SIGNA™ 7.0T

Scientific discovery meets clinical translation

Designed to overcome the limitations of many of today's clinical MR systems, SIGNA™ 7.0T* is a powerful new platform for advancing neurological research and clinical translation. Approximately five times more powerful than most clinical systems, SIGNA™ 7.0T is designed to detect subtle structures that may be significant for clinicians and researchers alike.

Powered by SIGNA™Works

This new system is powered by SIGNA™Works, so users have access to the latest state-of-the-art applications along with deep-learning tools like AIR x™ Brain, while delivering the diagnostic confidence of an ultra-high field system.

UltraG gradients

The system also features UltraG gradients, GE's most powerful whole-body gradient system yet. With peak amplitude of 113 mT/m and a peak slew rate of 260 T/m/s, this scanner can properly leverage the clinical capabilities and research demands that users expect from a 7.0T.

Freedom and Familiarity

The SIGNA™ 7.0T is FDA cleared in the U.S. so users there have the freedom to use for research and/or clinical scanning. And because SIGNA™ 7.0T has the same look and feel of other GE MR scanners, anyone experienced with scanning on a GE 1.5T or 3.0T, may comfortably approach this powerful system and deliver results without missing a beat.

❝❝ We were immediately impressed with the quality and stability of the SIGNA™ 7.0T system. We are keen to update our system to this new configuration and to continue our relationship with GE to realize the promise of this technology in meeting our research goals. ❞❞

Michela Tosetti, PhD, Laboratory Director, IRCCS Stella Maris and Imago 7 Research Foundations Professor

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*Not yet CE marked. Not available for sale in all regions.

A system that can meet both research and clinical needs

SIGNA™ 7.0T is a great fit for facilities that conduct research but are also in need of an option to do clinical scanning. On the clinical side, this scanner shines with the power to image neurodegenerative diseases and extremities.

For advanced clinical and research needs, the system delivers impressive results with diffusion tensor imaging (DTI), which is often used to visualize the white matter architecture and integrity of the normal and diseased brain in multiple sclerosis, stroke, aging, tumors, dementia, and schizophrenia. SIGNA™ 7.0T also produces extremely clear functional MRI (fMRI) studies, which can be used in planning surgery or other treatments for diseases such as epilepsy.

In addition to brain imaging, the SIGNA™ 7.0T is an ideal system for extremity imaging such as the knee.

The best of advanced MR technology in one system

SIGNA™ 7.0T boasts new technology that allows the scanner to overcome common challenges associated with operating at a higher field strength. This new technology includes UltraG, our newest and most powerful whole-body gradient technology, advanced shimming and a precision RF chain. These new features are then combined with the best of GE's existing advanced MR technology — such as the SuperG gradient amplifiers and gradient drivers from the SIGNA™ Premier 3.0T and the zero boil-off actively shielded 7.0T magnet from the Discovery™ MR950[†] research-only 7.0T system. The magnet, the result of a partnership with Tesla Engineering in Storrington, UK, delivers top-of-the-line performance, uniformity and stability.

The system features a new 60 cm gradient coil with a large (>45 cm) FOV capability. It is torque-balanced to significantly lower vibrations and acoustics and is also designed for uniform heat dissipation and thermal control. Because the coil doesn't interact with the magnet, the system can deliver a complete performance solution at a higher operating point.

In addition to the UltraG gradient platform, the system features a precision RF transmitter architecture with two modes, clinical and research. In clinical mode, the system transmits on two channels giving the facility flexibility in optimizing the system for uniformity and pushing the system to get the most of its 7.0T capabilities. The SIGNA™ 7.0T RF transmit architecture includes two 7.5kW RF power amplifiers, with capabilities to optimize phase and amplitude for improved uniformity, regardless of patient shape size and/or body habitus.

SIGNA™ 7.0T UltraG Gradient Platform

Patient bore dimension	60 cm
Design	All hollow conductor
Power	2400 V, peak instantaneous current: 1034 A
Peak graident amplitude	113 mT/m
Peak slew rate	260 T/m/s

[†]Investigational device. Not 510(K) cleared and not for sale in any region.

[††]Technology in development and not cleared for clinical use on SIGNA™ 7.0T in the US or any other country.

Further enabling research[‡‡]

In addition to its powerful clinical applications, the SIGNA™ 7.0T is designed with the following advanced research capabilities when used in research mode.

- **Precision Transmit: Multinuclear Spectroscopy mode** In MNS mode, Precision Transmit provides a single 8 kW channel covering the most commonly imaged low gamma nuclei, from ^{17}O to ^{31}P. All 64 receiver channels may be used for reception, or a subset may be selected to allow the use of multichannel multinuclear receive arrays, providing both ^{1}H imaging and MNS acquisition without moving the subject.

- **Precision Transmit: Multichannel mode** In Multichannel mode, Precision Transmit provides 8 x 2.5 kW channels for ^{1}H imaging and spectroscopy. These channels may be driven by a common waveform kernel with individual phase and amplitude control per channel, to support B1 shimming or dynamic multiphase imaging for transmit uniformity correction; or in multi-waveform mode to support tailored waveform design for multidimensional excitation and conventional parallel transmit, with per channel definition of amplitude, phase, and frequency modulation.

- **Development Tools, Collaboration Portal and Research Applications** Develop your own applications with development platforms such as EPIC for pulse sequence programming and Orchestra for reconstruction, share ideas on GE's Collaboration portal, and have access to investigational applications such as Silent fMRI.

Diffusion Tensor Imaging - 1.5 mm isotropic resolution
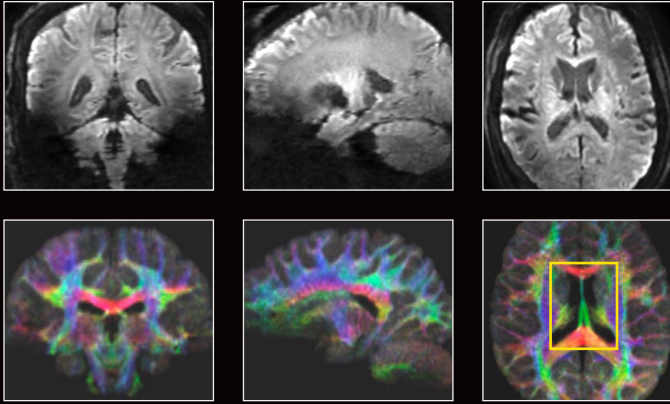
1.5 mm isotropic resolution
TE 60.4 ms
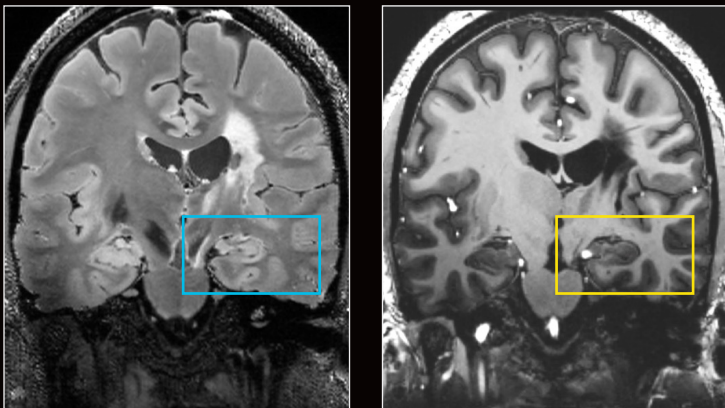TR 6000 ms
b=0 (6) + 667 (20) + 2000 (40)

T2w Cube with HyperSense

4.7 mm MIP through IACs
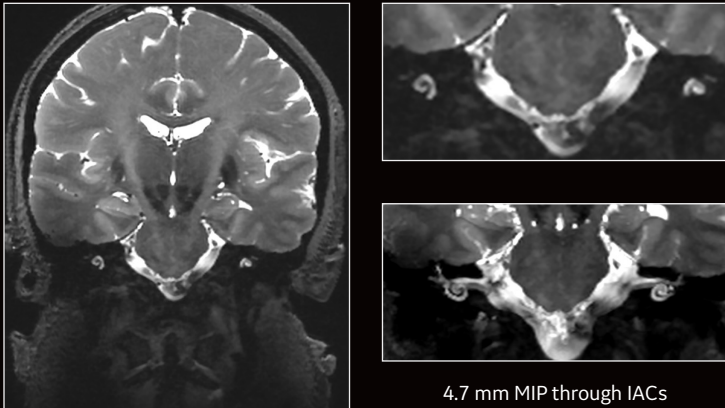
TE 89.7 ms
TR 3002 ms
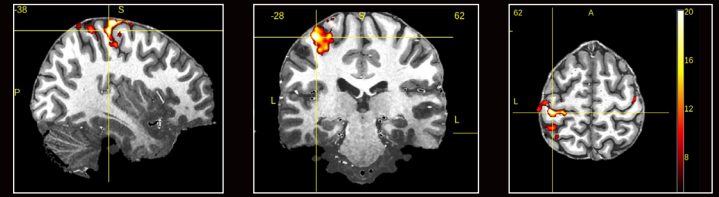0.43 x 0.43 x 0.7 mm
HyperSense 1.5

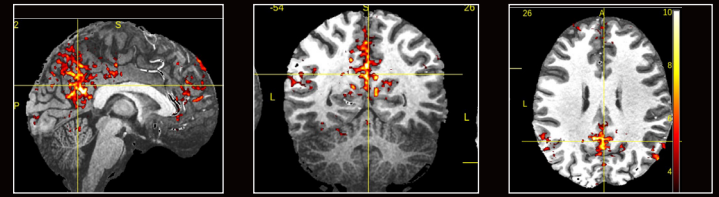## Co-registered Cube FLAIR and MP-RAGE

0.4 x 0.4 x 0.7 mm
TE 120
TR 6502

0.4 x 0.4 x 0.7 mm
TE 3.9
TR 3424

Isotropic fMRI

1.2 mm isotropic
TE 26.8 ms
TR 1500 ms
200 volumes

1.0 mm isotropic
TE 29.3 ms
TR 3582 ms
120 volumes

High-resolution knee imaging

FIESTA-C
150µm x 150µm x 1.2 mm

PROPELLER (2D FSE)
293µm x 293µm x 2 mm

FIESTA-C
150µm x 150µm x 1.2 mm

The latest state-of-the-art applications

SIGNA™ 7.0T features the same software and capabilities of the SIGNA™ Premier with SIGNA™Works AIR™ Edition software. This means that users have access to the SIGNA™Works applications platform, which includes the following:

3D Cube

With various contrasts, such as T2 FLAIR, can help visualize even small and subtle lesions without partial-volume averaging effect and is particularly impressive at 7.0T.

SWAN

Helps clearly delineate small blood vessels, microbleeds, and large vascular structures in the brain. At 7.0T it can be used to visualize iron and calcium deposits by providing both phase and magnitude images to aid in an easier diagnosis.

DWI and DTI

SIGNA™ 7.0T is excellent for high-resolution diffusion work with very little distortion and reduced TEs due to the powerful UltraG gradients.

PROPELLER

Designed to reduce the effect of patient voluntary and physiologic motion (breathing, flow, peristalsis), and reduce magnetic susceptibility artifacts, PROPELLER works well for neuro and extremity imaging.

Silent T1

Silenz is a 3D Zero-TE sequence comprising high bandwidth excitation and reduced gradient switching radial acquisition that results in sound levels near ambient. Silenz has added flexibility in sequence prescription for anisotropic resolution enabling faster scan times and includes axial as well as oblique geometries.

PROMO

Prospective motion correction is a real time 3D navigator based motion correction technique compatible with 3D sequences such as Cube, BRAVO and MP-RAGE.

semi-LASER

semi-LASER is a double spin echo single-voxel MRS technique that uses a slice selective non-adiabatic excitation along with two pairs of adiabatic slice-selective refocusing pulses for volume selection. The adiabatic pulses compensate for B1 inhomogeneity while increased pulse bandwidth addresses chemical shift displacement errors.