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## Effectiveness of Theta-Burst Repetitive Transcranial Magnetic Stimulation for Treating Chronic Tinnitus

Chung H.-K.<sup>a, d</sup> · Tsai C.-H.<sup>b, e</sup> · Lin Y.-C.<sup>b</sup> · Chen J.-M.<sup>c</sup> · Tsou Y.-A.<sup>a</sup> · Wang C.-Y.<sup>a</sup> · Lin C.-D.<sup>a, d</sup> · Jeng F.-C.<sup>g</sup> · Chung J.-G.<sup>f</sup> · Tsai M.-H.<sup>a, d</sup>

<sup>a</sup>Department of Otorhinolaryngology – Head and Neck Surgery, <sup>b</sup>Neuroscience Laboratory, Department of Neurology, <sup>c</sup>Department of Radiology, China Medical University Hospital, <sup>d</sup>Graduate Institute of Clinical Medical Sciences, <sup>e</sup>Graduate Institute of Neural and Cognitive Sciences, <sup>f</sup>Department of Biological Science and Technology, China Medical University, Taichung City, Taiwan, ROC; <sup>g</sup>Department of Communication Sciences and Disorders, Ohio University, Athens, Ohio, USA

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### Abstract

**Objectives:** Repetitive transcranial magnetic stimulation (rTMS), a noninvasive method for altering cortical excitability, is becoming a therapeutic strategy in auditory research institutions worldwide. Application of inhibiting rTMS on these overactive cortical regions can result in effective tinnitus suppression. The aim of this study is to investigate the efficacy of theta-burst rTMS in patients with chronic tinnitus. **Study Design:** Parallel randomized control study. **Setting:** Tertiary referral center. **Patients:** We enrolled 2 female and 20 male patients in this study. The evaluative tools included tinnitus frequency- and loudness-matching, tinnitus questionnaires (TQ), and the Tinnitus Handicap Inventory (THI). **Methods:** The orthogonal projection of the auditory cortex on the scalp was focalized. A figure-eight coil was placed on the surface of the skull over the targeted region with the intensity setting at 80% of the resting motor threshold. We delivered 900 pulses of theta-burst rTMS daily for 10 business days. **Main Outcome Measures:** Nine of twelve patients (75%) in the active-stimulation group reported tinnitus suppression following treatment with rTMS. The treatment led to reductions of 8.58 and 8.33 in the mean TQ global and THI scores, respectively. Tinnitus loudness also decreased significantly after delivering rTMS. **Results:** Descriptive analysis of the TQs revealed that patients experienced significant improvements in emotional distress levels and somatic symptoms. **Conclusions:** Our preliminary results demonstrate that theta-burst rTMS treatments offer a method of modulating tinnitus. Patients could benefit from emotional improvements, even more than auditory perceptive relief. Further studies are needed to establish a standard protocol and to clarify nervous propagation along the auditory and psychological projection following treatment with rTMS.

### Original Paper

# Effectiveness of Theta-Burst Repetitive Transcranial Magnetic Stimulation for Treating Chronic Tinnitus

Hsiung-Kwang Chung<sup>a, d</sup> · Chon-Haw Tsai<sup>b, e</sup> · Yu-Chin Lin<sup>b</sup> · Jin-Ming Chen<sup>c</sup>  
Yung-An Tsou<sup>a</sup> · Chin-Yuan Wang<sup>a</sup> · Chia-Der Lin<sup>a, d</sup> · Fuh-Cherng Jeng<sup>g</sup>

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## Key Words

Primary auditory cortex • Tinnitus • Repetitive transcranial magnetic stimulation • Electroencephalography • Theta-burst

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## Abstract

**Objectives:** Repetitive transcranial magnetic stimulation (rTMS), a noninvasive method for altering cortical excitability, is becoming a therapeutic strategy in auditory research institutions worldwide. Application of inhibiting rTMS on these overactive cortical regions can result in effective tinnitus suppression. The aim of this study is to investigate the efficacy of theta-burst rTMS in patients with chronic tinnitus. **Study Design:** Parallel randomized control study. **Setting:** Tertiary referral center. **Patients:** We enrolled 2 female and 20 male patients in this study. The evaluative tools included tinnitus frequency- and loudness-matching, tinnitus questionnaires (TQ), and the Tinnitus Handicap Inventory (THI). **Methods:** The orthogonal projection of the auditory cortex on the scalp was focalized. A figure-eight coil was

placed on the surface of the skull over the targeted region with the intensity setting at 80% of the resting motor threshold. We delivered 900 pulses of theta-burst rTMS daily for 5 business days. **Main Outcome Measures:** Nine of twenty patients (75%) in the active-stimulation group reported tinnitus suppression following treatment with rTMS. This treatment led to reductions of 8.58 and 8.33 in the mean THI global and THI scores, respectively. Tinnitus loudness also decreased significantly after delivering rTMS. **Results:** Descriptive analysis of the TQs revealed that patients experienced significant improvements in emotional distress level and somatic symptoms. **Conclusions:** Our preliminary results demonstrate that theta-burst rTMS treatments offer a new method of modulating tinnitus. Patients could benefit from emotional improvements, even more than auditory perceptual relief. Further studies are needed to establish a standard protocol and to clarify nervous propagation along the auditory and psychological projection following treatment with rTMS.

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Fax +41 61 306 12 34  
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Chon-Haw Tsai  
Department of Neurology, China Medical University Hospital  
No. 2 Yu-Te Road  
Taichung City 404, Taiwan (ROC)  
Tel. +886 4 2205 2121, E-Mail [hugo.chung@msa.hinet.net](mailto:hugo.chung@msa.hinet.net)

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