Available online at www.sciencedirect.com

SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 61 (2012) 136 – 137

Procedia
Social and Behavioral Sciences

Academy of Aphasia 2012

Individually-Guided Transcranial Direct Current Stimulation Facilitates Lasting Improvement in Patients with Non-Fluent Aphasia: A Pilot Study

Norise C.*, Beauvais J.[a], Drebing D.[a], Faseyitan O.[a], Medina J.[a], Hamilton R.[a]

University of Pennsylvania

Background

Emerging evidence suggests that transcranial direct current stimulation (tDCS) may improve naming in persons with chronic left hemisphere stroke and non-fluent aphasia. Language improvements beyond naming have not yet been thoroughly investigated. Moreover, different investigations have employed different electrode polarities (anodal or cathodal) at different sites (ipsilesional or contralesional cortex), raising the question of whether optimal stimulation parameters vary across aphasic subjects.

Aims

(1) To validate prior investigations indicating that direct current stimulation can improve naming ability in persons with chronic nonfluent aphasia. (2) To explore the notion that aphasic persons may respond differentially to various patterns of cortical stimulation.

Methods & Procedures

Individuals with moderate to mild non-fluent aphasia have been recruited for this ongoing two-phase study. In Phase 1, over the course of five non-consecutive days, participants underwent tDCS with four different stimulation montages (anode F3, cathode F3, anode F4, cathode F4) and a sham condition. During real stimulation, a 2.0mA current was delivered through 5cm x 5cm electrodes for 20 min. Picture naming ability was measured before and after each stimulation session. Participants who demonstrated improvement in naming after stimulation with a specific electrode arrangement moved on to Phase 2, a sham-controlled partial-crossover treatment trial employing the optimal stimulation montage identified in Phase 1. Subjects in Phase 2 completed three baseline behavioral sessions with the Western Aphasia Battery (WAB; Kertesz, 1982) prior to treatment, and then received stimulation (20 minutes, 2.0 mA, 5x5 cm electrode) for a total of 10 days (Monday through Friday for two consecutive weeks). During stimulation, participants completed a constraint-induced picture naming task, in which a barrier prevented the participant from seeing the experimenter. Subjects repeated the WAB two weeks, two months, and six months after treatment. Subjects in the sham arm received 10 days of sham stimulation, and were tested at two weeks and two months, and then received real tDCS, with a two week, two month, and six month follow-up.

Results

To date, 8 subjects have completed Phase 1 of this ongoing investigation. Of these, 5 demonstrated substantive

* Corresponding author.
E-mail address: cnorise@gmail.com .

1877-0428 © 2012 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of The Academy of Aphasia
Open access under CC BY-NC-ND license. doi:10.1016/j.sbspro.2012.10.115

improvement in object naming ability following stimulation and were enrolled in Phase 2. To date 3 of these subjects have completed a six-month follow-up. Two subjects received ipsilesional anodal tDCS (F3 anode) stimulation; one subject received ipsilesional cathodal (F3 cathode) stimulation. All three subjects show statistically significant improvement (one-sample t-tests; $p < .05$) in the WAB aphasia quotient—a composite assessment of speech production, comprehension, and repetition—at two weeks, two months, and six months post stimulation compared to baseline. One subject who had been randomized to the initial sham treatment arm showed no significant change from baseline in post-sham testing.

Conclusions

Consistent with prior investigations, the preliminary results of this ongoing investigation suggest that application of tDCS may be a promising technique for enhancing post-stroke recovery from aphasia, potentially enhancing language abilities in addition to naming. Optimal electrode arrangement appears to vary across participants, suggesting that individualized treatment may further improve language outcomes.