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Can Brain Stimulation Improve Sensory Detection? Evidence from Healthy Young Adults.

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The brain integrates signals from various systems, including the vestibular system, which detects head movement and spatial orientation, and the somatosensory system, which processes sensory information such as touch and pressure from the body, to maintain balance (Gaerlan, 2010). Although the contribution of these systems to balance control is well established, how they interact physiologically is not yet fully understood. This study aimed to explore the physiological links between these systems by determining whether noisy galvanic vestibular stimulation (nGVS) alters somatosensory perception. This repeated measure crossover study recruited 30 healthy adults who received either nGVS or sham nGVS (a placebo-type control condition) across two sessions at three different timepoints. Somatosensory perception was assessed using a process somatosensory detection task (SSDT) on foot at different stimulus intensities to evaluate true positive rate (TPR). Participants showed improved ability to detect touch during and after nGVS compared with before stimulation, while no similar improvement was observed during the sham condition. These findings suggest that stimulating the vestibular system can temporarily enhance the way the brain processes touch, providing evidence that the vestibular and somatosensory systems work closely together. This presentation will describe the study design, key findings, and their significance for understanding how the brain integrates sensory information. It will also discuss the potential of nGVS as a safe, non-invasive approach to improve sensory function and support future balance rehabilitation techniques.

Keywords
Non-invasive brain technique, cutaneous stimulation, Somatosensory signal detection theory (SSDT), cutaneous perceptual threshold, True positive rate (TPR)

References

Gaerlan, M. G. (2010). *The role of visual, vestibular, and somatosensory systems in postural balance* [thesis, University of Nevada Las Vegas]. Oasis. http://dx.doi.org/10.34917/1598677