T

Tesla

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A typical MRI scanner has a field strength of 1.5–3.0 T. Greater field strength allows better resolution. In the USA, 8 T is the maximum magnetic field strength approved by the FDA for clinical use on humans at this time. 11.7 T is available for research purposes in humans and 21.1 T is available for small animal studies.

Synonyms

Nikola Tesla

Definition

The official SI (System International – International agreement to use MKS units) Unit of magnetic field strength is the tesla (T). Magnetic field “strength” describes the *Magnetic Induction or Magnetic Flux Density*: the number of lines of magnetic flux per unit area. The unit of magnetic flux is the weber (Wb); so $1 \text{ T} = 1 \text{ Wb/m}^2$ (or $\text{kg} \times \text{s}^{-2} \times \text{A}^{-1}$), where 1 Weber represents $\text{m}^2 \times \text{kg} \times \text{s}^{-2} \times \text{A}^{-1}$. A conventional unit of magnetic field strength is the Gauss (in cgs units). 1 Tesla (T) = 10,000 gauss. In mathematical equations, the Tesla is used to avoid confusion and errors due to the need for conversion factors.

Cross-References

- Functional Magnetic Resonance Imaging
- Magnetic Resonance Angiography
- Magnetic Resonance Spectroscopy
- Magnetoencephalography

References and Readings

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- Fanet, H. (2014). *Medical imaging based on magnetic fields and ultrasounds*. New Jersey: Wiley.
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