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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Genetic influences on response to transcranial direct current stimulation in swallowing motor cortex

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Transcranial direct current stimulation (tDCS) is a form of noninvasive brain stimulation that modulates cortical excitability. Recent studies have reported variability in response to tDCS depend on genetic factors. Several studies applying tDCS to the dorsolateral prefrontal cortex and examining catechol-o-methyl transferase (COMT) genotype show that met/met carriers exhibit poorer cognitive flexibility following a single session of anodal tDCS. We hypothesized that an individual's COMT val158met predisposition may contribute to such variability in the mylohyoid motor cortex. This study aimed to explore possible associations between response to tDCS and individual's COMT val158met predispositions. Twenty healthy participants (mean age: 22.45±3.26 years old; range: 19-29 years old; 12 males, 8 females) were recruited for the study. Subjects were divided first into either a sham or tDCS session by random assignment and had two separate visits (Fig. 1). At the first visit, all participants underwent for genotype (COMT val158met) analysis. For each visit, participants underwent inhibition to 1-Hz repetitive transcranial magnetic stimulation (rTMS). After rTMS, anodal tDCS was performed at 1.5mA for 10 minutes in tDCS session. In the sham condition, 1mA stimulation lasted for only 30 seconds with the electrodes left in place for a further 10 minutes. For the primary outcome, mylohyoid resting motor–evoked potentials (MEP) were recorded at baseline, post rTMS inhibition and immediate and 30mininutes after tDCS. This work was supported by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) 2017R1C1B5017926. Regarding COMT genotype, 10 patients had the val/val allele (age: 21.00±1.56; 6 males, 4 females) and 10 were met carrier (age: 23.90±3.81; 6 males, 4 females). Post rTMS inhibition, the amplitude of mylohyoid MEP decreased significantly in both sham and tDCS session (TDCS Δ=-28.09(50.49) p=0.0066; sham Δ=-13.93(25.33) and 0.016). Patients treated with tDCS showed greater improvement in amplitude of mylohyoid MEP than the sham group in immediate and 30mininute follow up (Fig. 2). In subgroup analysis, both val/val and met carrier group amplitude of mylohyoid MEP decreased significantly after rTMS inhibition (val/val group Δ=-12.81(34.00) p=0.0052; met carrier group Δ=-31.84 and 0.037). Significant associations were found between tDCS response and COMT polymorphism. Only val/val group showed significant increment of MEP amplitude in immediate and 30minute follow up (Immediate Δ=30.42(62.06)

p=0.0020; 30minute Δ=50.09(65.88) p=0.0020) (Fig. 3). Although TDCS was significantly effective when compared with the sham group for the entire participants, met carrier showed no significant effect in subgroup analysis. This study provides insight toward the understanding of response variability across COMT genes and highlights the need to create stratified approaches in tDCS treatments for dysphagia.

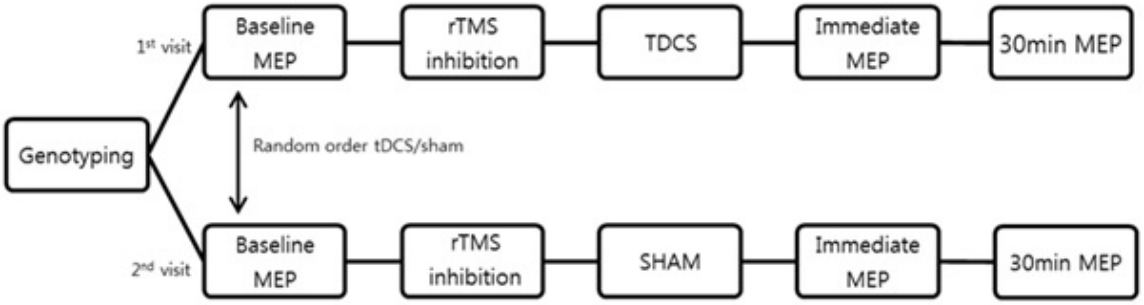

Figure. 1 Timeline of an experimental session

Protocol		Δ Immediate	Δ 30min
TDCS	**mean (SD)**	18.62 (46.84)	31.20 (56.78)
	p-value	0.012 *	0.0012 *
SHAM	**mean (SD)**	3.09 (10.67)	1.10 (19.36)
	p-value	0.32	0.14

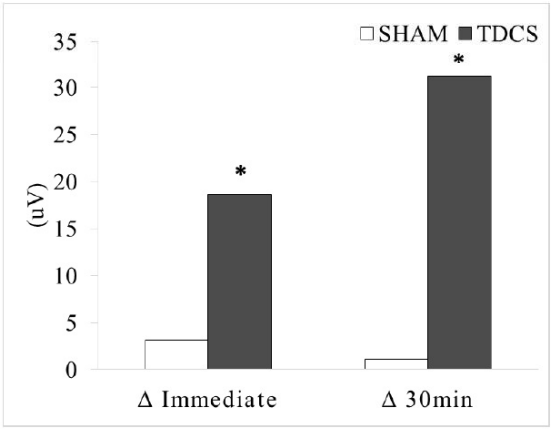

Figure. 2 Change in Amplitude of Mylohyoid Motor Evoked Potentials at immediate and 30min after tDCS/SHAM, *Indicates $p < 0.05$

Gene	Protocol		Δ Immediate	Δ 30min
Met+	TDCS	mean (SD)	6.81 (21.70)	12.32 (40.91)
		p-value	0.49	0.16
	SHAM	mean (SD)	1.71 (11.80)	6.68 (12.02)
		p-value	0.58	0.11
Val/Val	TDCS	mean (SD)	30.42 (62.06)	50.09 (65.88)
		p-value	0.0020 *	0.0020 *
	SHAM	mean (SD)	4.17 (10.30)	-3.24 (23.37)
		p-value	0.32	0.14

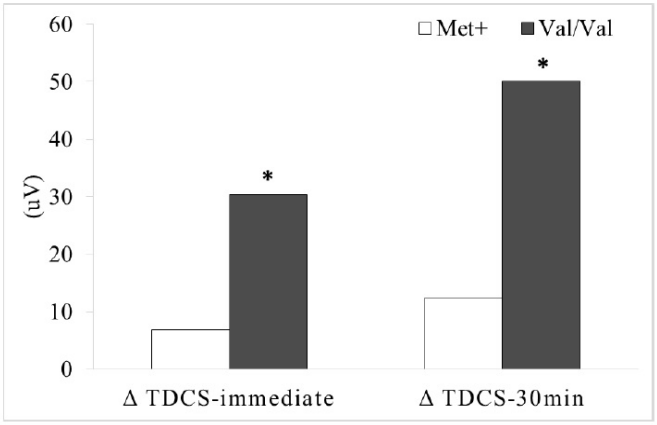

Figure. 3 Interaction of COMT and Change in Amplitude of Mylohyoid Motor Evoked Potentials at immediate and 30min after tDCS/SHAM, *Indicates $p < 0.05$