P2-Q-100 Subcortical structures in humans can be facilitated by transcranial direct current stimulation

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BACKGROUND: Transcranial direct current stimulation (tDCS) is a noninvasive brain stimulation technique that alters cortical excitability via application of a weak direct current. Interestingly, it was demonstrated in cats that tDCS can facilitate subcortical structures as well (Bolzonii et al., J Physiol, 2013). Here, we hypothesize that subcortical facilitation by tDCS is also possible in humans. We assessed the effects of tDCS on two responses that are evoked from subcortical structures, in particular the reticular formation. First, we examined the StartReact effect, in which a startling acoustic stimulus (SAS) accelerates movement responses to an imperative stimulus. The SAS-induced responses are thought to reflect a direct subcortical release of motor programs. Second, we examined automatic postural responses to external balance perturbations, with and without a concurrent SAS. These initial postural responses also arise from subcortical structures. METHODS: Ten healthy adults received anodal-tDCS (15 minutes, 2 mA) and sham-tDCS on two different testing days in a counterbalanced order. The anodal electrode was placed over the non-dominant motor region, the reference electrode over the contralateral supraorbital region. After stimulation, we instructed participants to respond as fast as possible to a visual imperative stimulus during (1) dorsiflexion of the dominant or (2) non-dominant ankle, and (3) flexion of the dominant wrist. Furthermore, using a moveable platform, we evaluated automatic postural responses to translational forward and backward balance perturbations (0.75 m/s2). A SAS (116 dB) was delivered simultaneously with the imperative stimulus and balance perturbations in 25% of trials. We assessed electromyographic and kinematic responses. RESULTS: During all tasks, response onsets were significantly faster (4-13 ms) following anodal-tDCS compared to sham-tDCS, both in trials with and without a SAS. A SAS accelerated latencies of the simple reaction movements as well as the responses to backward balance perturbations. The effect of tDCS did not differ between legs. CONCLUSION: Our results suggest that subcortical structures in humans, in particular the reticular formation, can be facilitated by tDCS. This effect may be explained by two mechanisms that are not mutually exclusive. First, the applied current may have directly stimulated the reticular formation. Second, subcortical facilitation may have resulted from enhanced cortico-reticular drive. As cortico-reticular tracts project bilaterally, the latter mechanism may explain the absence of tDCS-related effects between the legs. There is evidence that reticulospinal tracts play an important compensatory role in the recovery after corticospinal lesions. Application of tDCS may increase the number of activated reticulospinal neurons or result in a stronger subcortical output, both of which could be beneficial for the recovery of motor functions during rehabilitation.

P2-Q-101 **The Effect of Conflicting Virtual Scenery on Leveled and Inclined Gait**

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Background and aim: The effects of visual flow on gait were studied mainly in relation to gait speed control. Our objective is to study the effects of visual scenery related to path inclination on gait. We hypothesize that visual cues related to path inclination during treadmill walking will trigger gait modulation, even in the absence of actual inclination. Methods: Eleven young healthy adults (7 women;