

# Magnetic pulses to the brain deliver long-lasting relief for tinnitus patients

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Dr. Folmer is a research investigator with the National Center for Rehabilitative Auditory Research at the VA Portland Health Care System and associate professor of Otolaryngology/Head and Neck Surgery in the OHSU School of Medicine. Credit: National Center for Rehabilitative Auditory Research at the VA Portland Health Care System/OHSU

In the largest U.S. clinical trial of its kind funded by the Veterans Affairs (VA) Rehabilitation Research and Development Service, researchers at the VA Portland Medical Center and Oregon Health & Science University found that transcranial magnetic stimulation significantly improved tinnitus symptoms for more than half of study participants. Their findings were published today in the journal *JAMA Otolaryngology - Head & Neck Surgery*.

"For some study participants, this was the first time in years that they experienced any relief in symptoms. These promising results bring us closer to developing a long-sought treatment for this condition that affects an enormous number of Americans, including many men and women who have served in our armed forces," said Robert L. Folmer, Ph.D., research investigator with the National Center for Rehabilitative Auditory Research at the VA Portland Health Care System and associate professor of Otolaryngology/Head and Neck Surgery in the OHSU School of Medicine.

One of the most common health conditions in the country, tinnitus affects nearly 45 million Americans. People with this audiological and neurological condition hear a persistent sound - that can range from ringing or buzzing to a hissing or white noise hum - when there is no external sound source. The distraction can impair people's ability to sleep or concentrate and is sometimes disabling.

According to the Centers for Disease Control and Prevention, nearly 15 percent of Americans experience some degree of tinnitus. Currently, there are no proven treatments available. So, patients with the condition often develop coping strategies to manage their reaction to tinnitus.

Military veterans are at greater risk of developing the condition. Tinnitus is the most prevalent service connected disability in the VA health system. Study participants were a mix of veterans and non-veterans.



Dr. Theodoroff is a research investigator at the National Center for Rehabilitative Auditory Research at the VA Portland Health Care System and an assistant professor of Otolaryngology/Head and Neck Surgery at OHSU. Credit: National Center for Rehabilitative Auditory Research at the VA Portland Health Care System/OHSU

"We applaud the work of Dr. Folmer and his colleagues. The results of the joint National Center for Rehabilitative Auditory Research/OHSU study are promising for tinnitus patients everywhere," said Melanie West, Chair of the American Tinnitus Association's Board of Directors, the premier member-based tinnitus organization. "We are committed to

finding solutions for tinnitus and excited to see the progression of TMS clinical trials producing positive results for some patients."

To conduct this research, Folmer and colleagues, including Sarah Theodoroff, Ph.D., used a TMS system that generates a cone-shaped magnetic field that penetrates the scalp and skull to interact with brain tissue. The higher the stimulation intensity, the deeper the magnetic field can penetrate and affect neural activity. Currently, the Food and Drug Administration has approved [transcranial magnetic stimulation](#) only for treatment of depression.

All 64 participants enrolled in the study received one pulse of TMS per second to their skull just above the ear to target the auditory cortex in the brain. Participants underwent TMS sessions on 10 consecutive workdays, receiving 2,000 pulses of TMS per session. Of the 32 participants who received the "active" TMS treatment, 18 people found their symptoms were alleviated for at least six months. To participate in the study, patients were required to have had tinnitus for at least a year or more.

A significant number of participants who had tinnitus for more than 20 years were pleased to receive some relief from TMS treatment. In light of these encouraging results, Dr. Folmer hopes to conduct a larger clinical trial to refine protocols for the eventual clinical use of TMS for [tinnitus](#).

**More information:** "Repetitive Transcranial Magnetic Stimulation Treatment for Chronic Tinnitus: Results of a Randomized, Placebo-Controlled Clinical Trial," *JAMA Otolaryngology - Head & Neck Surgery*, 2015. doi:10.1001/jamaoto.2015.1219

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