

# Exploring the effects of transcutaneous Vagus Nerve Stimulation on long-term potentiation induced by paired associative stimulation.

Monday, September 23, 2024 4:50 PM (10 minutes)

Transcutaneous vagus nerve stimulation (tVNS) is held as a non-invasive tool to enhance the effect of motor rehabilitation in neurological diseases. However, there is no evidence supporting its neurophysiological effect on brain plasticity. Here, we aimed to explore the effects of tVNS on brain plasticity, induced by Paired Associative Stimulation (PAS), i.e., a paradigm generating long-term potentiation in the human motor cortex.

We measured the effects of active vs sham tVNS on neuroplasticity induced by PAS over the left or right primary motor cortex (M1). PAS consisted in a 13-minute block of repetitive pairing of peripheral median nerve stimulation and cortical TMS on M1. Before, immediately after, and 30 minutes later PAS, we recorded the recruitment curve and the amplitude of the motor evoked potentials from the index and little finger muscles. This procedure was repeated in three different daily sessions: at baseline without any stimulation and after 60 min of active and sham tVNS. During tVNS, participants perform a visuomotor task with their index finger to exploit possible state-dependent effects of tVNS.

Preliminary results did not show any increase in PAS-induced plasticity. Differently, an explorative analysis seems to suggest a counteracting effect of active tVNS on PAS-induced plasticity. Given that previous studies showed an increase in cortical inhibition after active tVNS, these results would support the role of cortical inhibition as critical for regulating plasticity, providing some hints on the application of tVNS as a noninvasive and nonpharmacological way to regulate aberrant brain plasticity.

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**Session Classification:** Mini-talks: ACTION & MOTION (1)