



Motor Activated Auricular Vagus Nerve Stimulation (MAAVNS) Improves Motor Kinematics in Stroke

Patients With Upper Extremity Deficits

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Background: Around 800,000 Americans experience a stroke each year and over 85% of that number will experience motor function impairments resulting in poorer quality of life and reduced well-being. Improving motor function post-stroke is achieved through therapist guided motor rehabilitation training, however effects are moderate and take time to develop. We propose using transcutaneous auricular vagus nerve stimulation (taVNS) to enhance neuroplasticity and accelerate restoration of motor function in post-stroke rehabilitation. **Methods:** We enrolled 18 participants (n=10, 2 women) who have experienced a stroke and have upper limb functional impairments into a four-week clinical trial exploring the use of taVNS paired with rehabilitation to improve motor function. In a specific subanalysis (n=10, 2 women), we measured the motor kinematics improvement of the participants using motion capture technology before and after taVNS-paired rehabilitation. Using 36 active markers and 10 cameras, motion capture assessments were made on the affected arm. Participant's movement was captured during three tasks: forward reach, grasp, and overhead reach and we assessed the following metrics: hand velocity, normalized hand jerk, trunk compensation, shoulder elevation, elbow extension and wrist flexion. **Results:** The mean maximum hand velocity improved in all movements (overhead: 0.16 m/s, forward: 0.08 m/s, grasp: 0.09 m/s). Normalized hand jerk was also reduced in all movements (overhead: -2.7, forward: -0.85, grasp: -1.92). The only changes in trunk displacement were demonstrated in the grasp task (3.99 mm reduction) in maximum trunk displacement. We will provide additional kinematics metrics in the poster. **Conclusions:** TaVNS is a safe and effective therapy to pair with motor rehabilitation. Furthermore, our findings suggest that four weeks of taVNS-paired motor rehabilitation increases hand velocity, as well as reduces jerk and trunk displacement in upper extremity post stroke.