

Transcranial magnetic resonance-guided focused ultrasound

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[Transcranial Magnetic Resonance-Guided Focused Ultrasound](#) (tcMRgFUS) typically refers to a therapeutic technique that combines [magnetic resonance imaging](#) (MRI) and [focused ultrasound](#) to treat certain neurological conditions.

Breakdown of the components

Transcranial: This means the procedure is done through the skull without the need for surgery. The ultrasound waves are targeted at specific brain regions without any incisions.

Magnetic Resonance-Guided (MRg): MRI is used to visualize and guide the procedure in real-time. This provides accurate imaging of the brain and allows for precise targeting of the ultrasound.

Focused Ultrasound (FUS): This involves the use of high-intensity sound waves that are focused on a specific target within the brain. The focused ultrasound can create thermal or mechanical effects, depending on the application.

[Transcranial magnetic resonance-guided focused ultrasound](#) at low intensities has been reported to directly evoke responses and reversibly inhibit function in the central nervous system. While some doubt has been cast on the ability of [ultrasound](#) to directly evoke neuronal responses, spatially-restricted [transcranial ultrasound](#) has demonstrated consistent, inhibitory effects

tFUS predominantly causes neuroinhibition and the primary biophysical mechanism is the thermal effect of [focused ultrasound](#) ¹⁾.

Indications

see [Transcranial magnetic resonance-guided focused ultrasound indications](#).

1)
Darrow DP, O'Brien P, Richner TJ, Netoff TI, Ebbini ES. Reversible neuroinhibition by focused ultrasound is mediated by a thermal mechanism. Brain Stimul. 2019 Jul 23. pii: S1935-861X(19)30299-2. doi: 10.1016/j.brs.2019.07.015. [Epub ahead of print] PubMed PMID: 31377096.

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