

## Editorial



# Does Transcranial Direct Current Stimulation Have a Role in the Treatment of Tinnitus?

Bong Jik Kim <sup>1,2</sup> and Yong-Ho Park <sup>1,2</sup>

<sup>1</sup>Department of Otolaryngology-Head and Neck Surgery, Chungnam National University College of Medicine, Daejeon, Korea

<sup>2</sup>Brain Research Institute, Chungnam National University College of Medicine, Daejeon, Korea

## OPEN ACCESS

► See the article “Adjunctive Role of Bifrontal Transcranial Direct Current Stimulation in Distressed Patients with Severe Tinnitus” in volume 34, e19.

**Received:** Dec 25, 2018

**Accepted:** Dec 28, 2018

### Address for Correspondence:

**Yong-Ho Park, MD, PhD**

Department of Otolaryngology-Head and Neck Surgery, Brain Research Institute, Chungnam National University College of Medicine, 282 Munhwa-ro, Jung-gu, Daejeon 35015, Republic of Korea.

E-mail: parkyh@cun.ac.kr

© 2019 The Korean Academy of Medical Sciences.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ORCID iDs

Bong Jik Kim

<https://orcid.org/0000-0002-6384-2171>

Yong-Ho Park

<https://orcid.org/0000-0003-2106-3791>

### Disclosure

The authors have no potential conflicts of interest to disclose.

Tinnitus is defined as abnormal perception of sound when there is no external sound source. Tinnitus can be classified into subjective and objective tinnitus, most of which is subjective tinnitus. Tinnitus affects more than 600 million people worldwide, and patients with tinnitus have frequent symptoms that negatively affect the quality of life.<sup>1</sup> Up until recently, various treatments and medications have been studied for the treatment of subjective tinnitus and some of them have shown positive results for tinnitus control.<sup>2,3</sup> However, current therapies do not yet have complete control over tinnitus. Thus, researchers and clinicians continue to seek more effective and definitive therapies for tinnitus.

Drug or sound therapy to alleviate the severity or frequency of tinnitus is commonly used in the tinnitus clinic, and education, hearing aids and cognitive behavior therapy are recommended for treatment of tinnitus according to the American Academy of Otolaryngology-Head and Neck Surgery guidelines. Recently, new therapies using neuromodulation techniques such as repetitive transcranial magnetic stimulation or transcranial direct current stimulation (tDCS) have been attempted to treat patients with tinnitus.<sup>4,5</sup> Neural modulation is defined as the process of increasing neuroplasticity using invasive or noninvasive methods. The tDCS is a well-known non-invasive neuro-modulation technique. The tDCS is assumed to modulate the tinnitus by disturbing the neural network underlying the pathophysiology, and some studies using tDCS have had unsatisfactory results but others identified a therapeutic effect on the treatment of tinnitus.<sup>5</sup>

In this study, the authors evaluated the effect of bifrontal tDCS targeting dorsolateral prefrontal cortex as an adjunctive therapy for tinnitus patients. The tDCS was performed as an adjunct to standard treatment protocols, including guidance counseling, sound therapy and/or oral clonazepam.<sup>6</sup> The authors found that some patients treated with additional bifrontal tDCS were relieved of tinnitus-related anxieties. However, the number of tDCS sessions was not correlated with changes in Tinnitus Handicap Inventory or Visual Analogue Scales scores, and the application of tDCS could not be identified as an independent prognostic factor for recovery.

Despite these limitations, the addition of bifrontal tDCS to conventional therapies has alleviated the distress associated with tinnitus in some patients with moderate or severe

discomfort and has shown that tDCS can be a promising adjunctive form of treatment for tinnitus. More accurate optimization of current intensity, stimulation site, duration of stimulation, and number of stimulation sessions will greatly enhance tDCS as a treatment for tinnitus.

## REFERENCES

1. Zenner HP, Delb W, Kröner-Herwig B, Jäger B, Peroz I, Hesse G, et al. A multidisciplinary systematic review of the treatment for chronic idiopathic tinnitus. *Eur Arch Otorhinolaryngol* 2017;274(5):2079-91.  
[PUBMED](#) | [CROSSREF](#)
2. Langguth B. Treatment of tinnitus. *Curr Opin Otolaryngol Head Neck Surg* 2015;23(5):361-8.  
[PUBMED](#) | [CROSSREF](#)
3. Cederroth CR, Dyhrfeld-Johnsen J, Langguth B. An update: emerging drugs for tinnitus. *Expert Opin Emerg Drugs* 2018;23(4):251-60.  
[PUBMED](#) | [CROSSREF](#)
4. Soleimani R, Jalali MM, Hasandokht T. Therapeutic impact of repetitive transcranial magnetic stimulation (rTMS) on tinnitus: a systematic review and meta-analysis. *Eur Arch Otorhinolaryngol* 2016;273(7):1663-75.  
[PUBMED](#) | [CROSSREF](#)
5. Yuan T, Yadollahpour A, Salgado-Ramírez J, Robles-Camarillo D, Ortega-Palacios R. Transcranial direct current stimulation for the treatment of tinnitus: a review of clinical trials and mechanisms of action. *BMC Neurosci* 2018;19(1):66.  
[PUBMED](#) | [CROSSREF](#)
6. Lee HY. Adjunctive role of bifrontal transcranial direct current stimulation in distressed patients with severe tinnitus. *J Korean Med Sci* 2019;34(3):e19.  
[CROSSREF](#)