Signa EXCITE MRI Technology
The EXCITE
With the introduction of Signa® EXCITE™ technology, GE Medical Systems took magnetic resonance imaging to a new level.

EXCITE was the industry's first end-to-end design of the MRI data pipeline. Every component in the imaging chain was optimized and integrated into a new platform that unleashed unprecedented scanning speed, resolution and SNR for MRI applications.

Now the EXCITE platform is evolving with new technologies that further improve clinical productivity and image quality, and deliver highly-advanced, data-intensive applications that are clinically practical only with the speed and power of EXCITE.

Only EXCITE gives you:

- **Accelerator™ Data Management technology** – a high-performance operating system and high-volume image database for faster workflow

- **A visible improvement in image quality with new 8-Channel coils for neurovascular, spine, body and cardiac imaging**

- **Breakthrough imaging techniques that enhance your diagnostic options for stroke evaluation, peripheral vascular imaging, breast cancer staging and other clinical applications.**
MRI procedure growth is projected to double over the next four years. The mix is shifting towards dynamic applications in vascular, body and cardiac imaging, and towards higher resolution neurologic and orthopedic applications. These changes will drive nearly a three-fold increase in the amount of data per exam.

The EXCITE Data Management Accelerator provides the image processing horsepower to handle this data explosion, allowing you to integrate the most advanced applications into your routine clinical practice.

Specifically, the EXCITE Accelerator provides:

- A high-performance operator workstation
- A Linux-based operating system that responds instantaneously to user input
- A rapid-access, high-volume image database

The result is an incredibly fast system that accelerates workflow. In an MRA study of the brain, for example, MRI EXCITE reduced scan time by 50% and processing time by 65% compared with a non-EXCITE Signa scanner. Total exam time is reduced by 15 minutes, allowing you to see two patients in the time it used to take for one.

MRI data is exploding. Are you ready?

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50% reduction in end-to-end exam time.
EXCITE Technology

- Tailored operating system optimizes performance of each pipeline component
- High-performance Linux-based operator workstation
- Instantaneous response to user input
- Software to design end-to-end applications

- The industry's largest family of 8-Channel coils optimized for parallel imaging
- Modular receiver channels, expandable from 8 to 16 and ultimately to 64*

- Dual 2.66GHz processors
- 2GB dedicated processor memory
- 128MB graphics memory

- Fastest pulse sequences in MRI
- Fast reconstruction at 200 or 400 images/sec (256^2 FFTs full FOV)
- Scalable memory from 1 to 2GB
- Complete simultaneity so all acquisition and processing proceed in parallel

- Rapid-access, high-volume image database
- 108GB (3x36GB) total storage
- 75MB/sec data insertion rate
- Stores up to 20K images in a single series (for fMRI)

*Works-in-progress
Expanding your diagnostic tools

New applications that flow from and depend on EXCITE

The Signa EXCITE 1.5T system provides the most extensive range of leading-edge imaging technologies in the industry, enabling a virtually unlimited range of applications.

Propeller T2 acquisition (right) eliminates the motion artifacts seen in the T2-weighted image of an uncooperative, moving patient (left).

Propeller DWI acquisition (right) reduces the artifact produced by dental work affecting the EPI DWI sequence on left. The result is a dramatic increase in tissue resolution.

Propeller technology – NEW

This revolutionary image data collection method gets its name from a unique pattern of k-space filling that acquires data in radial “blades” rotating in sequence until the image acquisition is complete.

Propeller produces high-resolution, robust image quality in the most challenging circumstances by enabling:

- 25-75% improvement in contrast-to-noise ratio without time penalty.
- Dramatically reduced sensitivity to patient motion.
- Reduced sensitivity to magnetic susceptibility artifacts that challenge traditional EPI-based DWI imaging. DWI Propeller produces high quality results in the skull base even in the presence of dental work, craniotomies or other abnormalities disturbing the magnetic field.
TRICKS technology– NEW

MR imaging typically involves a tradeoff between spatial and temporal resolution. Not so with TRICKS (Time Resolved Imaging of Contrast Kinetics). This exclusive technique uses an intricate temporal sampling method and complex data re-combination to accelerate the temporal resolution of three-dimensional dynamic imaging without sacrificing spatial resolution.

In the imaging suite, TRICKS eliminates the problem of inaccurate timing of the contrast bolus. You can simply inject and scan with complete separation of arterial and venous phases.

Our initial application combines TRICKS with GE’s Elliptical-Centric data sampling technology to produce EC-TRICKS … an ideal imaging technique for the very difficult task of contrast-enhanced MRA in the lower extremities.

TRICKS captures high-resolution peak arterial phase in each leg, even with asymmetric flow.

TRICKS enables the characterization of complex flow dynamics associated with vascular disease.

TRICKS temporal resolution capability provides a clean peak arterial phase in the lower leg without sacrificing spatial resolution.

VIBRANT enables both high temporal and high spatial resolution imaging of this patient with multi-focal disease. The matched temporal resolution - rather than toggled - enables direct contrast uptake comparison (114 images/phase, 1:22/phase).

VIBRANT’s high temporal resolution captures contrast uptake without sacrificing spatial resolution (90 images/phase, 1:06/phase).

Superb fat suppression with VIBRANT enhances lesion conspicuity in this relatively fatty breast.

VIBRANT - ASSET imaging– EXPANDED

VIBRANT (Volume Imaging for BReast AssessmeNT) is the latest addition to the GE ASSET family of parallel imaging techniques. It enables simultaneous bilateral breast imaging with high resolution in the sagittal plane, the preferred view in mammography. VIBRANT provides the same resolution as a unilateral MRI breast exam, without any penalty in scan time. It also provides absolute confidence in fat elimination with a unique multi-technology approach that incorporates bilateral shimming per patient, a breast-specific spectral inversion technique, and an automated image subtraction technique for the most reliable and robust fat elimination.

VIBRANT applies ASSET in the slice dimension to provide true slice dimension resolution – an improvement over alternative approaches that try to shorten exam time with interpolation methods in the slice direction. The result is the highest resolution bilateral breast technique available.
The Signa EXCITE platform continues to expand its 8-Channel imaging capability with the availability of new surface coil designs to improve the SNR, speed and resolution of a broad base of MRI applications. These include:

- 8-Channel Neurovascular Array, ASSET-compatible with 13 independent coil elements
- 8-Channel Torso-Pelvic Array, ASSET-compatible with 12 independent coil elements
- 8-Channel Cardiac Array, ASSET-compatible for oblique cardiac imaging with 8 independent coil elements
- 8-Channel CTL Spine Array, optimized for SNR and uniformity with 12 independent coil elements

These, in combination with our EXCITE 8-Channel Brain coil, represent the industry’s largest complement of commercially available 8-Channel imaging coils.

What do Propeller, TRICKS, VIBRANT and other new imaging methods have in common?

They all make significantly greater data throughput demands on the MRI system. VIBRANT, because it’s ASSET based, requires about 4 times the amount of processing of a non-ASSET application. Propeller requires 5 times the amount of processing versus conventional diffusion weighted or T2 imaging. And TRICKS requires about 10 times the data volume, as well as 12 times the amount of data processing.

It might be possible to perform these applications on conventional MRI systems…but you wouldn’t want to. It’s the high data throughput capability – available only with EXCITE technology – that brings these technologies to life in the clinical suite. Only EXCITE can manage their large data volumes and complex image reconstruction needs without slowing down your clinical workflow.
**3D TOF with FT-MRA and Elliptical-Centric**

3D TOF using ASSET and Elliptical-Centric provides high-resolution imaging of the coronary arteries.

**NEURO**

EXCITE makes exceptional image quality routine for critical neuro applications.

EXCITE technology provides multiple techniques for high-resolution IAC imaging. 3D FSE (left); 3D FIESTA-C (right).

3D FIESTA-C cervical spine image demonstrates high SNR and CNR resulting in visualization of the nerve roots.

ASSET enables rapid, high-quality imaging in this T2 brain study.

**BODY**

3D FAME provides a rapid high-resolution study with full liver coverage without interpolation in a single breathhold. Note uniform fat suppression.

SSFSE large FOV abdomen acquired with the only commercially available 8-Channel torso coil designed for high SNR.

MRCP using ASSET and respiratory triggering was acquired with free-breathing and true isotropic resolution.

Only GE provides DWI with ASSET to differentiate tissue contrast in the liver.

**VASCULAR**

3D TOF with FT-MRA and Elliptical-Centric

3D TOF using ASSET

3D TOF SmartStep

TRICKS

In addition to the new TRICKS techniques, EXCITE delivers a complete toolkit of acquisition and timing techniques.

**CARDIAC**

Short-and long-axis 2D FIESTA using ASSET and 8-Channel cardiac coil.

Right Coronary

Left main and LAD

LAD and Circumflex

3D Fat Sat FIESTA provides short-breathhold, high-resolution coronary imaging that complements the GE comprehensive cardiac imaging package.

**ORTHOPEDIC**

GE’s leadership in MR orthopedic imaging is further enhanced with EXCITE by higher-resolution acquisitions and faster exam times.
The Signa EXCITE platform changes everything in MRI.

Proactive, interactive support
Support on the EXCITE EXCITE and thevosim image database for faster workflow can be instantly accessed by any team member on the EXCITE scanner. Total exam time is reduced by 15 minutes.

Efficient, high-volume imaging
A rapid-access, high-volume image database stores up to 20K images at 75MB/sec data insertion rate, and provides the image processing horsepower to handle this data explosion, allowing you to integrate the most advanced applications into your routine clinical practice.

High-speed, high-performance computing
With the introduction of Signa® EXCITE™ Technology, the Signa EXCITE platform integrates advanced networking, imaging, and high-performance computing capabilities into a single, highly-advanced, data-intensive applications environment.

Digital, rapid, and high-performing imaging
A rapid-performance graphic system backed by the world’s most powerful GPUs accelerates image processing time, dramatically reducing scan times. New technologies such as diffusion, fMRI, and cardiac imaging have been integrated into a new platform that increases the scanning speed and power of EXCITE.

Signa EXCITE delivers fundamental improvements in imaging quality and speed. It enables new applications that increase the diagnostic power of MR. It reduces scan times, leverages experienced protocols and expands your service opportunities.

Innovative, hot-rolled technology
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For more than 100 years, healthcare providers worldwide have relied on GE Medical Systems for medical technology, services and productivity solutions.

So no matter what challenges your healthcare system faces— you can always count on GE to help you deliver the highest quality healthcare.

For details, please contact your GE representative today.