뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 15:45-16:30 Room G(3F)

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Changes of Functional Connectivity after Transcranial Direct Current Simulation in Leg Motor Area

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Purpose

Transcranial direct current stimulation (tDCS) has been known as a non-invasive technique for neuromodulation of corticospinal excitability. In this study, we investigated differences of the resting-state functional connectivity after dual site transcranial direct stimulation (tDCS) for modulation of gait-related neural network plasticity using functional near-infrared spectroscopy (fNIRS) in stroke patients.

Methods

Twenty stroke patients (13 males; mean age 56.0 ± 10.2 years) participated in this single-blind, randomized cross-over study. Four conditions were randomly applied with 24 hours of washout period between each condition: dual-site anodal stimulation over the bihemispheric primary leg motor area (M1leg) and supplementary motor area (SMA) (Dual Condition); anodal stimulation over the ipsilesional M1leg and SMA (Ipsilesional Condition); anodal stimulation over the contralesional M1leg and SMA (Contralesional Condition); sham stimulation over the bihemispheric primary leg motor area (M1leg) and supplementary motor area (SMA) (Sham condition). Two battery-driven stimulators (DC Plus stimulator, NeuroConn Ltd., Germany) were used with 2 mA direct current in each anode. Cathodal electrodes were placed on bilateral supraorbital areas. During the 30 minutes of stimulation, subjects took rest in the early and late 10 minutes and walking on a treadmill in the middle 10 minutes. The hemodynamic responses were recorded by an fNIRS system (NIRScout®, NIRx Medical Technologies, Germany) at before and after the intervention. Pearson correlation coefficient was generated from oxyhemoglobin signals.

Results

To confirm the changes of the connectivity after tDCS stimulation compared with the sham stimulation, the network change was investigated by thresholding based on the correlation coefficient value of 0.6. The network changes after dual-site stimulation was noticeable

compared to single or sham stimulation conditions. Connectivity between sensorimotor-related areas such as M1leg, SMA, and primary sensory motor cortex was increased after dual-site stimulation.

Conclusions

This study implies dual-site tDCS may enhance the neuromodulation effect in the gait-related motor network compared to the conventional single-site stimulation in stroke patients.

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