

# **Clinical Implementation of transcranial direct current stimulation (tDCS) in chronic aphasia: Speech-Language Pathologists' Opinions Regarding the Translation of tDCS into Clinical Practice**

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## **Background:**

- Following a stroke, 20-38% of survivors suffer from aphasia (Engelter et al., 2006; Laska, Hellblom, Murray, Kahan, & Arbin, 2001) and for 40-60% of individuals with aphasia, the impairment continues into the chronic stages (Pederson, P., Vinter, K., Olsen, 2004).
- Despite documented benefits of behavioral aphasia therapy, actual outcomes are modest (Hope et al., 2017).
- Recovery of language abilities of individuals with aphasia (IWA) depends on the reorganization of brain function (Abel, Weiller, Huber, Willmes, & Specht, 2015; Sarasso et al., 2010; Saur et al., 2006). For this reason, many have capitalized on methods of neuromodulation to manipulate left hemisphere cortical activity (Baker, Rorden, & Fridriksson, 2010; Crinion & Alexander, 2007).
- Paired with traditional speech and language therapy in post-stroke aphasia, tDCS reveals promising results for naming (Fridriksson, Richardson, Baker, & Rorden, 2011; Kang, Kim, Sohn, Cohen, & Paik, 2011; Meinzer, Darkow, Lindenberg, & Flo, 2016), recovery of articulatory deficits (Marangolo et al., 2011; Marangolo et al., 2013), and speech production (Marangolo et al., 2014; Marangolo, Fiori, Di Paola, et al., 2013).
- tDCS is safe (Bikson, M. et al., 2016; Fridriksson et al., 2018) and serious adverse effects have not been reported (Bikson, M., et al., Elsner, Kugler, Pohl, & Mehrholz, 2016)
- A phase II, double-blinded, prospective randomized clinical trial from our group reveals tDCS is superior to placebo (sham stimulation) for improving outcomes in chronic aphasia (Fridriksson et al., 2018). Such results encourage proceeding with a Phase III trial and prompt a measure of clinician perceptions of tDCS.
- In addition to informing a Phase III clinical trial, it is important to involve stakeholders, such as clinicians, before the start of costly clinical trials to increase the chance that expected outcomes will be embraced in clinical practice. Currently it takes, on average, 17 years for 14% of research findings to be adopted into clinical practice (Balas, Boren, 2000; Green, Ottoson, García, & Hiatt, 2009). Furthermore, successful execution of evidence-based practice bears many challenges such as time and cost constraints, utility restrictions and misunderstood professional roles (Harold, 2019).

## **Aims:**

- To identify speech-language pathologists' (SLPs') familiarity with tDCS
- To quantify what SLPs consider the necessary tDCS-related improvement ("tDCS boost") in aphasia severity to implement tDCS for the clinical management of chronic aphasia
- To identify concerns that could potentially hinder the clinical adoption of tDCS

## **Methods:**

- A brief (14 question) REDCap survey was disseminated via email and social media outlets to target SLPs working with IWA.

## **Results:**

- 221 individuals responded, and 155 valid surveys were analyzed.
- SLPs reported that a mean “tDCS boost of 22.9% (SD = 20) would be needed for clinical implementation. The 75<sup>th</sup> and 90<sup>th</sup> percentile for the range of “tDCS boost” corresponded to a 25% and 50% desired increase, respectively.
- There was a significant main effect of years of clinical experience on “tDCS boost” and negative correlation between “tDCS boost” and percent of IWA on caseload. Importantly, 94.2% of SLPs reported concerns that need to be addressed before tDCS can be implemented in clinical settings.
- 5.8% of respondents reported no concerns regarding tDCS adoption in clinical practice. ~30.3% reported at least three concerns when provided five broad categories (education, administrative approval, safety, efficacy, cost).

## **Conclusions:**

- SLPs’ responses related to “tDCS boost” suggest that they would consider using tDCS as an adjuvant for chronic aphasia therapy, if it could improve outcomes by approximately 23-50%.
- Trends suggest clinicians in academic settings, those with more experience, and with a larger caseload of IWA report lower necessary “tDCS” thresholds.
- This study is the first to identify clinician familiarity with tDCS and to quantify a behavioral therapy boost that SLPs deem necessary for clinical adoption for post-stroke aphasia in the rehabilitation setting.
- SLPs’ perspectives regarding tDCS may inform future clinical trials and should be considered as an integral factor for estimating potential for clinical translation.

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