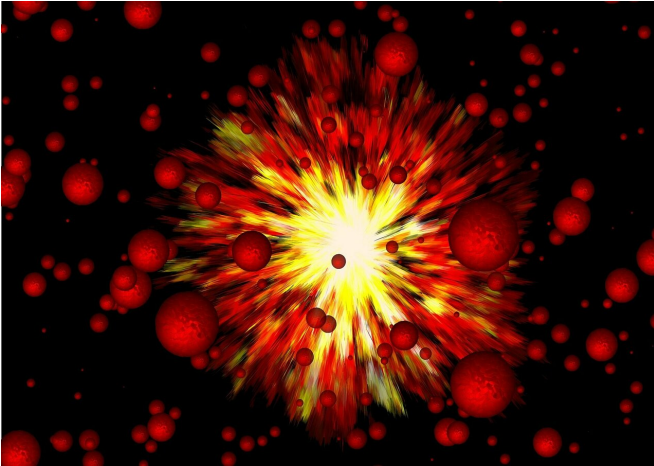


# Scientists develop noninvasive ultrasound neuromodulation technique

15 May 2020, by Li Yuan



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Epilepsy is a central nervous system disorder characterized by recurrent seizures resulting from excessive excitation or inadequate inhibition of neurons.

Ultrasound [stimulation](#) has recently emerged as a noninvasive method for modulating [brain activity](#); however, its range and effectiveness for different neurological disorders, such as Parkinson Disease, Epilepsy and Depression, have not been fully elucidated.

Researchers from the Shenzhen Institutes of Advanced Technology (SIAT) of the Chinese Academy of Sciences developed a noninvasive ultrasound neuromodulation technique, which could potentially modulate neuronal excitability without any harm in the brain.

Low-intensity pulsed ultrasound and ultrasound neuromodulation system were prepared for non-human primate model of [epilepsy](#) and human epileptic tissues experiments, respectively.

The results showed that ultrasound stimulation could exert an inhibitory influence on epileptiform discharges and improve behavioral seizures in a non-human primate epileptic model.

Ultrasound stimulation inhibited epileptiform activities with an efficiency exceeding 65% in biopsy specimens from epileptic patients in vitro.

The mechanism underlying the inhibition of neuronal excitability could be due to adjusting the balance of excitatory-inhibitory (E/I) synaptic inputs by the increased activity of local inhibitory neurons. In addition, the variation of temperature among these brain slices was less than 0.64°C during the experimental procedure.

The study demonstrated for the first time that low-intensity pulsed ultrasound improved electrophysiological activities and behavioral outcomes in a non-human primate model of epilepsy and suppressed epileptiform activities of neurons from human epileptic slices.

It provided evidence for the potential clinical use of non-invasive low-intensity pulsed [ultrasound](#) stimulation for epilepsy treatment.

The study was published in *Theranostics* and selected as the cover article.

**More information:** Zhengrong Lin et al. Non-invasive ultrasonic neuromodulation of neuronal excitability for treatment of epilepsy, *Theranostics* (2020). [DOI: 10.7150/thno.40520](https://doi.org/10.7150/thno.40520)

Provided by Chinese Academy of Sciences

APA citation: Scientists develop noninvasive ultrasound neuromodulation technique (2020, May 15) retrieved 4 July 2022 from <https://medicalxpress.com/news/2020-05-scientists-noninvasive-ultrasound-neuromodulation-technique.html>

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