

Abstract

Title: Effect of an acute bout of expiratory threshold loading (ETL) and transcranial direct current stimulation (tDCS) on chest wall intermuscular coherence in healthy adults

Authors: Alesha J. Reed, BSc¹, Reyhaneh Bakhtiari, PhD¹, Haley Gynane, BSc¹, Andrea Chang, BSc¹, and Carol A. Boliek, PhD^{1,2}

¹Communication Sciences and Disorders, University of Alberta, Edmonton, AB, Canada

²Neuroscience and Mental Health Institute, University of Alberta, Edmonton, AB, Canada

Purpose: We evaluated the combinatory effects of an acute bout of expiratory threshold loading (ETL) and transcranial direct current stimulation (tDCS) on cortical drive to the intercostal and oblique muscles during maximum performance tasks in a group of healthy adults. **Method:** Twenty-one adults (mean \pm STD: 28.00 \pm 6.27 yrs, 11 female) participated. Participants attended two sessions (n=19), 24 hours apart. One session involved anodal tDCS (1mA, applied for 10 minutes, over Cz) followed by ETL the other involved sham tDCS followed by ETL. Stimulation order was randomized. Pre-and post- measures included tidal breathing, vital capacity, expiratory threshold loading (ETL), which entailed measuring expiratory pressure (MEP) while blowing against a resistor at 100%, 80%, and 30% MEP, and maximum duration phonation tasks at conversational and perceived twice conversational loudness. **Results:** Following the anodal condition, intermuscular coherence increased significantly ($p < .05$) in the high, mid and low frequency bandwidths for maximum phonations produced at conversational loudness. No changes in intermuscular coherence were found following the sham condition. **Conclusions:** ETL + anodal tDCS may further potentiate changes in neuromuscular modulation and may confer additional benefit for those using EMST to improve respiratory muscle weakness secondary to typical aging or neurogenic causes.