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The impact of transcutaneous vagal nerve stimulation on central noradrenergic activity as evidenced by salivary alpha amylase and the P3 event-related potential

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Abstract

We applied transcutaneous vagus nerve stimulation (TVNS) in concert with electroencephalogram (EEG) recordings and saliva samples to test for an impact of TVNS on norepinephrine (NE) activity in the central nervous system. TVNS is a new, non-invasive intervention for epilepsy and depression with a yet-to-be established efficacy for increasing central NE. Both the electroencephalogram and saliva samples offer biomarkers of central NE activity. The P3 event-related potential may reflect phasic changes in cortical NE levels, and salivary alpha amylase (SAA) is sensitive to changes in central NE activity. We applied real and sham TVNS to a group of healthy subjects while they performed a standard set of oddball tasks known to elicit a P3, and analyzed EEG data and SAA to determine the efficacy of a standard TVNS protocol for manipulating central NE activity. TVNS did not affect P3 amplitude, but did increase SAA, casting doubt on the NE-P3 theory.