WS11. Clinical Neurorehabilitation Based on Neuromodulation Interventions

Upper-Alpha Neurofeedback Training for Cognitive Enhancement: A Single-Session Study*

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Abstract. This paper reports on a single-session neurofeedback (NF) training procedure on the user-specific upper alpha band for cognitive enhancement of healthy users. A double-blind study was designed using a NF group and an active control group. Control group performed as the NF group but received sham feedback, minimizing the non-specific factors of training. Results of EEG analysis show the key role of the feedback: only the NF group enhanced upper alpha during the training, and it led to a desynchronization increase during the execution of a cognitive task. Regarding the behavioral results, a strong learning effect was observed, with the NF group performing better in almost all measurements but many of them without statistical significance.

1 Introduction

Alpha activity is characterized by a peak in the range $[7.5 - 12.5]$ Hz and has been traditionally linked to cognitive performance [1]. It has been recently hypothesized that alpha rhythm may act in the cortex as a mechanism to inhibit unnecessary or conflicting processes to the task being performed, thus facilitating attention by actively suppressing distracting stimuli [2]. Neurofeedback (NF) has emerged as a potential technique to allow users to modulate their brain rhythms using an operant control paradigm, which could increase cognitive performance.

This study reports on a single-session NF training procedure on the upper alpha (UA) frequency band. It has been designed in a double-blind fashion using a NF training group and an active control group, where the control group performed as the

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