43 Transcutaneous Vagus Nerve Stimulation Effects on Functional Connectivity of the Hippocampus in Mild Cognitive Impairment

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Objective: Transcutaneous vagus nerve stimulation (tVNS) is a promising potential intervention for Alzheimer's disease (AD) due to its influence on brain functions and mechanisms important in disease progression. Regions of interest include projection to the nucleus of the solitary tract, locus coeruleus, and hippocampus. Deterioration of the hippocampus is one of the most prominent early characteristics of AD, particularly during the mild cognitive impairment (MCI) stage. tVNS could modify function of the hippocampus. We examined resting state functional connectivity from the bilateral hippocampus in response to tVNS in patients with MCI.
Participants and Methods: Fifty older adults (28 women, 60-89 years of age) diagnosed with MCI were assessed. MCI was confirmed via diagnostic consensus conference with a neurologist and neuropsychologist (sources of information: Montreal Cognitive Assessment Test [MoCA], Clinical Dementia Rating scale [CDR], Functional Activities Questionnaire (FAQ), Hopkins Verbal Learning Test – Revised [HVLT-R] and medical record review). Resting state functional magnetic resonance imaging (fMRI) was collected on a 3T Siemens Prisma scanner while participants received either unilateral tVNS (left tragus, n = 25) or sham stimulation (left ear lobe, n = 25). fMRI data were processed using CONN toolbox v18b and hippocampal seed to voxel (whole brain) analyses were conducted with voxel and cluster level multiple comparison correction.
Results: Contrasting tVNS and sham stimulation, whole-brain seed-to-voxel analysis demonstrated significant changes in connectivity from the left hippocampus to several cortical and subcortical regions bilaterally. Specifically, there was increased connectivity to prefrontal regions and cingulate gyri, and decreased connectivity to anterior and medial temporal lobes. A seed-to-voxel analysis from the right hippocampus indicated significant decrease in connectivity to a single cluster of regions in the left anterior temporal lobe in response to tVNS.
Conclusions: In conclusion, tVNS modified connectivity from the hippocampus to multiple brain regions implicated in semantic and salience functions, in which disruption correlates with deterioration in AD. These findings indicate afferent target engagement of tVNS. Future work is needed to investigate the long-term effects of tVNS in patients with MCI and whether it could contribute to meaningful cognitive change and subsequent improvements in quality of life.

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44 Functional Connectivity In The Default Mode Network Of ASD and ADHD

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Objective: Autism Spectrum Disorders (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) are neurodevelopmental disorders with overlapping symptomatology and shared genetic makeup. Numerous previous studies have investigated ASD and ADHD using resting state functional networks. One functional network of particular interest is the Default Mode Network (DMN), as it has been shown to be abnormal in several mental disorders. Previous studies have investigated the DMN in ASD and ADHD separately but reported mixed trends of

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