuclei, in search of metabolic and functional information. It allows you to perform clinical imaging, spectroscopy and research studies of **six different nuclei** (^1H , ^{31}P , ^{13}C , ^{23}Na , $^{19}\text{F}^*$ and $^{129}\text{Xe}^*$).

Besides regular proton (^1H) imaging, you can:

- Begin to evaluate sodium (^{23}Na) presence throughout the body with sub-millisecond TE acquisition facilitating imaging of short T2-signals
- Measure the dynamics of muscle metabolism using phosphorus (^{31}P) spectroscopy by visualizing the changes in PCr / Pi-ratio over time
- Investigate metabolic processes by using carbon (^{13}C)
- Image fluorine ($^{19}\text{F}^*$) exogenous labeled contrast agents
- Create xenon ($^{129}\text{Xe}^*$) images

Simply put, our Multi Nuclei solution can be used **across all anatomies**.

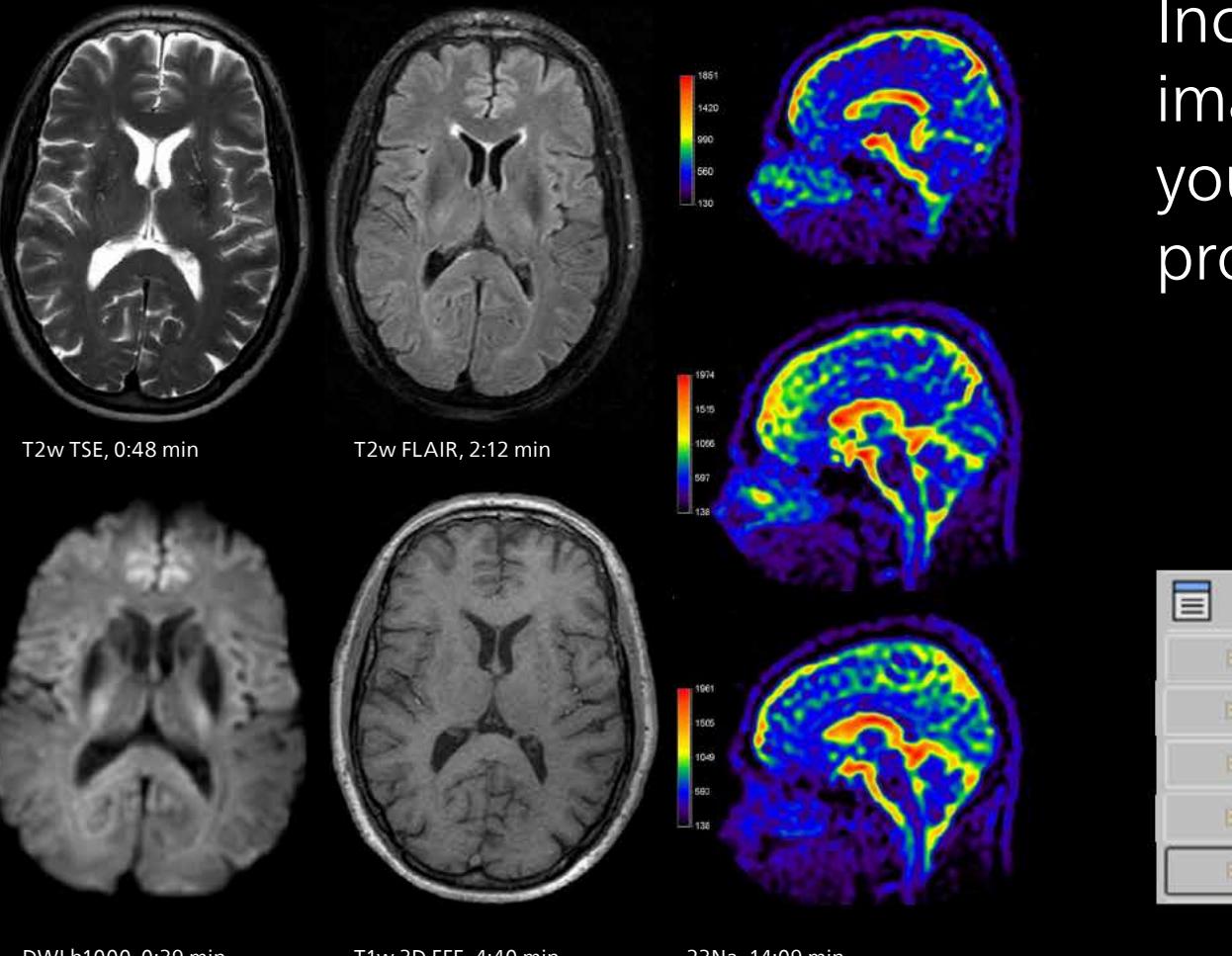
We've made it easy for your operation, with a **seamless integrated workflow** for multi-nuclei image acquisition, spectroscopy, reconstruction, and viewing. Rather than a complex process, multi-nuclei studies have become a simple protocol that can be "dragged and dropped" into your ExamCard. How much simpler can it be?

The nucleus is just a scan parameter like any other sequence parameter. A single ExamCard can be used to run both proton and non-proton imaging and images can be checked on the console before the patient even leaves the room. Reconstruction and viewing of non-proton images or spectra, as well as the process for sending the data to PACS is fully integrated, so workflow does not differ from proton imaging. Easy export of multi-nuclei data is supported for enhanced DICOM, SPAR/SDAT, and XML-REC.

In addition to a seamless user interface, the dual tuned head coil enables brain exams, including **acquisition of proton and other nuclei, without switching coils**. This allows you to schedule your multi-nuclei studies as part of your clinical exam time slots. A **full brain study, including both proton (¹H) and sodium (²³Na) imaging can be completed in 30 minutes¹²**, all organized in one ExamCard using the same dual tuned head coil. A sodium (²³Na) brain exam can be completed in less than 15 minutes¹³.

Transmit-receive flex coils are available for carbon (¹³C), phosphorus (³¹P), and sodium (²³Na) scans. The ExamCard interface immediately recognizes these multi-nuclei coils. A sodium (²³Na) knee exam can be as fast as 15 minutes¹⁴. Improved SNR and simplified spectra¹⁵ can be achieved for phosphorus (³¹P) and carbon (¹³C) spectroscopy by combining body coil decoupling, with the transmit-receive surface coils.



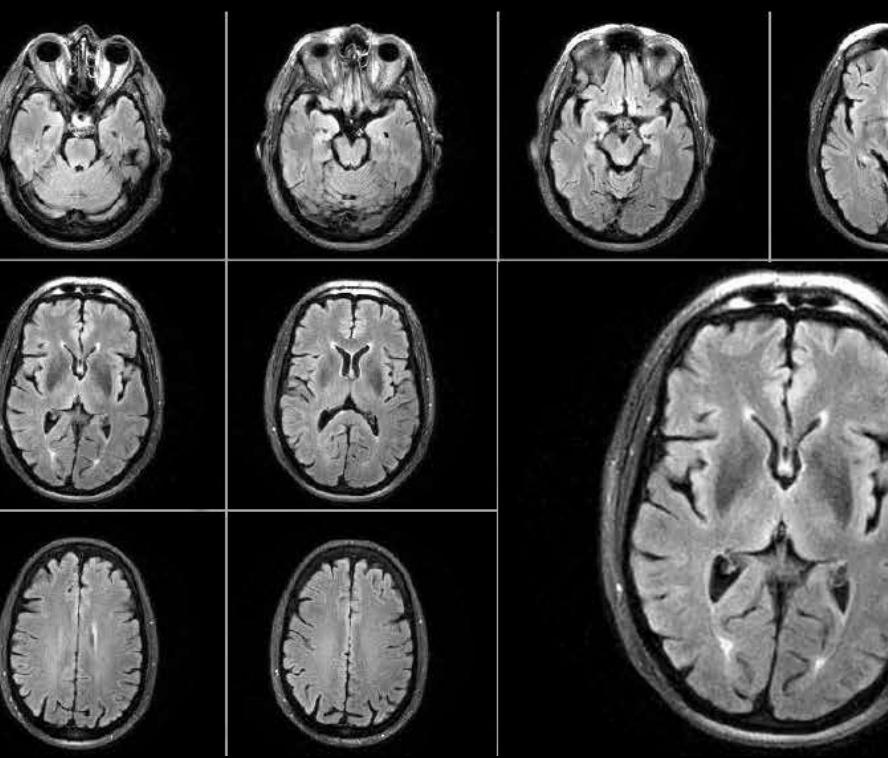


Routine Brain examination including 23Na imaging as well as pre and post contrast T1w scans in under 30-minutes using a dual-tuned 1H/23Na head coil¹⁴

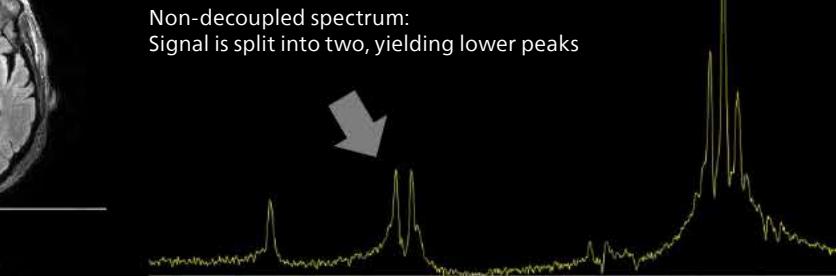
Brain MultiNuclei		00:27:32
T2w TSE	tra	
T2w FLAIR	tra	
DWI	tra	
3D T1w FFE	tra	
23 Na	sag	

Include 23Na imaging into your daily clinical protocol

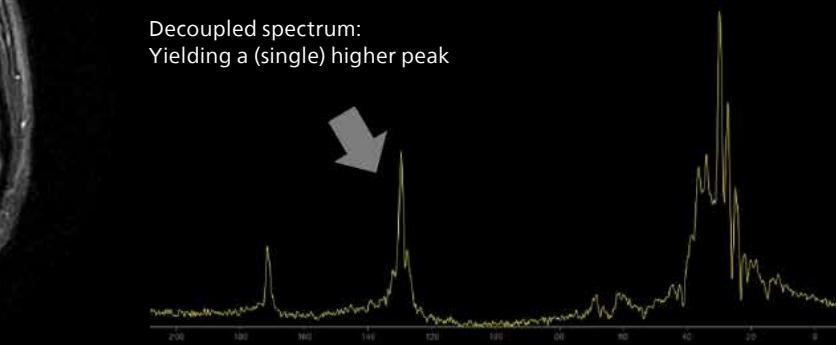
Identifying metabolism with 13C spectroscopy



Non-decoupled spectrum:
Signal is split into two, yielding lower peaks

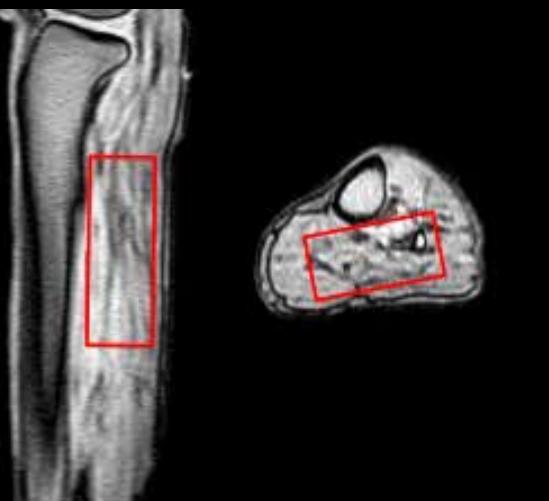


Decoupled spectrum:
Yielding a (single) higher peak

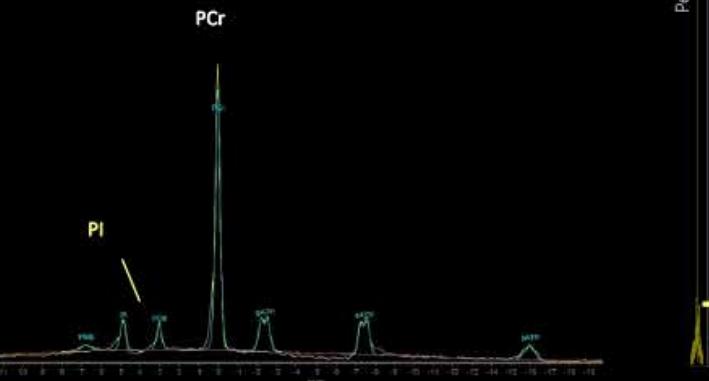


13C natural abundance spectroscopy of the full brain. Most 13C signal is coming from the fat. Decoupling was done to enhance the SNR of the peak detection.

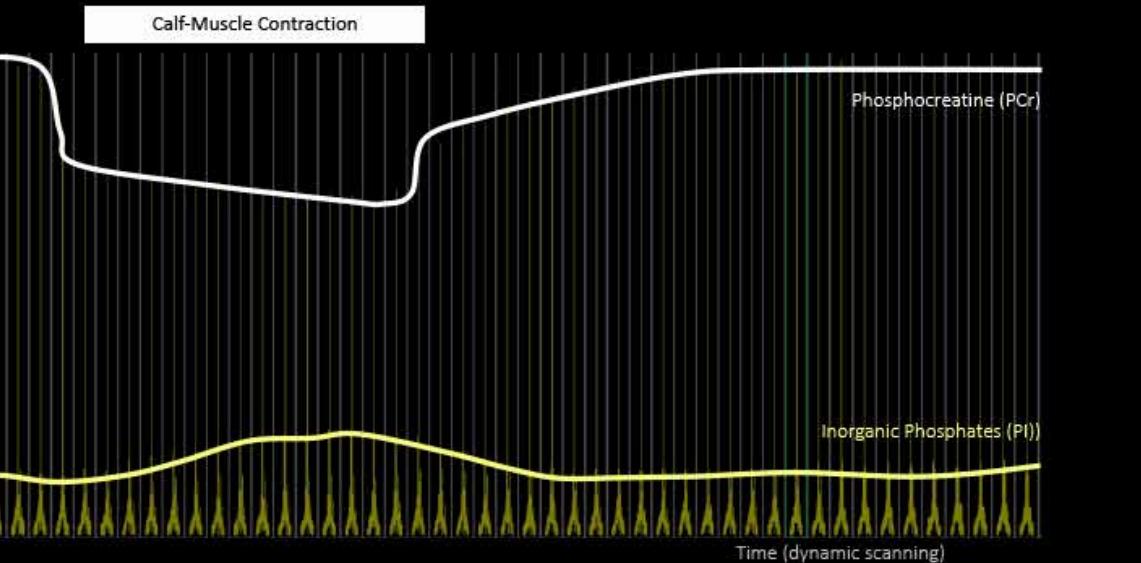
Dynamic muscle metabolism using ^{31}P spectroscopy



Planning of the spectroscopy voxel
in the calf-muscle

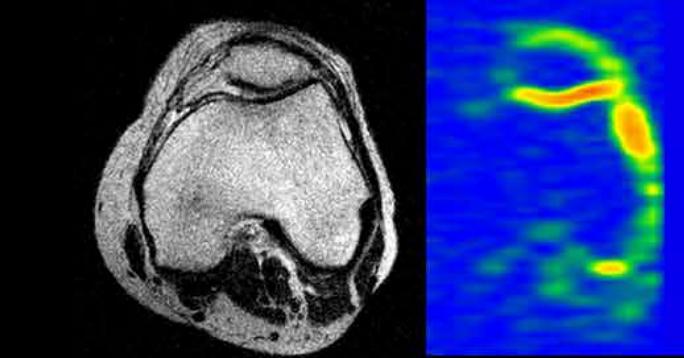


Single ^{31}P spectrum of the calf-muscle showing the PCr and PI peaks



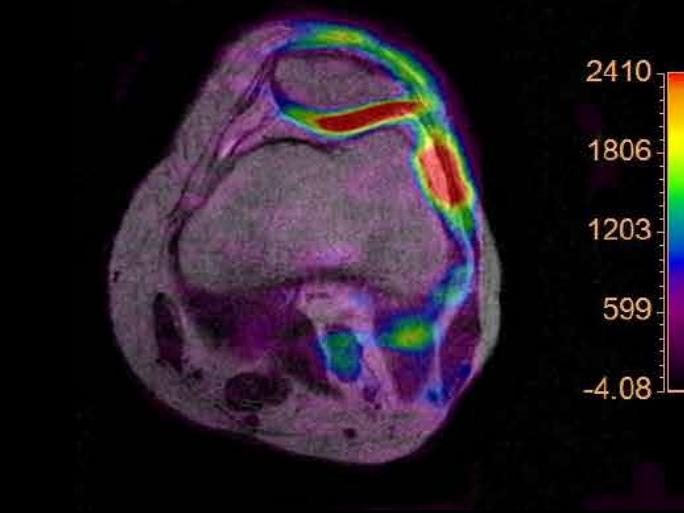
Dynamic ^{31}P spectroscopy of the calf-muscle (5sec/acq, 50 dynamics) showing how the signals of PCr and PI change during a calf-muscle exercise

Metabolite imaging, across all anatomies

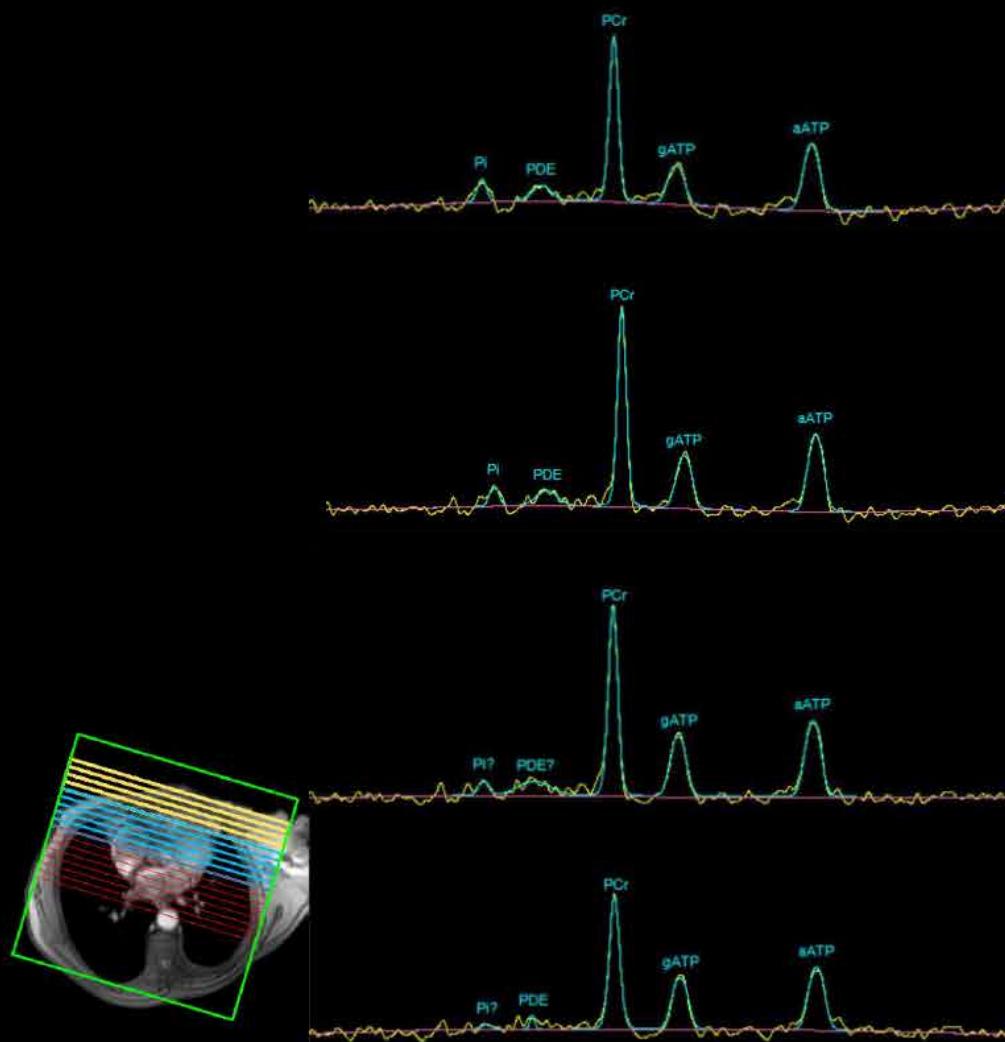


Anatomical imaging
(^1H body coil)

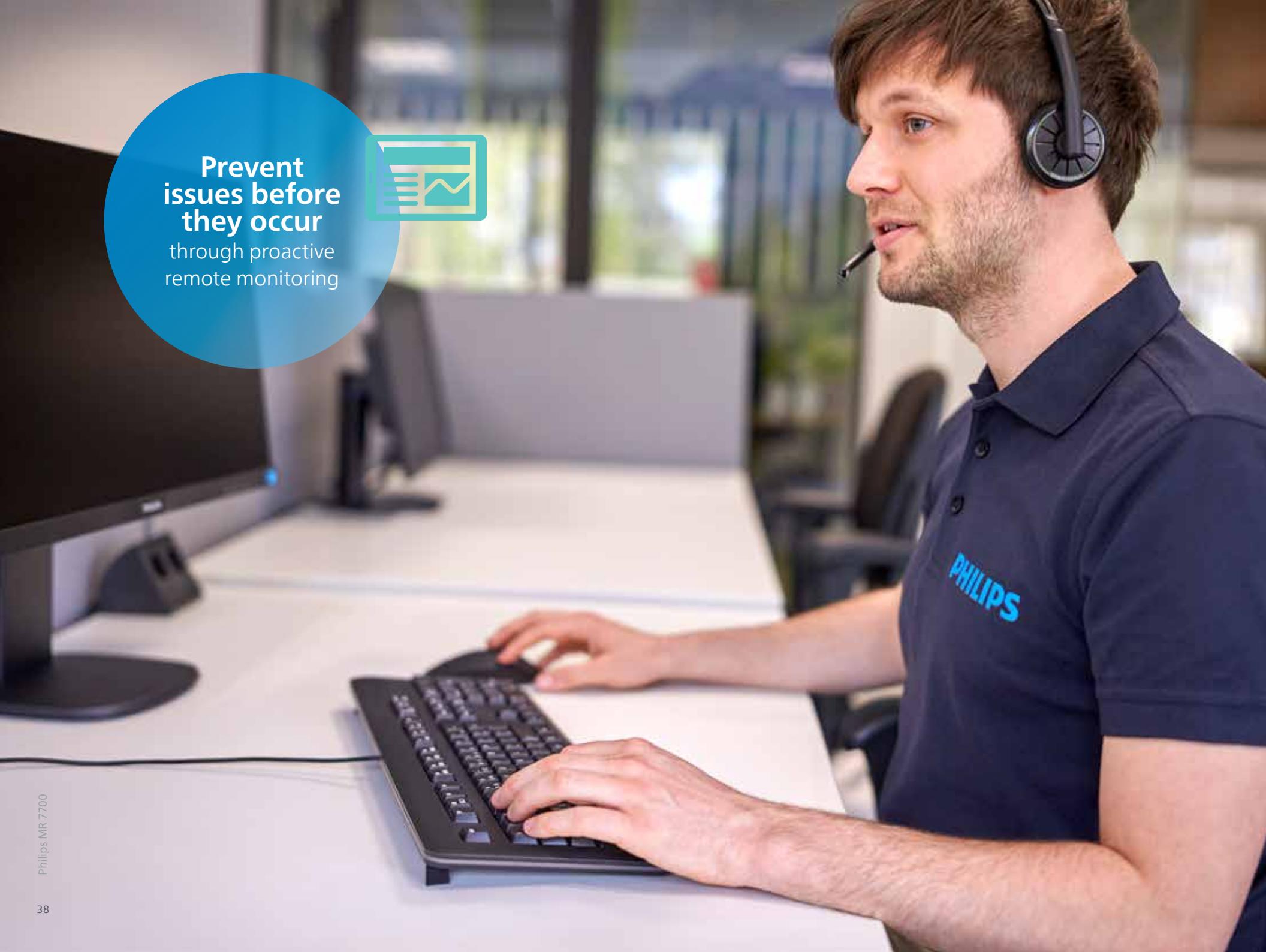
Functional ^{23}Na imaging
of the knee with a laterally placed flex coil Na-140



^{23}Na imaging, overlayed on ^1H anatomical imaging Sodium (^{23}Na) knee exam can be performed as fast as 15 minutes. The sub-millisecond TE acquisition for sodium (^{23}Na) imaging facilitates imaging of short T2-signals.



^{31}P , cardiac triggered, 1D CSI of the heart
Using flex coil P-140 with the patient in prone position



Philips MR 7700

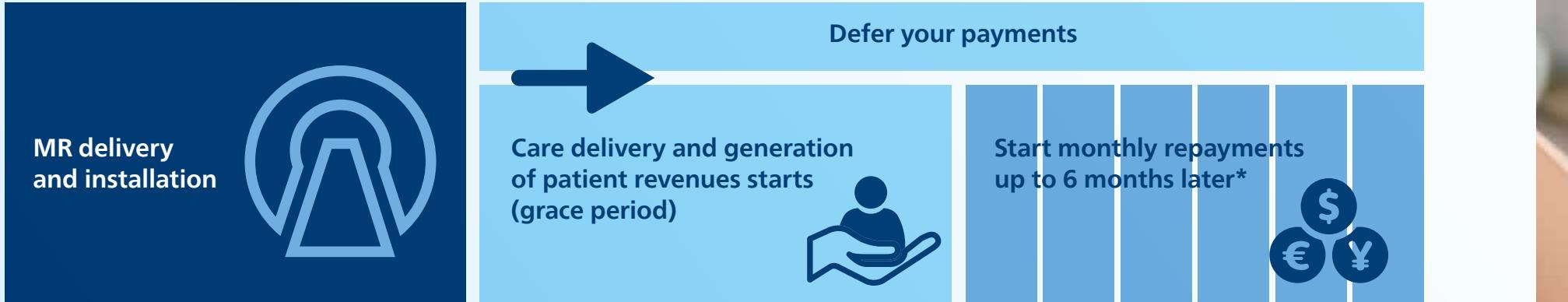
Protect and enhance your MR investment

The MR 7700 system's combination of neuroscience capabilities, unsurpassed gradients, speed for all applications, streamlined workflow, and patient comfort, make it an essential investment in the future of MR imaging. We offer thoughtful programs to protect your investment and ensure ongoing performance.

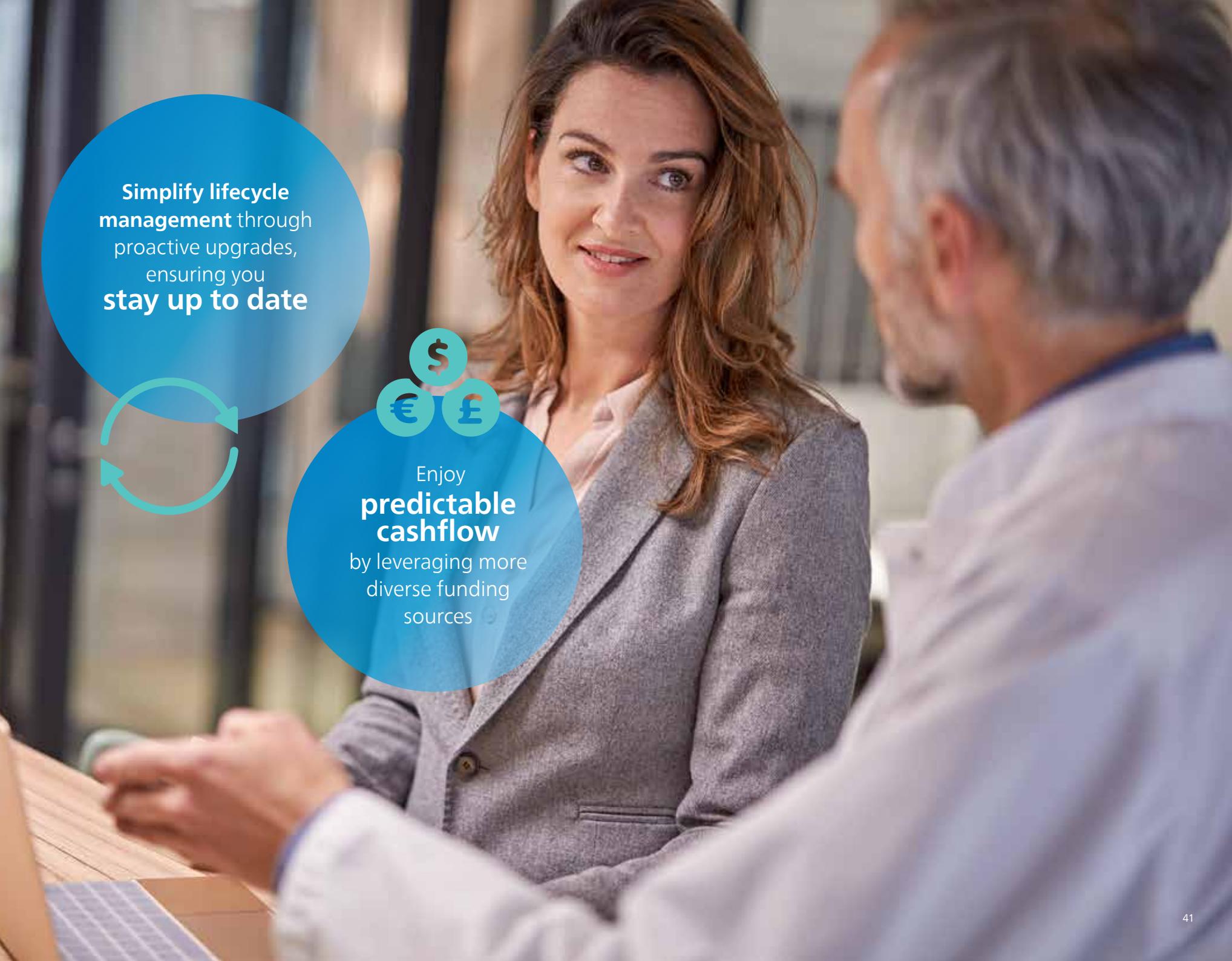
Avoid disruptions in your schedule and delays of patient care through our latest service innovations, including a scanner uptime guarantee. **Prevent issues before they occur** through proactive remote monitoring, remote diagnostics and remote and field service support. With e-Alerts and other remote data, we monitor more than 500 parameters of your MR system from a distance, detecting and resolving issues without impacting your department's operations. In fact, more than 50% of MR service cases are resolved remotely¹⁷.

Protecting patient health information requires constant vigilance. To **keep health information secure**, we employ best practices in medical device security. Our multi-layered defense barriers include security policies, procedures, access controls, technical measures, training, and risk assessments. Conveniently keep your MR systems up-to-date through access to the latest cybersecurity patches and mandatory safety fixes.

Simplify lifecycle management through proactive upgrades, boosting clinical capabilities and performance and ensuring you stay up to date. Receive the latest software and hardware technology releases for a fraction of the cost of purchasing them individually. Technology Maximizer, our structured upgrade program, keeps costs predictable and shifts upgrades to your operating budget, saving you from the hassle of capital expense approval. To manage your financial challenges, you need to know whether your healthcare investments are sustainable – and how to get the most from your equipment.



EasyStart Deferral Payment Program¹⁸: Postpone payments for a pre-agreed period and deliver immediate care to your patients.





Philips MR 7700

Disclaimers

- * According to the definition of AI from the EU High-Level Expert Group.
- 1 Compared to Ingenia Elition X with Vega HP gradients, measured in brain white matter.
- 2 Compared to Ingenia Elition X with Vega HP gradients.
- 3 Gradient fidelity is defined as the proximity of the actual gradient strength and waveform to the targeted gradient strength and waveform.
- 4 Compared to Philips DTI/fMRI scans without MultiBand SENSE.
- 5 Zhou et al., Nat Med 9, 1085-1090 (2003), Zhou et al., Magn Reson Med 50, 1120-1126 (2003), Jones et al., Magn Reson Med 56, 585-592 (2006).
- 6 Compared to our 2D double inversion methods with same brain coverage and scan time.
- 7 Compared to our 3D T1w scan without MSDE pre-pulse.
- 8 Requires an unobstructed line-of-sight.
- 9 Compared to the Ingenia mattress. Based on in-house testing.
- 10 Compared to Philips scans without Compressed SENSE.
- 11 Compared to Philips diffusion protocols without MultiBand SENSE, requires a 32ch head coil.
- 12 Measured from start of first scan to end of last reconstruction. Includes 1H (T2w TSE, T2w FLAIR, SSh DWI, and 3D T1w FFE pre&post) + 23Na (with a voxel size of 4mm isotropic).
- 13 For 4 mm isotropic voxels.
- 14 For 3 mm isotropic voxels, slice coverage > 95 mm.
- 15 Compared to non-decoupled spectroscopy results.
- 16 For brain exams with a dual tuned head coil.
- 17 Based on global Philips-only data.
- 18 Deferral Payment Program: Moratorium of up to 6 months possible, subject to credit approval on a case-by-case basis; offer valid for a limited time and subject to changes without notice.

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