La estimulación cerebral no invasiva basada en la aplicación de campos mágneticos estáticos: pasado, presente y futuro

Non-invasive brain stimulation based on the application of static magnetic fields: past, present, and future

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Introduction

- ✓ The advent of transcranial Static Magnetic Field Stimulation (tSMS) has broadened the spectrum of non-invasive brain stimulation (NIBS) techniques, offering a novel approach to modulate cortical excitability. Unlike its predecessors, such as transcranial Magnetic Stimulation (TMS) and transcranial Direct Current Stimulation (tDCS), tSMS utilizes static magnetic fields to induce changes in neuronal activity. This mechanism of action posits a unique niche for tSMS within the NIBS family, as it operates without inducing electrical currents in the brain.

- ✓ tSMS's principle relies on the application of a static magnetic field over targeted regions of the brain (Figure 1). Preliminary research suggests that tSMS can alter cortical excitability with effects lasting beyond the period of stimulation, indicating its potential for therapeutic applications in neuropsychiatric disorders and neurorehabilitation.

- ✓ Focal application of static magnetic field stimulation (tSMS) over the left motor cortex in healthy subjects induces network effects at motor network level (Figure 2). tSMS reduced functional connectivity at the stimulation site and within the stimulated motor network. With 10 min real tSMS over the motor cortex we did not see any relevant effects in other functional networks like the default mode network or visual system network. The tSMS reduces functional connectivity of both below the magnet and at distant sites within the same network.

✓ FIGURE 1

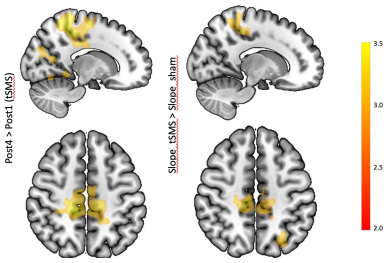

FIGURE 2

- ✓ The possibility to use tSMS to interfere with a specific functional network may be used for cognitive neuroscience studies and for treatment of neuropsychiatric and neurological disorders.

- ✓ As a new member of the NIBS family, tSMS represents an exciting frontier in neuroscience research, with the potential to significantly impact clinical practice and our understanding of brain modulation.

- ✓ The technique's simplicity, safety, and non-invasiveness are particularly appealing for clinical use, making it a promising tool for treating a variety of conditions, including for example ALS, drug-resistant epilepsy, and to boost stroke recovery. The simplicity and high safety profile suggest a potential us at home.

Conflic of Interests

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