

With 7 Tesla scanner Magnetom Terra, Siemens Healthineers introduces new clinical field strength in MR imaging

- **First CE approval for ultra-high-field magnetic resonance (MR) scanner**
- **New level of detail for musculoskeletal and neurological applications to further pave the way for precision medicine**
- **Easy integration of Magnetom Terra into the clinical environment**
- **Dual Mode functionality enables clinical and research application, creating an optimal platform for translational research**

Siemens Healthineers has achieved a CE approval for the 7 Tesla magnetic resonance (MR) scanner Magnetom Terra, making it the first-ever ultra-high-field MR scanner to be approved for clinical use. Siemens Healthineers, the global market and innovation leader in magnetic resonance imaging (MRI), is therefore breaking new ground in medical imaging once again and working alongside customers to establish a new clinical field strength for MRI – in line with the company’s motto “Engineering Success. Pioneering Healthcare. Together.” Clinicians in Europe can now use the system for neurological and musculoskeletal examinations in routine clinical applications, as the CE mark means that the product meets all EU requirements with regard to safety, clinical benefit, and environmental protection.

“Thanks to our long-standing commitment and experience with ultra-high-field MRI as well as our extensive innovation network of collaboration partners around the world, we are now establishing 7T imaging in the clinical routine with Magnetom Terra”, says Dr. Christoph Zindel, Senior Vice President and General Manager of Magnetic Resonance Imaging at Siemens Healthineers. “Having now gained approval for clinical use, we are expanding the scope of diagnostic MRI – 15 years after 3T scanners first became established. With this new clinical field strength, we can achieve a new level of detail in

anatomy and function, helping further pave the way for precision medicine,” says Zindel. “I am convinced that Magnetom Terra will help grow the footprint of 7 Tesla in research and clinical application, allowing us to further explore new territories in MRI.”

Thanks to its very high spatial and spectral resolution, Magnetom Terra provides detailed insights into the human musculoskeletal system, presents a precise picture of the metabolic processes in the brain, and also aids in the visualization of neurological diseases such as Alzheimer’s, epilepsy, and multiple sclerosis (MS). The advantages of ultra-high-field imaging are especially apparent in brain imaging. At 7T, lesions can be identified more clearly thanks to the higher resolution and stronger image contrast.

New diagnostic capabilities for epilepsy and multiple sclerosis

One example of this is the examination of epilepsy patients, where the clearer distinction between white and gray matter opens up new diagnostic capabilities, which are not possible at lower field strengths. Results from 7 Tesla can also be beneficial to patients with MS by improving the visibility of lesions in the gray brain matter that can lead to cognitive impairments. Here, the combination of a better signal-to-noise ratio, stronger tissue contrast, and greater spatial resolution means that 7T can reveal information that would be invisible at 3T.

“This ability to use 7 Tesla technology in the clinical realm is a breakthrough into broader clinical 7 Tesla MR applications. This CE certificate is now well-supported by the remarkable progress with respect to novel radio-frequency technologies and MR methods that will make whole-body MRI at 7 Tesla feasible in the future. It will definitely foster the translation of research into clinical applications,” says Professor Dr. Siegfried Trattnig, M.D., Director of the MR Centre of Excellence at the Medical University of Vienna, “And, the higher signal to noise ratio, the improved contrast, and non-proton MR at 7T will translate into better spatiotemporal resolution, but even more importantly into enhanced biochemical and metabolic tissue characterization en route to clinical noninvasive personalized medicine.”

Dual Mode functionality enables both clinical routine and research

With Magnetom Terra’s Dual Mode functionality, users can easily switch between the clinical protocols and innovative research methods. This makes it an optimal platform for

translational research, allowing the use of 7T to be expanded, such as for whole-body applications. Until now, 7T has typically been used to examine and enhance the visibility of extremely small pathologies with anatomical imaging, as well as sub-cortical brain activations utilizing functional imaging. In the near future, the exploration of metabolic changes in the patient will play an important role, and 7 Tesla could be thought of as a MRI microscope that examines the anatomy, function, and metabolism of body tissue. Furthermore, the open system architecture of Magnetom Terra is especially attractive for researchers, allowing them to utilize and build on their own developments.

Manufactured at Siemens Magnet Technology in Oxford, England, the actively shielded magnet on the new ultra-high-field MR system is the lightest 7 Tesla whole-body magnet in the world, being 50 percent lighter than previous actively shielded magnets. The low total weight of Magnetom Terra facilitates its installation in the clinical environment. Magnetom Terra uses the same software platform as other clinical scanners from Siemens Healthineers in the 1.5T and 3T segments and is closely modeled on their established user interface. In conjunction with specially optimized applications for the 7 Tesla system, this allows easy operation of the ultra-high-field system in clinical routine, as well as the easy exchange of study protocols across other MR systems.

Magnetom Terra's current FDA approval status is "510(k) pending".

The products/features (here mentioned) are not commercially available in some countries. Due to regulatory reasons their future availability cannot be guaranteed. Further details are available from the local Siemens organizations.

This press release and press pictures are available at

www.siemens.com/press/PR2017080391HCEN.

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