

Neuromodulation 101

What is it? Neuromodulation is a way of changing the way the brain functions. Neuromodulation works by actively engaging regions of the brain to enhance or suppress their function, with the goal of improving the cognitive, emotional or motor abilities that brain region is responsible for.

What does it do? Neuromodulation = altering the activity of neurons in specific brain regions. Ultrasound neuromodulation can change the activity of specific brain regions through painless, non-invasive and reversible stretching and compressing of neurons.

What are its potential applications? As tFUS can be used to target an array of brain regions, its potential applications are abounding. Currently, researchers at UCLA are studying the effect of tFUS on symptoms of Generalized Anxiety Disorder (GAD), Mild Cognitive Impairment (MCI), Alzheimer's Disease (AD), and Parkinson's Disease (PD).

Studies

Generalized Anxiety Disorder

Enrolling participants age 18-65

Mild Cognitive Impairment

Enrolling participants age 50-90

Alzheimer's

Enrolling participants age 50-90

Parkinson's

Enrolling participants age 18-75

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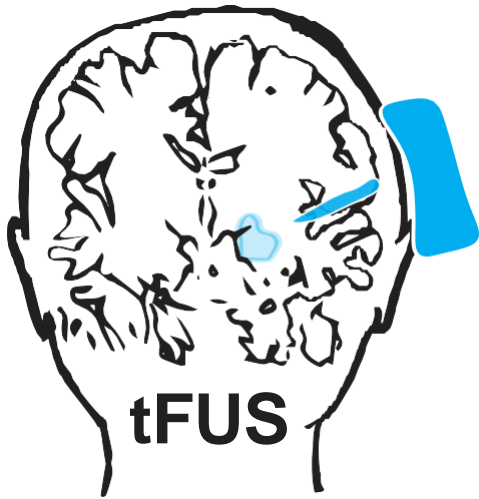
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transcranial Focused Ultrasound Sonication



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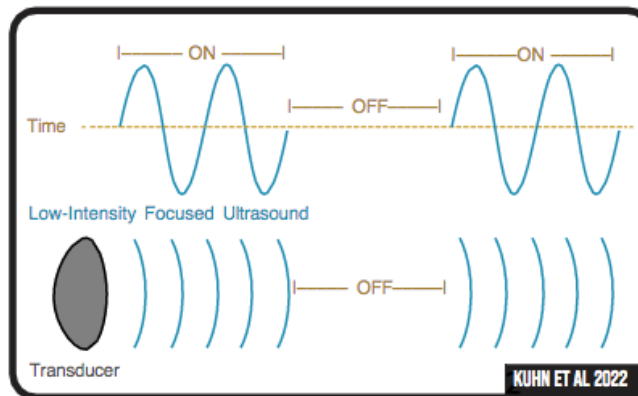


transcranial Focused Ultrasound Sonication

Low-Intensity, transcranial Focused Ultrasound Sonication (tFUS) is a novel, non-invasive device that uses ultrasound waves to stimulate deeper brain regions that can only be reached otherwise with brain surgery. tFUS can be focused on specific brain regions with the aim of changing activity in that brain area and associated functioning.

focused ultrasound

Ultrasound is a common technology most familiarly used for diagnostic imaging. Diagnostic ultrasound has a large beam and works by heating tissue. Conversely, pulsed focused ultrasound does not heat, but pulses sound waves using a small beam, to make changes in brain function.



Ultrasound = sound waves we cannot hear.

Transcranial focused ultrasound sonication (tFUS) works by increasing blood flow in targeted areas. This increased blood flow may lead to increases in the performance of those brain regions and the functions they are in charge of, such as emotion regulation, learning, memory and precise physical movement.



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in the literature

tFUS has been found to successfully modulate pain thresholds (Badran et al. 2020) in healthy humans. In rats, tFUS has been used to suppress epileptic activity (Legon et al. 2014). There are also case reports of it being used to treat disorders of consciousness in humans (Monti et al 2016).