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Spike-timing-dependent plasticity in the human dorso-lateral prefrontal cortex

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Abstract

Changes in the synaptic strength of neural connections are induced by repeated coupling of activity of interconnected neurons with precise timing, a phenomenon known as spike-timing-dependent plasticity (STDP). It is debated if this mechanism exists in large-scale cortical networks in humans. We combined transcranial magnetic stimulation (TMS) with concurrent electroencephalography (EEG) to directly investigate the effects of two paired associative stimulation (PAS) protocols (fronto-parietal and parieto-frontal) of pre and post-synaptic inputs within the human fronto-parietal network. We found evidence that the dorsolateral prefrontal cortex (DLPFC) has the potential to form robust STDP. Long-term potentiation/depression of TMS-evoked cortical activity is prompted after that DLPFC stimulation is followed/preceded by posterior parietal stimulation. Such

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