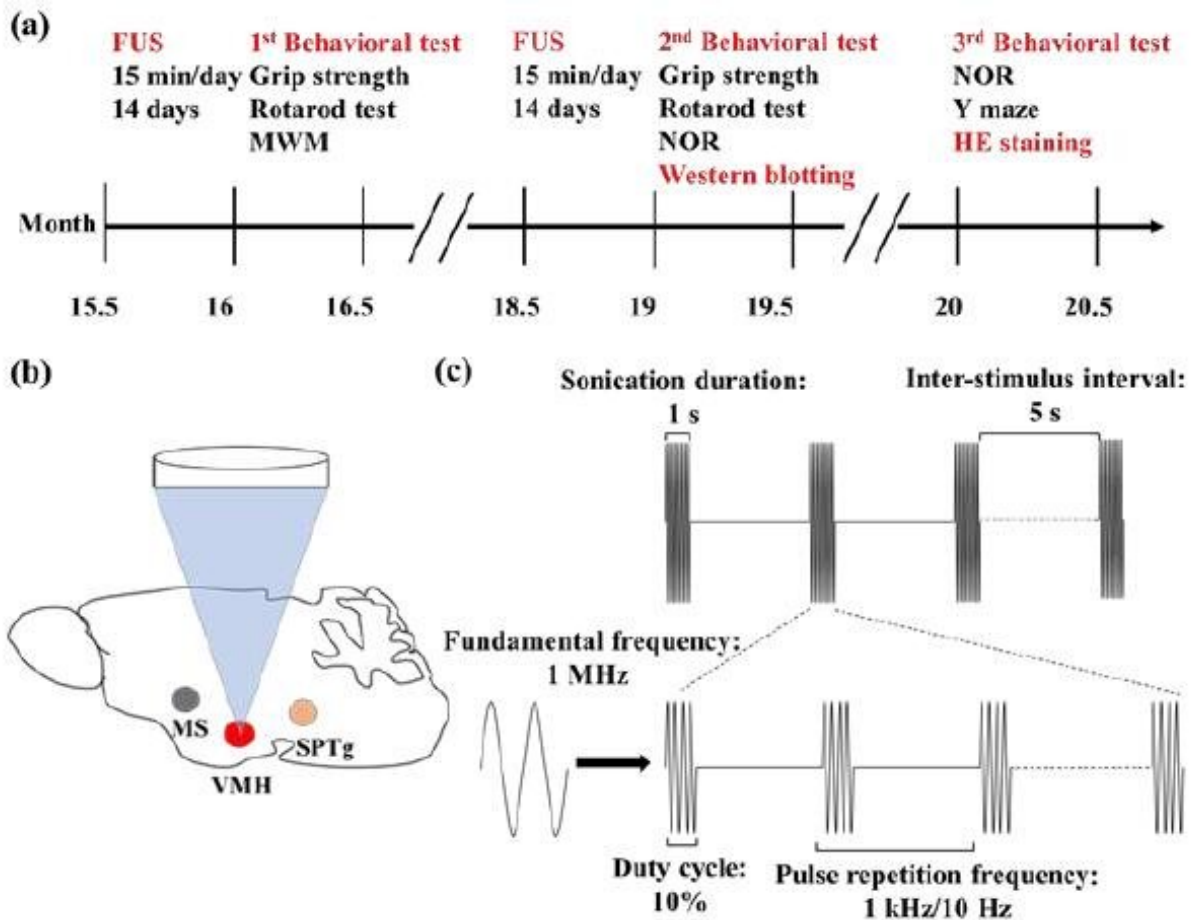


# Transcranial ultrasound stimulation can modulate hypothalamus: study

April 15 2020, by Li Yuan



Overview of the experimental design, time sequence of TUS, and ultrasound distributions. Credit: MENG Long

Transcranial ultrasound stimulation (TUS) is emerging as a non-invasive brain stimulation method that can achieve a highly focused stimulation of deeper brain areas.

The hypothalamus is the link between the endocrine and nervous systems. Previous studies showed that ultrasound could induce [brain activity](#) and the sensory discrimination ability of the primary somatosensory cortex of humans. However, the effect of ultrasound neuromodulation on hypothalamus is unknown.

According to a study published in *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, scientists from the Shenzhen Institutes of Advanced Technology (SIAT) of the Chinese Academy of Sciences have demonstrated that TUS could effectively modulate the hypothalamus.

They used a low-intensity ultrasound to stimulate the hypothalamus for controlling the aging of mice. The TUS included an arbitrary waveform generator and a power amplifier. A focused transducer with a fundamental frequency (FF) of 1 MHz and a diameter of 25 mm was used.

The mice were randomly divided into three groups. Through the experiments of two sessions of focused ultrasound [stimulation](#) (FUS) and three sets of behavioral tests, the results suggested that ultrasound stimulation could modulate the cognitive abilities of mice.

Besides, scientists used the western blotting analysis to indicate the expression levels of Bcl-2, Bax, NMDAR2B, Iba1, TNF- $\alpha$ , and IL-1 $\beta$  in ventromedial hypothalamic nucleus (VMH) of the mice. They found that the responses of the apoptosis factors and [inflammatory cytokines](#) both decreased after ultrasound stimulation, which delayed the symptoms of aging.

The study provides new evidence of ultrasonic neuromodulation and demonstrates that TUS has the potential to delay aging. There is no [tissue damage](#) or hemorrhaging in the hypothalamus after [ultrasound](#) stimulation.

**More information:** Na Pang et al. Transcranial Ultrasound Stimulation of Hypothalamus in Aging Mice, *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* (2020). [DOI: 10.1109/TUFFC.2020.2968479](#)

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