ExAblate Neuro

https://www.insightec.com/products/exablate-neuro/overview

INSIGHTEC, the leader in Transcranial magnetic resonance-guided focused ultrasound, has been awarded Best Medical Technology for Exablate Neuro by The Galien Foundation. Exablate Neuro is an innovative medical technology that uses focused ultrasound coupled with MR imaging (MRgFUS), to precisely target and treat areas deep within the brain through an intact skull.

The prestigious Prix Galien awards recognize excellence in scientific innovations that improve the state of human health. The Best Medical Technology award confirms INSIGHTEC's vision of transformative healthcare and the company's determination to improve the daily lives of patients living with essential tremor.

Having accepted the award at The American Museum of Natural History in New York City, INSIGHTEC's Vice President of Marketing, Xen Mendelsohn Aderka added "To be seen as an innovator whilst in the presence of so many renowned figures in the pharmaceutical, biomedical and medical technology industry, is a great accolade. We thank the judges for acknowledging the hard work and dedication of our team."

The U.S. Food and Drug Administration (FDA) approved Exablate Neuro in July 2016 for the non-invasive treatment of patients with essential tremor who had not responded to medication. Essential tremor is the most common movement disorder, affecting more than 5 million people in the United States, and millions more worldwide. Hand tremor is the most common symptom and for these patients, performing everyday tasks can seem nearly impossible and greatly impacts on their quality of life.

Transcranial magnetic resonance-guided focused ultrasound is used in clinics for treating essential tremor and proposed for many other brain disorders. This promising treatment modality requires high energy resulting eventually in undesired cavitation and potential side effects.

The goals of Lafon et al. were:

1- to evaluate the potential increase of the cavitation threshold using pseudo-random gated sonications and 2- to assess the heating capabilities with such sonications. The experiments were performed with the transcranial MR-compatible ExAblate Neuro system (InSightec) operating at a frequency of 670 kHz, either in CW or with pseudo-random gated sonications of 50% duty cycle. Cavitation activity with the two types of sonications was compared using chemical dosimetry of hydroxyl radical production at the focus of the transducer, after propagation in water or through a human skull. Heating trials were performed in a hydrogel tissue mimicking material embedded in a human skull, to mimic a clinical situation. The temperature was measured by MR-thermometry when focusing at the geometrical focus, and steering off focus up to 15mm. Compared to CW sonications, the use of gated sonication did not affect the efficiency (60%), nor the steering abilities of the transducer. After propagation through a human skull, gated sonication required higher pressure level (10MPa) to initiate cavitation as compared to CW (5.8 MPa). Moreover, at equivalent acoustic power above the cavitation threshold, the level of cavitation activity initiated with gated sonications was much lower with gated sonication than with continuous sonications, almost half after propagation through water, and one-third after propagation through a skull. This lowered cavitation activity may

be attributed to a breaking of the dynamic of the bubbles moving from monochromatic to more broadband sonications, and to the removal of residual cavitation nuclei between pulses with gated sonications. Heating capability was not affected by the gated sonications, and similar temperature increases were reached at focus with both types of sonications when sonicating at equivalent acoustic power, both in water or after propagation through a human skull (+15°C at 325W for 10s). These data, acquired with a clinical system, suggest that gated sonication could be an alternative to continuous sonications when cavitation onset is an issue [1)].

1)
Lafon C, Moore D, Eames M, Snell J, Drainville A, Padilla F. Evaluation of pseudorandom sonications for reducing cavitation with a clinical neurosurgery HIFU device. IEEE Trans Ultrason Ferroelectr Freq Control. 2020 Nov 9;PP. doi: 10.1109/TUFFC.2020.3036774. Epub ahead of print. PMID: 33166253.