Titolo (provvisorio): Analysis of cortical excitability and connectivity in healthy and Parkinson’s subjects: a TMS-EEG study

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Motivazione e campo di applicazione

Most neurological and psychiatric condition share, as a common substrate, the alteration of cortical excitability and connectivity. Transcranial magnetic stimulation (TMS) combined with simultaneous high-density electroencephalography (hd-EEG) represents a straightforward way to gauge, directly and non-invasively, cortical excitability and connectivity in humans in virtually any portion of the human thalamocortical system.

Obiettivi generali e principali attività

The aim of the thesis is to perform a TMS-EEG study on a population of healthy subjects and a population of patients affected by Parkinson’s disease. The study will target different cortical areas (e.g., presupplementary and supplementary motor cortex, motor cortex, parietal cortex) with stimulation protocols aiming at probing different neural circuits. The definition of these protocols, together with the stimulation setup, will be part of the thesis work too. In fact, very interesting would be to perform not only passive stimulation tasks, but also stimulations synchronized with simple motor tasks. This paves the way to technological issues that will have to be faced during the thesis.

Obiettivi di apprendimento (strumenti tecnici e analitici, metodologie sperimentali)

The candidate will learn to manage, to process and to analyse neurophysiological data (hdEEG signals and MRI images), to perform non parametric statistical analysis and to face source modelling problem. The candidate will acquire the technical competences to use a new technological device such as the TMS-EEG, the clinical knowledges at the base of the definition of new stimulation protocols and patients evaluation.