

TOMORROW TODAY



# SIGNA™ Pioneer

Fueled by SIGNA™Works



[gehealthcare.com/mr](http://gehealthcare.com/mr)



# Amaze

See things way beyond  
your expectations

Welcome to the SIGNA™ Pioneer, named for the many ways it is exploring and expanding what is possible for MR imaging.

Powerful magnetic resonance imaging platform delivers high definition results and a wide range of applications to meet your clinical imaging needs. Our latest pioneering technology, built on a new concept that combines advanced technology creating sharper scans and allowing more patients per day.

The results? An optimized experience that delivers more comfort and less anxiety to your patients.



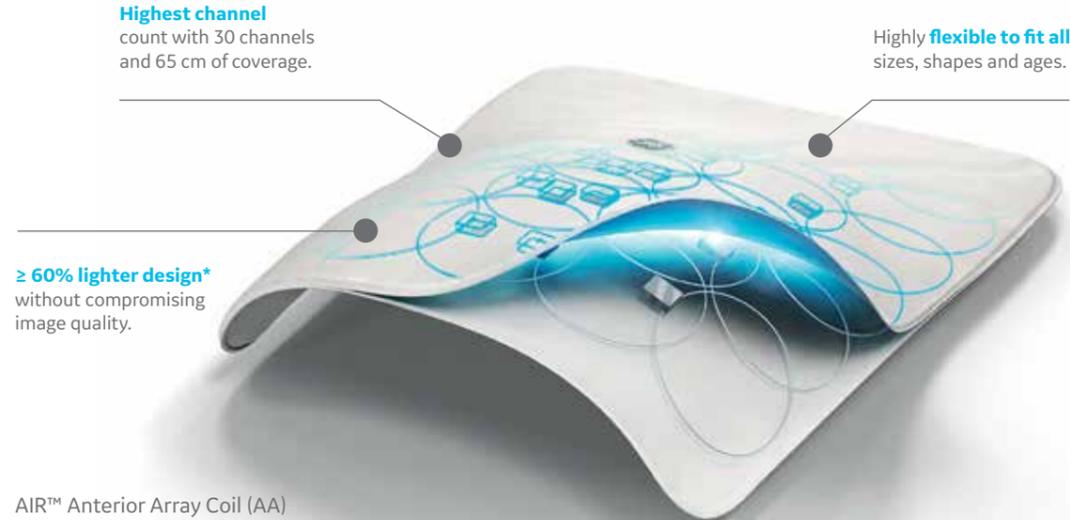
## AIR™ | Simply better

### Form fitting for every form

Freedom in coil positioning is the ultimate design goal behind AIR™.

Its flexible design improves the scan experience while increasing signal quality.

As a result, AIR™ is reinventing the way imaging should be.



## AIR™ Anterior Array Coil

The 30-channel AIR™ Anterior Array Coil (AA) is the next generation anterior array that allows flexibility in all directions to conform to the patient's anatomy.

Based on the innovative technologies behind the Inca conductor and the Emode electronics, the AA provides uncompromised SNR and acceleration performance, while improving the overall patient and user experience. The coil has been designed to adapt various patient shapes and sizes, with an ultra-light weight distribution. The AA can be used for torso, cardiac, abdomen, prostate, pelvis, msk, whole-body and peripheral vascular examinations, potentially in conjunction with other coils.

## AIR™ 48ch Head Coil

The AIR™ 48ch Head Coil delivers phenomenal performance for every patient, with a fit-adaptable design that addresses 99.99% of the population. It also preserves the highest SNR and supporting advanced imaging capabilities such as HyperWorks technologies. The AIR™ 48ch Head Coil is compatible with advanced features such as video goggles for patient comfort and fMRI studies, plus an industry-leading EEG-compatible design.



### Promotes patient satisfaction

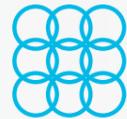
Lightweight, industry-leading flexible design.

### Redefine clinical excellence

Consistent high-quality imaging.

### Perform efficiently

Breakthrough freedom in coil positioning.



Highest channel count and coverage in the industry



Increases signal-to-noise ratio and reduces imaging artifacts



Improves signal quality by bringing the elements closer to the patient



Improves parallel acceleration



Simple, more durable design



Large coverage



### Streamline and optimize scan setup with AIR Touch™

Automatically select coil element combinations to optimize uniformity, SNR and parallel imaging tradeoff with AIR Touch™.

And with AIR Touch™ intelligent coil selection, technologists no longer have to worry about selecting the optimal coil element configuration for every exam, resulting in reduced coil setup time and fewer errors.



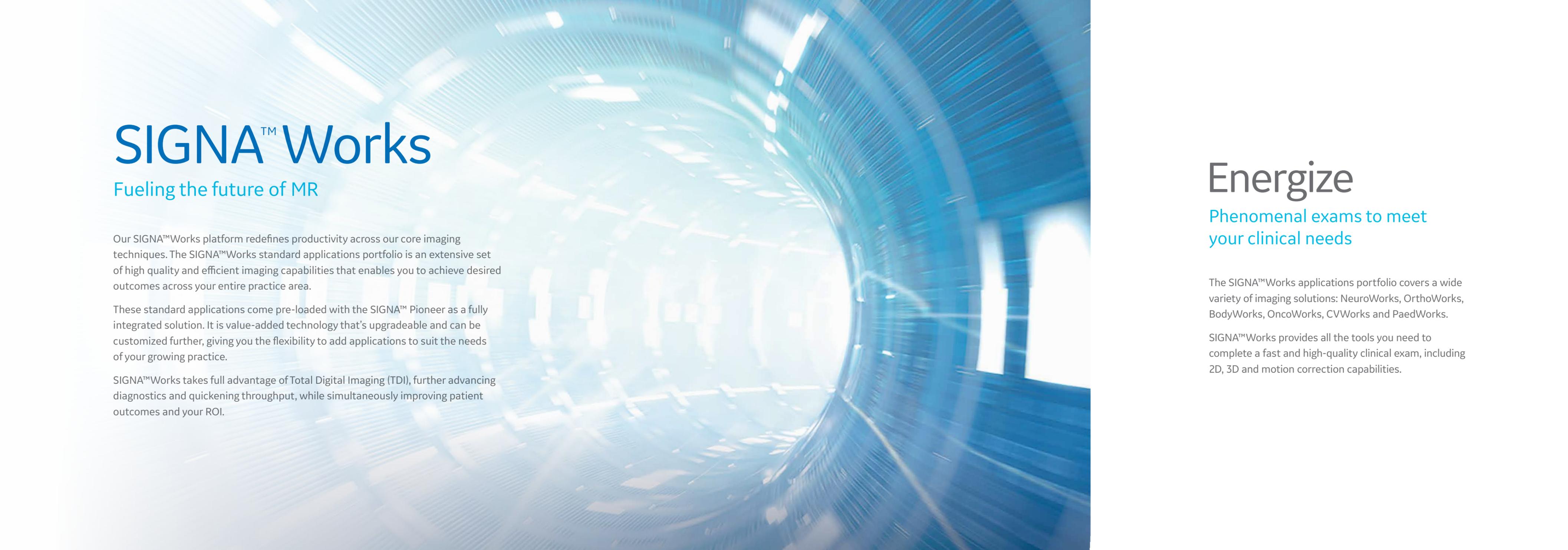
### Intelligent MR slice prescription

- Automatically detects anatomy and prescribes slices in the brain.
- Delivers consistent and quantifiable results.
- Helps eliminate rescans and scanning inefficiencies.



A smart reconstruction algorithm that improves SNR, reduces background noise and suppresses artifacts. The result is cleaner, crisper images.

\* Compared to conventional coil technology.  
Simply better compared to conventional coil technology.



# SIGNA™ Works

## Fueling the future of MR

Our SIGNA™Works platform redefines productivity across our core imaging techniques. The SIGNA™Works standard applications portfolio is an extensive set of high quality and efficient imaging capabilities that enables you to achieve desired outcomes across your entire practice area.

These standard applications come pre-loaded with the SIGNA™ Pioneer as a fully integrated solution. It is value-added technology that's upgradeable and can be customized further, giving you the flexibility to add applications to suit the needs of your growing practice.

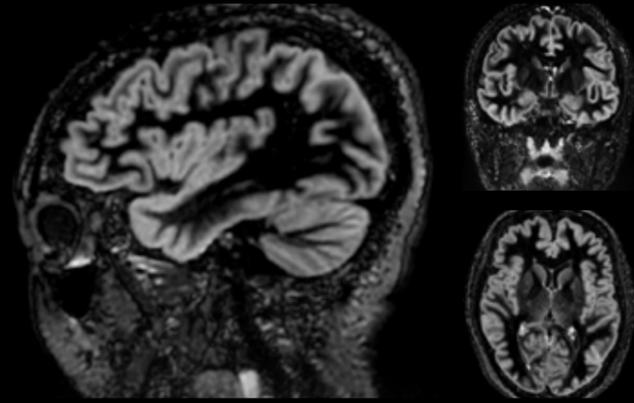
SIGNA™Works takes full advantage of Total Digital Imaging (TDI), further advancing diagnostics and quickening throughput, while simultaneously improving patient outcomes and your ROI.

# Energize

## Phenomenal exams to meet your clinical needs

The SIGNA™Works applications portfolio covers a wide variety of imaging solutions: NeuroWorks, OrthoWorks, BodyWorks, OncoWorks, CVWorks and PaedWorks.

SIGNA™Works provides all the tools you need to complete a fast and high-quality clinical exam, including 2D, 3D and motion correction capabilities.



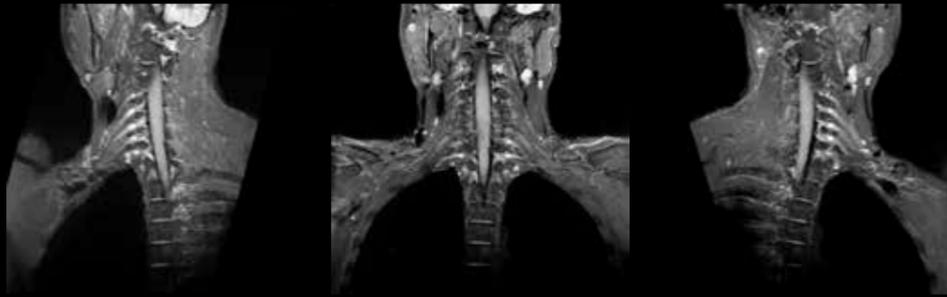
3D Cube DIR  
1.4 x 1.4 x 1.4 mm

## NeuroWorks

This one-stop solution enables you to image brain, spine, vascular and peripheral nerve anatomy with exceptional tissue contrast. These motion-insensitive techniques feature single-click auto alignment, providing the complete neuro solution from scanning to post processing.

Suppress CSF and either white or gray matter to increase lesion conspicuity with Cube, our 3D volumetric imaging suite.

Preserve tissue contrast, both in T1 and T2 scans, while also reducing motion artifacts with PROPELLER MB.



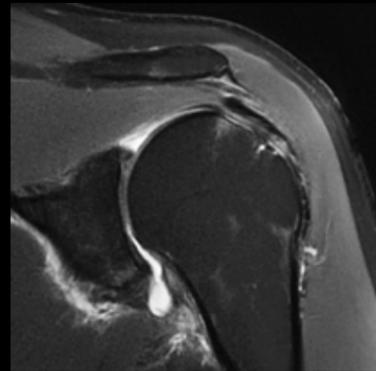
3D & MPR  
Cube DIR

## OrthoWorks

This extensive library of musculoskeletal imaging techniques enables you to image bone, joint and soft tissue with remarkable tissue contrast.

Cube, combined with ASPIR, produces proton-density 3D images with improved fat suppression uniformity.

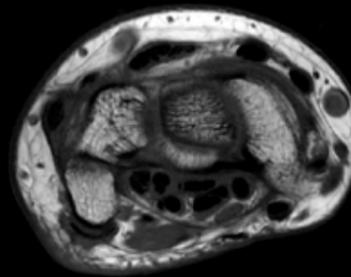
With one 3D acquisition and multi-planar reformats, Cube may replace individual 2D scans.



Coronal FD FatSat PROPELLER



FD FatSat PROPELLER



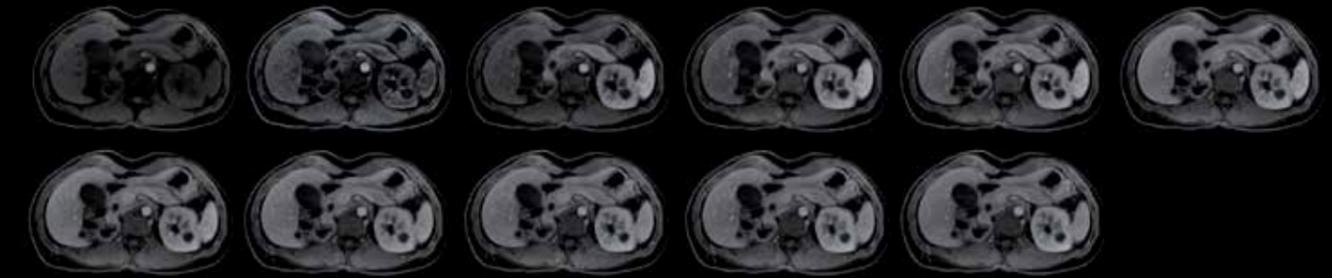
Axial T1  
0.2 x 0.25 x 2.5 mm

## BodyWorks

Scan whole-body, abdominal and pelvic anatomy with speed and flexibility to adapt to different patient types.

Reduce respiratory motion for more accurate abdominal imaging with Auto Navigator.

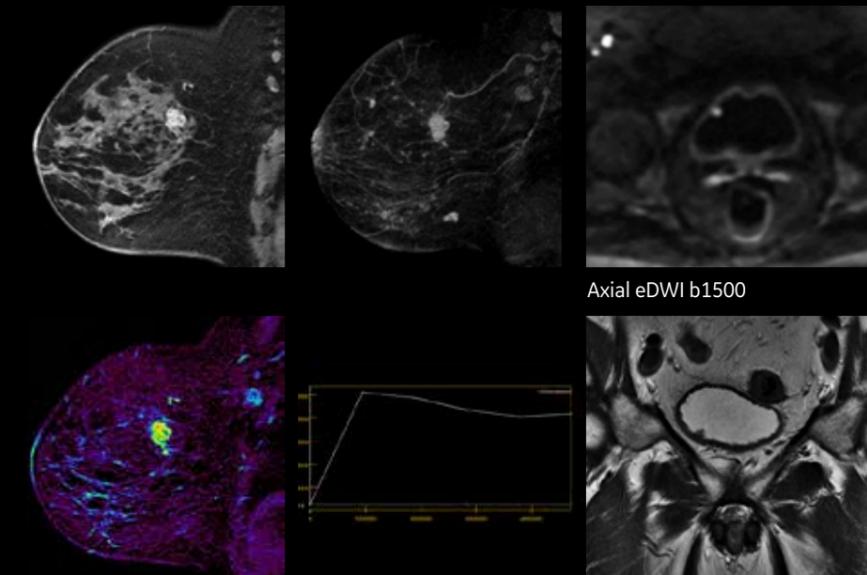
This free-breathing approach is compatible with multiple pulse sequences including diffusion, PROPELLER MB, MRCP and dynamic T1 imaging.



Axial DISCO LAVA Dynamic Liver Free-breathing

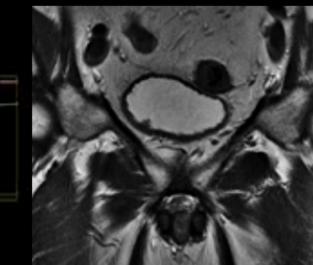


Coronal Turbo LAVA Dynamic Liver 2.4 mm



Sagittal VIBRANT

Axial eDWI b1500



Coronal T2 PROPELLER

## OncoWorks

This extensive library of techniques captures anatomic data to uniquely enable oncological assessment of the anatomy. OncoWorks includes robust tissue contrast, motion-insensitive, high temporal and spatial resolution imaging.

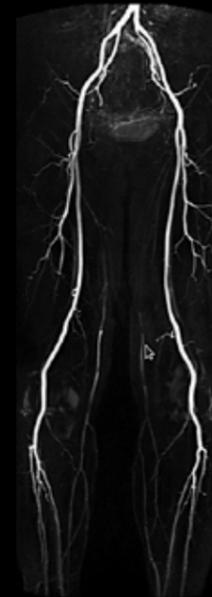
3D volumetric imaging with an optimized adiabatic fat suppression, combined with ARC or ASSET, provides high spatial and temporal resolution capture contrast uptake patterns.

## CVWorks

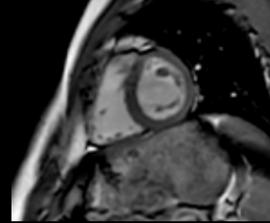
Intuitive cardiac techniques that adapt to different patient types. Assess morphology, flow, function and tissue viability to gain crucial insights into vascular structure and flow dynamics.

Multi breath-hold imaging is no longer needed with Single Shot MDE and Black Blood techniques, which provide patient-friendly alternatives to uncomfortable breath-holds.

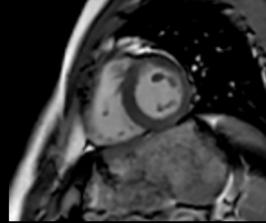
With our workflow-simplified QuickStep protocols, scanning whole body vasculature can be done in less than 6 minutes. High-performance gradients allow bright blood pool and myocardial tissue contrast on FIESTA Cine with high spatial resolution.



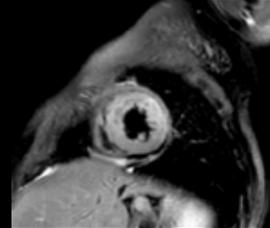
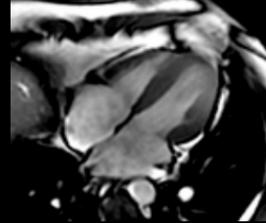
Inhance 3D DeltaFlow



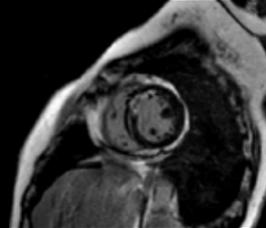
2D Cine FIESTA



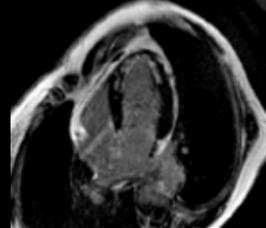
(short axis)



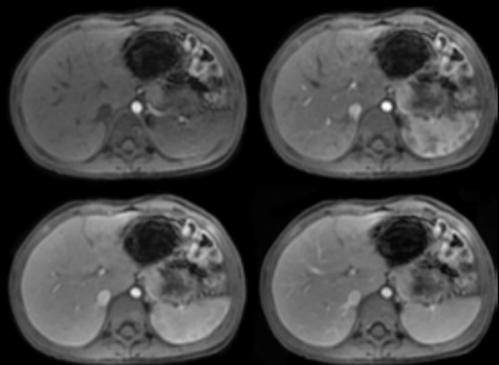
Black Blood - SSFSE



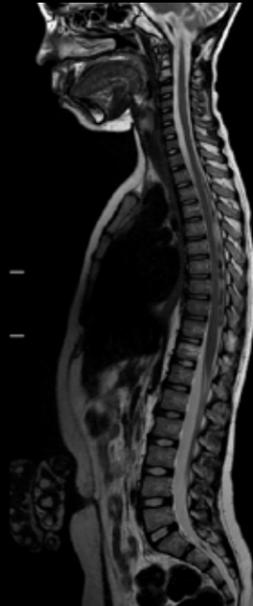
SS MDE



4 Chambers



Axial Navigated Turbo LAVA  
Free Breathing Dynamic Liver  
1.2 x 1.7 x 2.5 mm  
25 sec/phase



Sagittal T2 frFSE

## PaedWorks

Specialized protocols to simply address the needs of your smallest, most fragile patients. Techniques such as Auto Navigator combined with PROPELLER MB can be used with diffusion imaging for patient-friendly free-breathing exams.

When it comes to cardiac, Single Shot MDE provides faster and more reliable results.

Images on the left demonstrate dynamic T1 imaging with Auto Navigator, which enables the patient to breathe freely while capturing contrast. Whole spine evaluation can be obtained simply with routine T2 frFSE imaging.

# Expand

## Broaden your areas of expertise

Take your expertise to the next level when you move beyond the standard with SIGNA™Works innovative applications. Improved image quality, higher efficiency and a more streamlined workflow help you perform better than ever before.

### HyperWorks

HyperWorks means hyper scanning with astonishing imaging and impressive speed. Innovative applications that improve image quality, efficiency and workflow to help you perform better than ever before. HyperWorks includes HyperSense, which can deliver higher spatial resolution images or reduced scan times.

### ViosWorks

Extend cardiac MR assessment beyond the anatomy with a comprehensive solution that captures all 7 dimensions of information in a cardiovascular scan in 10 minutes or less with ViosWorks.

### SilentWorks

Virtually eliminate the acoustic noise of MR across all anatomies without compromising image quality with SilentScan.

### HyperMAVRIC SL

Hyper Multi-acquisition with Variable Resonance Image Combination SeLective (HyperMAVRIC SL) is our latest imaging technique for bone and soft tissue around MR Conditional metallic implants, enabling an average scan time reduction of 40%.

### ImageWorks

Boost your overall MR performance with ImageWorks applications. Deliver multiple contrasts in a single scan with MAGiC, reducing scan time by up to 50 percent compared to acquiring all contrasts separately.

### MUSE

A diffusion weighted and diffusion tensor technique that allows higher spatial resolution with reduced EPI-based distortions. MUSE implements a segmented readout approach along the phase encoding direction and utilizes a dedicated image reconstruction algorithm to mitigate shot-to-shot motion-induced phase errors inherent to multi-shot diffusion.

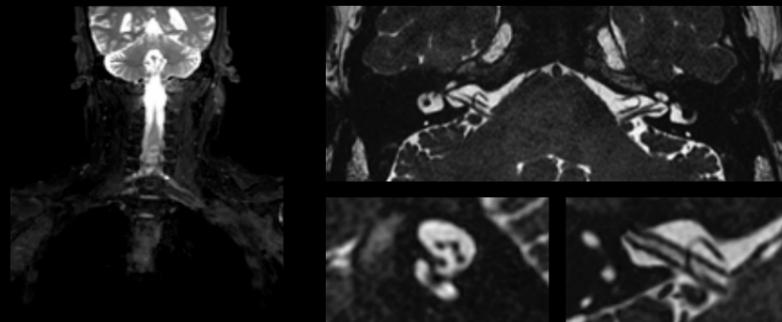
### PROGRES

Providing an automated distortion, motion and eddy current correction technique, based on an integrated Reversed Polarity Gradient (RPG) acquisition. Using a rigid affine registration, the technique outputs images with reduced susceptibility artifacts at no significant impact in overall scan time. Extended DTI capabilities allowing the selection and customization of up to 300 diffusion-encoding directions, resulting in more accurate diffusion tensor estimations.

# HyperWorks

## HyperCube

HyperCube expands the capabilities of 3D imaging, allowing you to significantly reduce scan times and minimize artifacts such as motion and aliasing by reducing the phase field of view without the presence of aliasing artifacts.

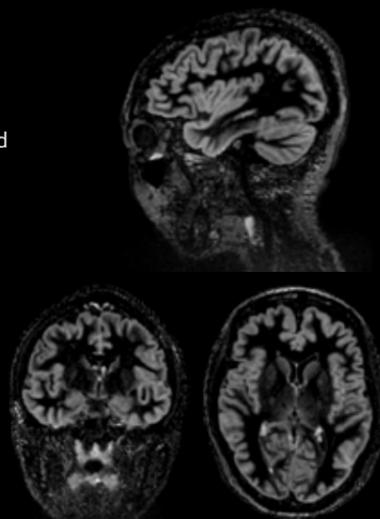


HyperCube T2 with Flex

HyperCube with HyperSense  
IAC Cube T2  
0.5 x 0.5 x 0.6 mm

## HyperSense

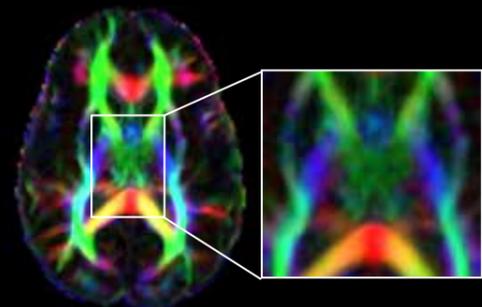
Reduce overall scan times without compromising image quality with HyperSense, which can be used in 88% of all clinical procedures.



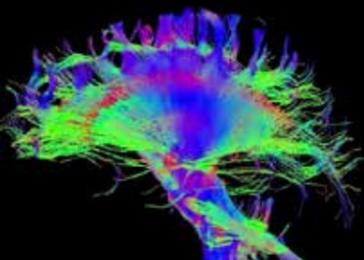
3D & MPR Cube DIR  
1.4 x 1.4 x 1.4 mm  
3:09 min

## HyperBand

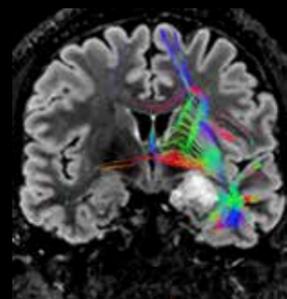
HyperBand takes your diffusion to a new level by allowing you to acquire more slices or diffusion directions within a typical scan.



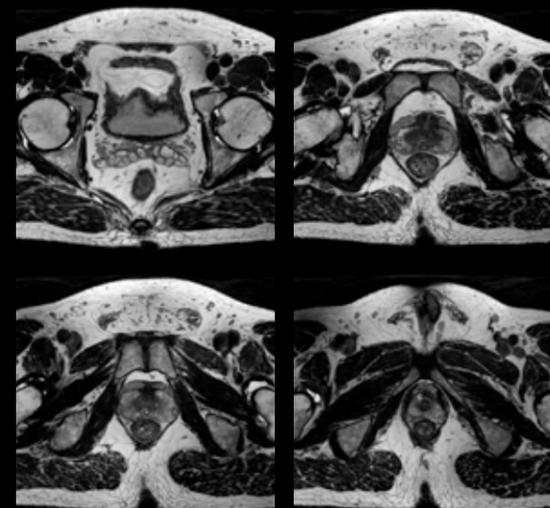
HyperBand colored orientation map



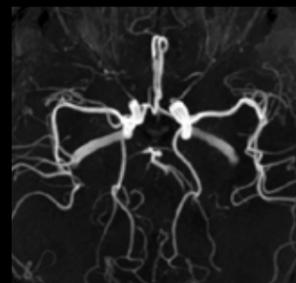
HyperBand DTI



Fused tractography  
with 3D Cube T2 FLAIR  
DTI Hyperband / 32  
directions



Axial HyperCube T2 with HyperSense  
0.7 x 0.7 x 0.7 mm  
3:58 min



3D TOF with HyperSense  
0.6 x 0.6 x 0.6 mm  
3:29 min

# ViosWorks

Extend cardiac MR assessment beyond the anatomy by acquiring all 7 dimensions of information (spatial, time and velocity) in a cardiovascular scan of 10 minutes or less with ViosWorks.

ViosWorks leverages the imaging analytic power of the Arterys™ cloud-based platform to precisely visualize and quantify cardiac flow.

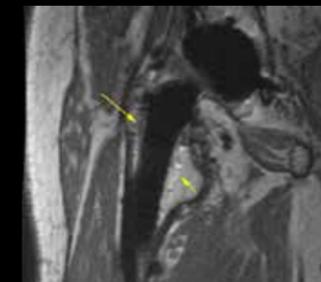


# HyperMAVRIC SL

HyperMAVRIC SL now brings T2-weighting, Flexible No Phase Wrap and an automated-parameter setting for streamlined UI workflow.



MAVRIC SL PD  
0.4 mm x 0.6 mm x 4 mm



HyperMAVRIC SL  
1.3 mm isotropic

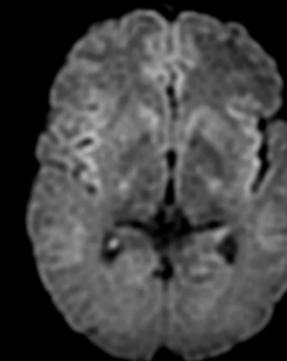
Fibrous membrane formation in femur that was not appreciated in a conventional acquisition or same scan time.

# SilentWorks

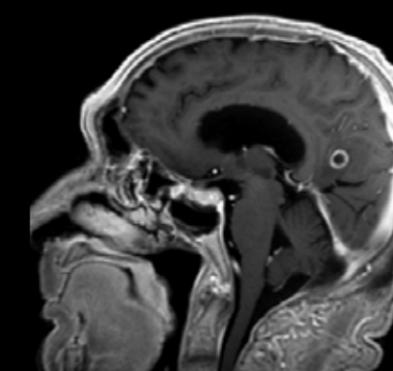
SilentWorks is available across all anatomies and can be done with multiple coils and weightings, including DWI. And with new enhancements like 3D Silenz and PROPELLER MB, your exam time is shortened without compromise.



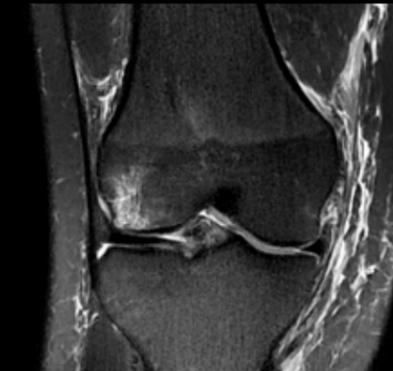
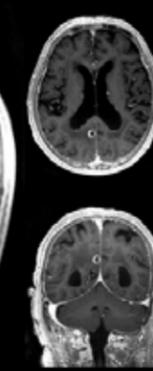
ZTE Silent MRA



Axial DWI with SilentScan



Sagittal 3D T1 SilentScan  
with Axial and Coronal MPR's

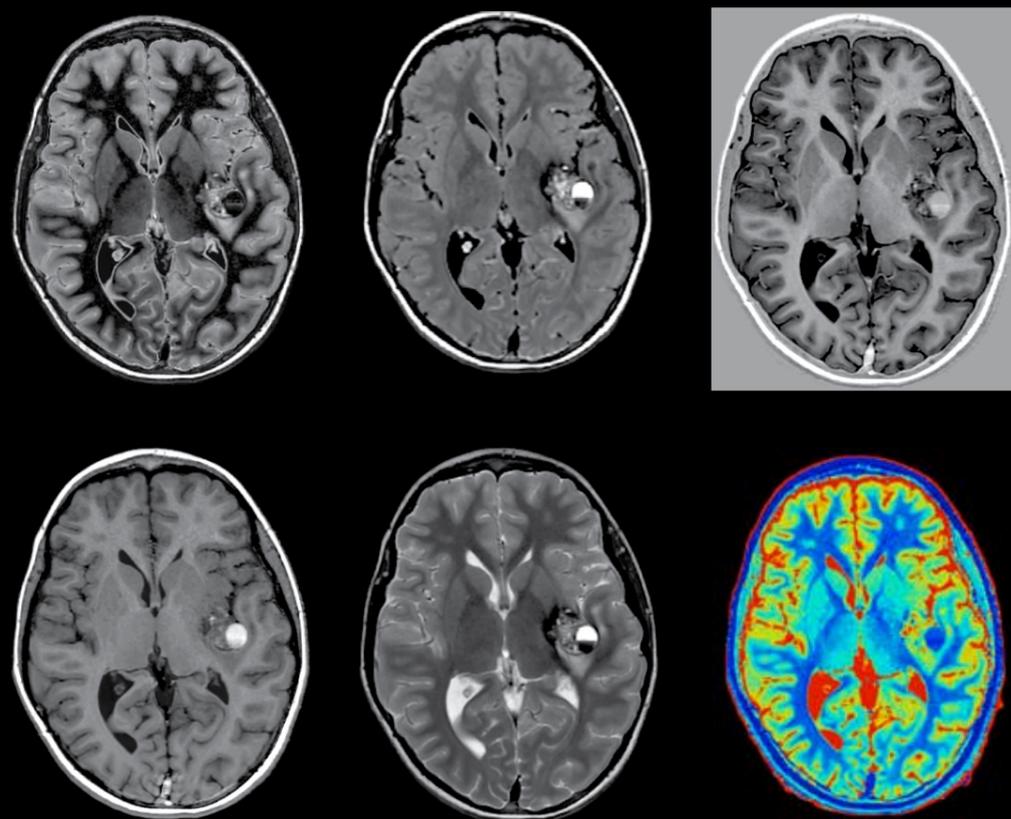


Coronal T2 PROPELLER  
FatSat with SilentScan

# ImageWorks

## MAGiC

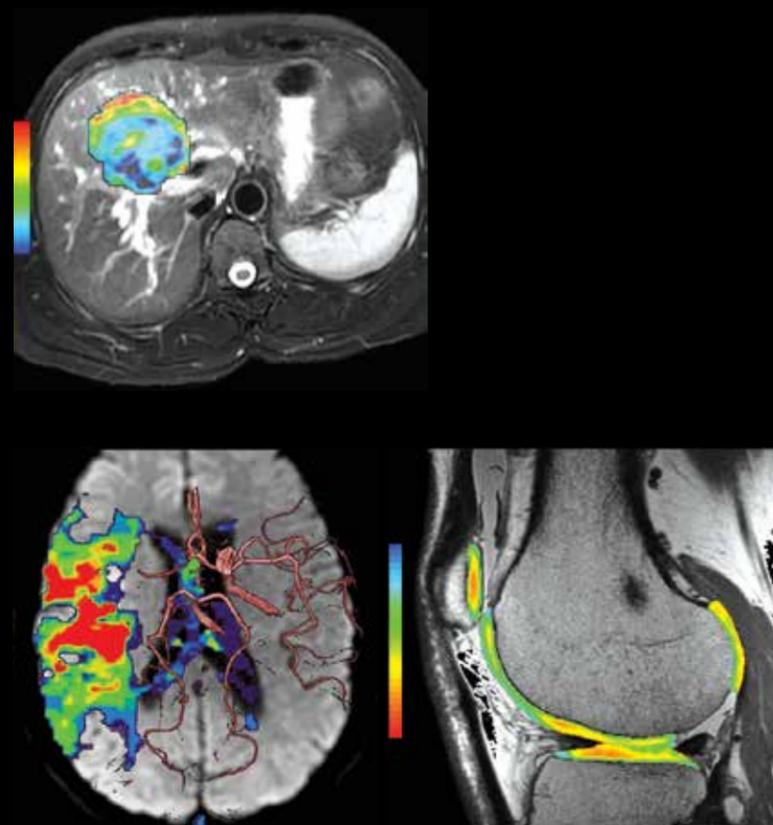
The secret of MAGiC lies in its unique ability to deliver multiple image contrasts in a single neuro scan. MAGiC delivers enhanced clinical flexibility by freeing up time for advanced imaging. MAGiC goes beyond the routine, providing complementary parametric data for a more complete picture. Image contrast can be changed by applying simple adjustments after acquisition.



Axial DIR, FLAIR, PSIR (top), T2, T1 and T2 maps (bottom) were acquired in one scan

## READYView

READYView helps simplify complex exams by providing a visualization platform that gives you access to advanced post processing technology. Being directly available on the MR operator console, READYView accelerates workflow and reading readiness by eliminating time consuming post processing steps.



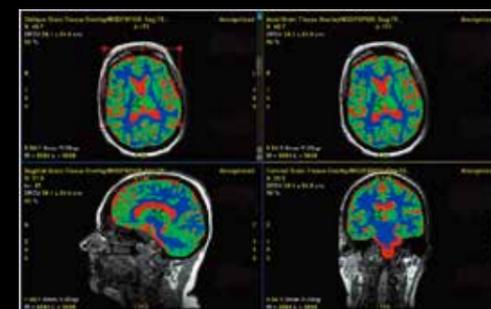
# Visualization

## Quantib™ Brain

Quantib™ Brain is a medical imaging processing software that is intended for automatic labeling, visualization, and volumetric quantification of segmentable brain structures from a set of MR images.

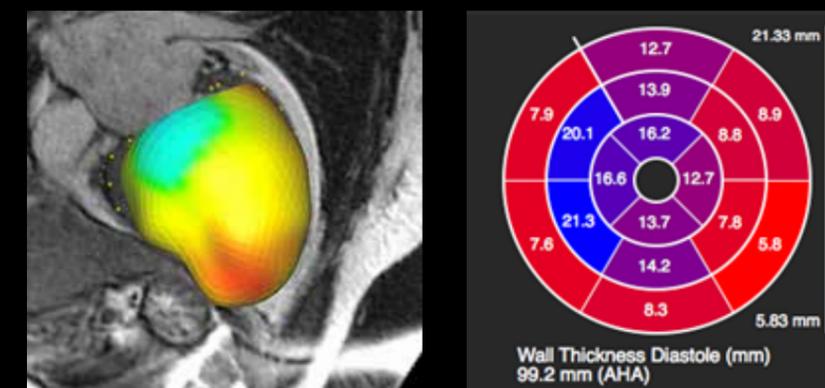
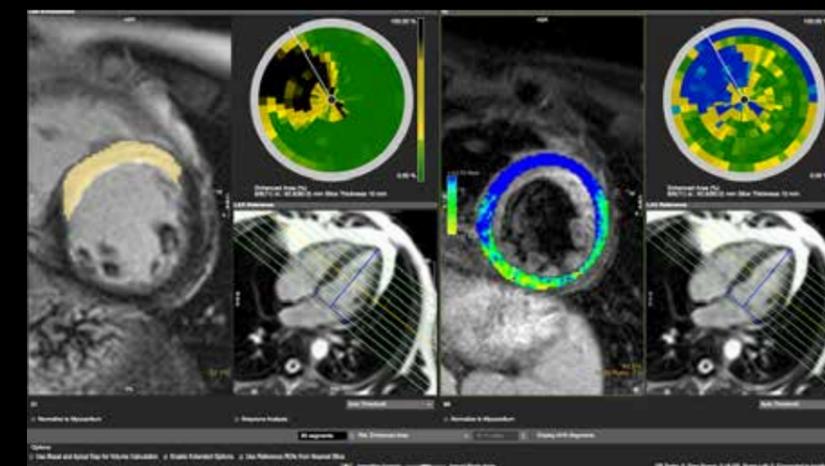
The Quantib™ Brain output consists of segmentations, visualizations and volumetric measurements of grey matter, white matter, and cerebrospinal fluid. The output also visualizes and quantifies white matter hyperintensity (WMH) candidates.

The Quantib™ Brain WMH segmentation function can perform a longitudinal analysis on validated WMHs for comparison of multiple exams of an individual patient.



## cvi<sup>42</sup>

cvi<sup>42</sup> is a comprehensive cardiovascular post processing solution that uses automated algorithms to characterize tissue, generate maps, and assess flow and function.

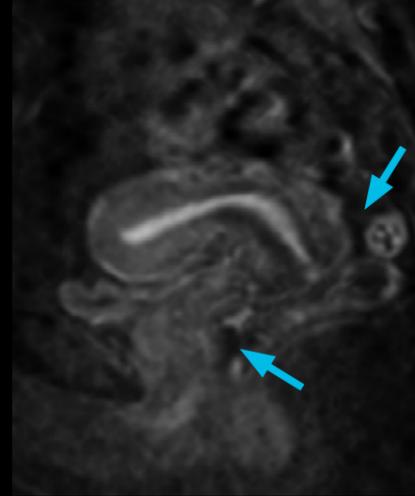
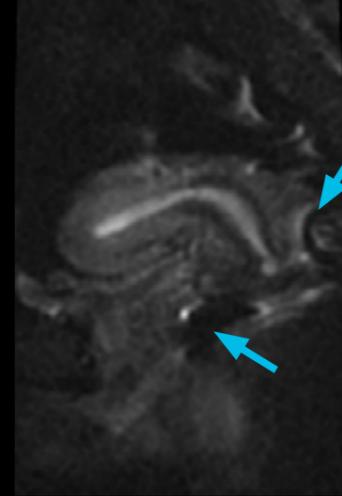


# MUSE

A diffusion weighted and diffusion tensor technique that allows higher spatial resolution with reduced EPI-based distortions.



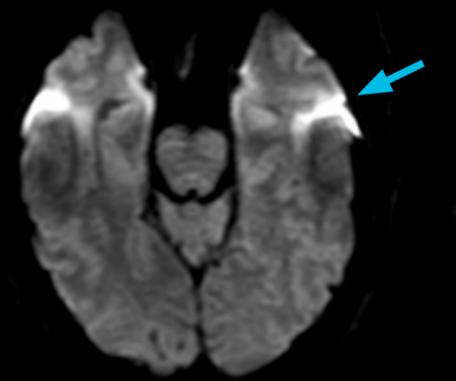
Sagittal T2 320 x 320 3.5 mm



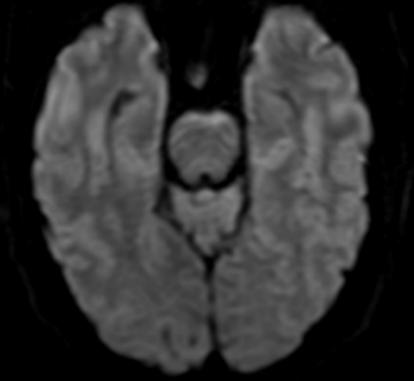
Standard EPI DWI on the left shows increased susceptibility likely from air on the bowel. MUSE image on the right demonstrate increased resolution and reduction in artifacts

# PROGRES

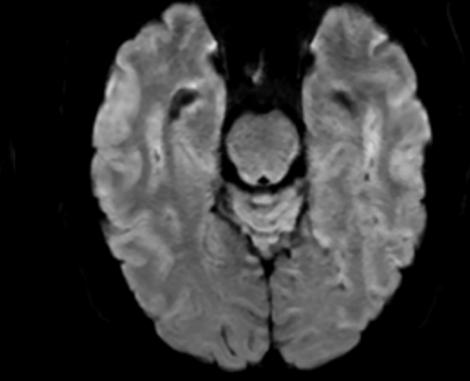
PROGRES provides automated distortion and eddy current correction, based on an integrated Reversed Polarity Gradient (RPG) acquisition.



Axial EPI DWI without PROGRES



Axial EPI DWI with PROGRES



MUSE DWI 0.9 x 0.8 x 4 mm

# Imagine

Get sharper images beyond your expectations

## Total Digital Imaging (TDI)

The SIGNA™ Pioneer offers startling advances in imaging. Starting with pioneering technology called TDI. It stands for Total Digital Imaging, and it means greater clarity and increased SNR by up to 27%.

TDI is built on three fundamental components:

GE's **Direct Digital Interface (DDI)** employs an independent analog-to-digital converter to digitize inputs from each of the RF (up to 97ch), eliminating unnecessary noise enhancement. In other words, every element translates to a digitized signal.

The result? Not only does DDI technology improve the SNR of our images but it also works with legacy GE coils for unmatched flexibility.

**Digital Surround Technology (DST)** combines the digital signal from every coil element with the signal from the integrated RF body coil. The superior SNR and sensitivity of the high-density surface coils are combined with the superior homogeneity and deeper signal penetration of the integrated RF Body Coil.

**eMode** technology replaces analog blocking circuits with intelligent ultra-fast switches which further expand zero TE imaging capabilities.

Sagittal T2 2 stations  
352 x 320 3 mm



# Maximize

Scan one more patient per hour,  
every hour of every day

Scanning faster is key to improve throughput but imagine also if you could reduce the repeated scans while getting consistent clear imaging in challenging conditions.

GE's proven PROPELLER technique delivers daily clear imaging in 2D scans for motion correction. With 3D PROMO technology, SIGNA™ Pioneer enables high resolution and motion reduced 3D images by using a real time 3D navigator-based motion correction algorithm to correct motion-induced data.

Free breathing or breath-hold in body imaging? Whatever the patient is able to sustain, SIGNA™ Pioneer provides the right and accurate features to secure the images consistency and patient comfort:

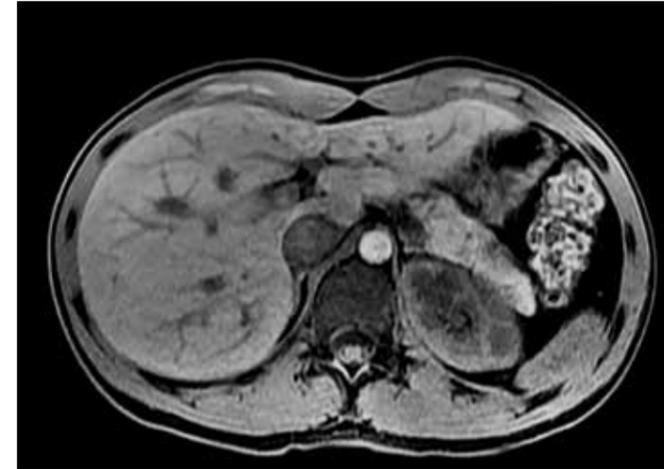
- Auto Navigator for automated free breathing body imaging
- Turbo LAVA to deliver shortened scan time and breath hold even for multiple high resolution arterial phases in a single breath hold.

## MR as simple as CT

Imagine you might perform advance MR body imaging as simple as CT?

Imagine you get rapid and robust dynamic volumetric imaging of the entire liver with less than 3 seconds fo temporal resolution? DISCO (Differential Sub-sampling with Cartesian Ordering) makes it happen and remove the fear of missed bolus. Just start scan and inject simultaneously to get each scan done right the first time.

Finally, just focus on the patient with Auto Protocol Optimization feature to get a one click predefined protocol parameters to easily adapt to the patient breath hold capability with the optimal scan time and resolution/coverage combination.



Body  
DISCO without contrast  
288 x 192 4 mm

## Lower costs to set up and operate

Now, imagine getting all of this in a system that first lowers your costs to set up the system on site, because its footprint is 25% smaller.

Then this system goes on to lower your operating costs, by consuming 25% less power than conventional 3.0T wide bore designs. Put this together and it represents exceptional economics overall for a wide bore 3.0T MR system.

Clearly, the SIGNA™ Pioneer is not just pioneering very big advances, but it is engineering them into a surprisingly small frame.





# Astonish

Discover how the SIGNA™ Pioneer is designed to deliver an unmatched patient experience

With the SIGNA™ Pioneer, we're pioneering patient-centered design built on new notions of higher patient comfort and lower patient stress.

Reducing MR scan noise has long been one of the most important goals in advancing MR technology. With the SIGNA™ Pioneer and GE's SilentScan technology, patients's MR experience may be significantly improved.

## Drive patient to new MR experience

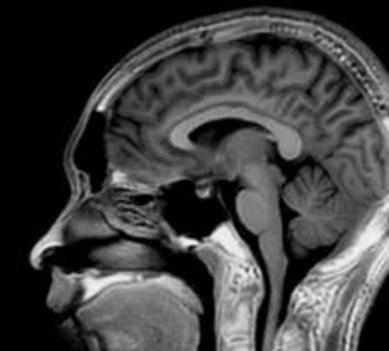
Thanks to SilentScan that is both revolutionary and proprietary, the SIGNA™ Pioneer reduces dB levels from an ear-splitting, motorcycle-level 91dB to within 3dB of scan room ambient noise.

Along with this dramatic advance comes the first-ever complete Silent Neuro Exam that includes Diffusion Weighted Imaging (DWI) and also Brain MR Angiography with ultra short TE capability. The Silent imaging capability has been also extended to musculoskeletal and spine imaging.

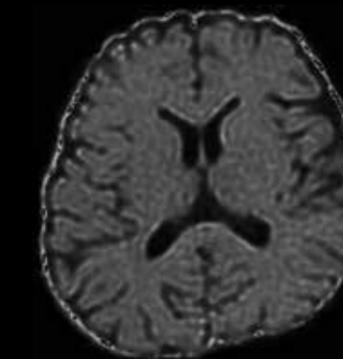
Now, the age-old problem of patients having to hold their breath or lay statue still? Consider that problem solved. With its advanced motion correction and free-breathing imaging applications, SIGNA™ Pioneer will compensate for patient movement.

And claustrophobia? The 70 cm wide bore design means more space and less anxiety with a wider table on top, offering the most comfort possible for your patients. The table even sits lower to the ground, making it easier for patients to get on and off.

And what does all of this mean for patients? Quite simply, the SIGNA™ Pioneer is designed to deliver an unmatched patient experience.



Brain  
T1 3D Silenz  
256 x 256 1 mm



Brain  
Silent eADC  
128 x 128 5 mm



Brain  
Silent Angio  
150 x 150 1.2 mm

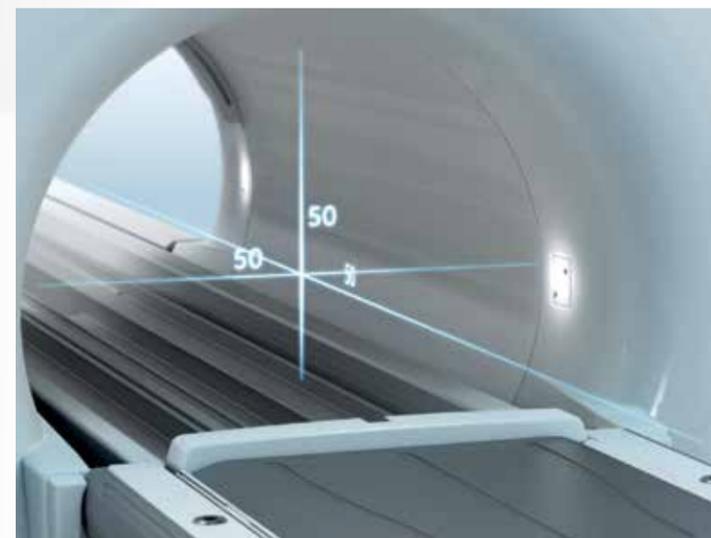


C-Spine  
Silent T2  
352 x 224 3 mm



## FOV

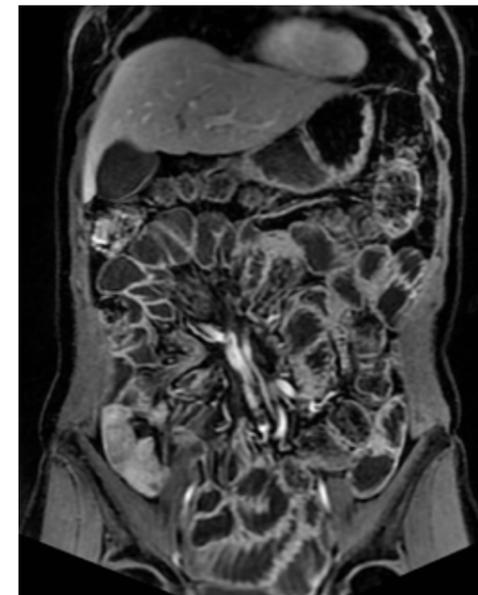
In addition to accommodating larger patients, full 50 x 50 x 50 cm FOV in a 70 cm wide bore allows you to properly image off-center anatomy such as shoulders and hips. The SIGNA™ Pioneer's phenomenal homogeneity enables our largest FOV ever, with higher gradient specifications. Additionally, excellent spatial integrity is provided by 3D GradWarp distortion correction. And no body part is left behind.



## reFINE and deFINE

With reFINE, the challenge of 3.0T high-field uniformity has finally met its match. Just like a home theater surround system can be optimized, with reFINE, you increase your control over improved RF pulse efficiency, so you get clearer, crisper signals no matter your patient composition or position. reFINE makes consistent 3.0T imaging the rule, not the exception.

deFINE takes the results of SIGNA™ Pioneer to the next level by enhancing the image appearance with integrated, in-line, optimizable settings. These settings can be generated for each individual sequence or for the entire exam. With deFINE, you meet your high quality image needs and go beyond the normal.





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GE Healthcare enables precision health in diagnostics, therapeutics and monitoring through intelligent devices, data analytics, applications and services. With over 100 years of experience and leadership in the healthcare industry and more than 50,000 employees globally, GE Healthcare helps healthcare providers, researchers and life sciences companies in their mission to improve outcomes for patients around the world.

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