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Rhythm controlled tasks and their influence on movement-related cortical potentials

Maki Yamada^{1,2}, Takayuki Tabira², Jun Murata², Rie Matsuo¹, Atsushi Okubo¹

¹*Nagasaki kita hospital, Nagasaki, Japan*, ²*Nagasaki University, Graduate School of Biomedical Sciences, Nagasaki, Japan*

Introduction

Movement-related cortical potentials (MRCP) are one of the event-related potentials (ERP) and are used as a measurement of the amount of time needed for voluntary movements in the supplementary motor area (SMA) and the primary motor cortex (M1). Its amplitude reflects the amount of preparation time in SMA and M1 which a subject needs to perform a task. It is greatly influenced by visual and auditory commands. We occupational therapists sometimes use such commands in the treatment of gait disorder in people with Parkinson and other related diseases. We focused on the significance of rhythm controlled tasks in occupational therapy for this study.

Objective

We investigated the relationship between the influences of auditory rhythmic patterns on movement tasks using familiar objects.

Method

10 healthy adults participated in this study. They performed three types of movements; pinching fingers-no object involved, pinching a ball, pinching a piece of cloth and turning it over. Their performance pace was controlled using a metronome and without at their own pace. The subjects executed the three tasks with and without rhythm at random. We obtained Electromyogram (EMG) from the right adductor pollicis and ERP from Cz and C3. We set the trigger at the beginning of EMG and analyzed for five seconds from a second before the trigger point. Then, we estimated the maximum amplitude of the MRCP and compared the maximum volume of each amplitude.

Result

The amplitude of the no rhythm movements was greater than rhythm controlled movements. No significant difference was found within the three task movements. Some subjects felt they could perform their tasks more easily to rhythm.

Conclusion

Rhythm controlled movements required less preparation in SMA and M1 than self paced movements.

Contribution to the practice of occupational therapy.

This result supports the concept of using rhythm in our therapy. MRCP amplitude showed same tendencies as some subjects felt that they could perform the task with ease. Though we have not attempted this study on regular patients, rhythm may enable them to perform more efficiently and easily.